NOTICE OF AVAILABILITY

Draft Environmental Impact Report

Date: March 19, 2021

To: Responsible and Trustee Agencies, Interested Organizations, and Interested Parties

Lead Agency: Irvine Ranch Water District

Project: Syphon Reservoir Improvement Project Draft Environmental Impact Report (State Clearinghouse No. 2019080009)

Review Period: March 19, 2021 to May 18, 2021

This Notice of Availability (NOA) has been prepared to notify responsible and trustee agencies, interested organizations, and interested parties that Irvine Ranch Water District (IRWD), as the Lead Agency pursuant to the California Environmental Quality Act (CEQA), has prepared a Draft Environmental Impact Report (Draft EIR) for the proposed Syphon Reservoir Improvement Project (proposed project) that is available for review and comment. The Draft EIR was prepared to comply with CEQA and the CEQA Guidelines and to provide agencies and the public with information on the potential significant environmental impacts of the proposed project, recommended mitigation measures to reduce or avoid those environmental effects, and the analysis of alternatives to the proposed project. In addition, the Draft EIR was prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA).

Project Location: The proposed project would be implemented within IRWD's service area at the location of the existing Syphon Reservoir, northeast of Portola Parkway between Bee Canyon Access Road and SR-133 in the County of Orange (see **Figure 1**). The Crean Lutheran High School Athletic Complex is located between Portola Parkway and the toe of the existing dam. Residential neighborhoods are located on the southwest side of Portola Parkway. The reservoir is located within the Central and Coastal Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and is included as an operating reservoir allowed within the NCCP/HCP Reserve. Implementation of expanded seasonal storage for recycled water purposes was anticipated and identified as a permitted use in the NCCP/HCP.

Project Description: The proposed project would allow IRWD to increase the storage capacity of the existing recycled water Syphon Reservoir to help IRWD become more self-sufficient by reducing its dependence on costly and less reliable imported water during summer months, and support the increased use of recycled water for public landscaping, agricultural, business and industrial uses in IRWD's service area. Increased use of recycled water for these non-drinking water purposes would make more drinking water available to the region to better withstand future water shortages.

The proposed project would replace the existing engineered dam with a new engineered dam, increasing the existing 59-foot dam height to 136 feet and increasing the elevation of the dam crest from the existing 388 feet above mean sea level (amsl) to 466 feet amsl. A spillway would be included with the new dam to protect the reservoir from overtopping. The replacement dam would result in an increase in the reservoir's maximum water surface elevation from the existing 376 feet amsl to 456 feet amsl and increase the reservoir's capacity from approximately the existing 500 AF to 5,000 AF. As part of the new design, the engineered embankment dam would include a seepage control drainage system and a circulation/aeration system for the reservoir. The existing strainer and disinfection facilities would be demolished, reconstructed and expanded at the toe of the new engineered dam to provide filtration, chlorination and de-chlorination. Additional project features include new onsite access and maintenance roads; wetland and riparian mitigation areas; and a potential recreational facility (i.e. walking trail). Project features are shown on **Figure 2**.

Environmental Impacts: The Draft EIR evaluates the potential impacts of the proposed project and, for identified potentially significant impacts, the Draft EIR recommends mitigation measures that would reduce the impacts of the proposed project to a less than significant level for the following environmental topics: aesthetics, air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, recreation, transportation, tribal cultural resources, and wildfire. Per Section 65962.5 of the Government Code, there are no open active cases for hazardous materials sites within the project site.

Document Availability: The NOA and Draft EIR may be viewed and downloaded from the following IRWD website address: http://www.syphonreservoir.com. Printed copies of the Draft EIR may be available for public review at the following public library and the IRWD office as permitted if/when the restrictions due to facility closures and the need for social distancing required in response to COVID-19 are lifted by the appropriate governmental agencies: Heritage Park Library, 14361 Yale Ave, Irvine CA 92604; and IRWD, 15600 Sand Canyon Avenue, Irvine, California 92618.

Public Information Presentation: IRWD will hold one virtual public meeting via Zoom and telephonically to receive public comments on the environmental analysis in the Draft EIR. The virtual public meeting will include a brief presentation providing an overview of the proposed project and findings of the Draft EIR. The virtual meeting will be held at 6:00 P.M. on April 21, 2021. For information on how to access the virtual public meeting, please see below or visit http://www.syphonreservoir.com.

Virtual Public Meeting Details

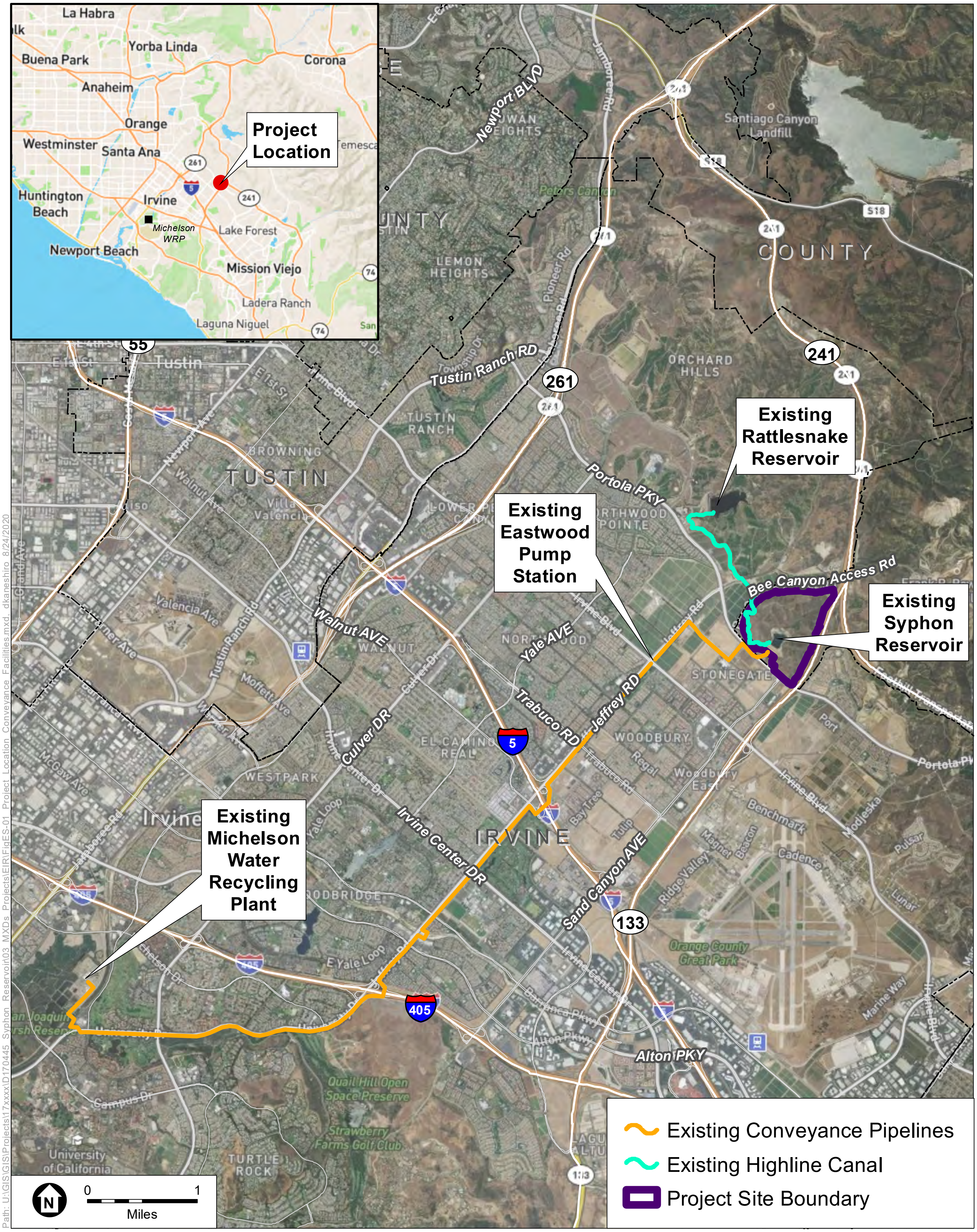
Date:	April 21, 2021
Time:	6:00 PM
Zoom Link:	http://bit.ly/syphoneirmeeting
Telephone Dial-in:	(877) 853 5247 (toll free)
Meeting ID:	898 6243 8353

If participating online, please register for the meeting prior to joining by providing your name and email address. For the best experience it is recommended that the public download and install Zoom on your computer before the meeting begins. The free Zoom software can be downloaded in advance, or at the moment you join the meeting at: https://zoom.us/download; however, it is not required to install the Zoom software on your computer to participate and provide comments. When you click on the meeting link provided at registration, a new browser tab or window will open (depending on your browser settings).

If participating by phone, you will not be able to see the visual content presented, but you can listen and participate. When instructed to do so, please press *6 to mute and unmute yourself, and press *9 to raise your hand.

Public Review and Comments: IRWD is soliciting comments from the public regarding the content of the environmental information provided in the Draft EIR. Written comments on the Draft EIR must be received by the IRWD, at the address provided below no later than 4:00 P.M. on May 18, 2021.

Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, California 92619-7000
Attn: Jo Ann Corey, Environmental Compliance Analyst
SyphonEIR@irwd.com

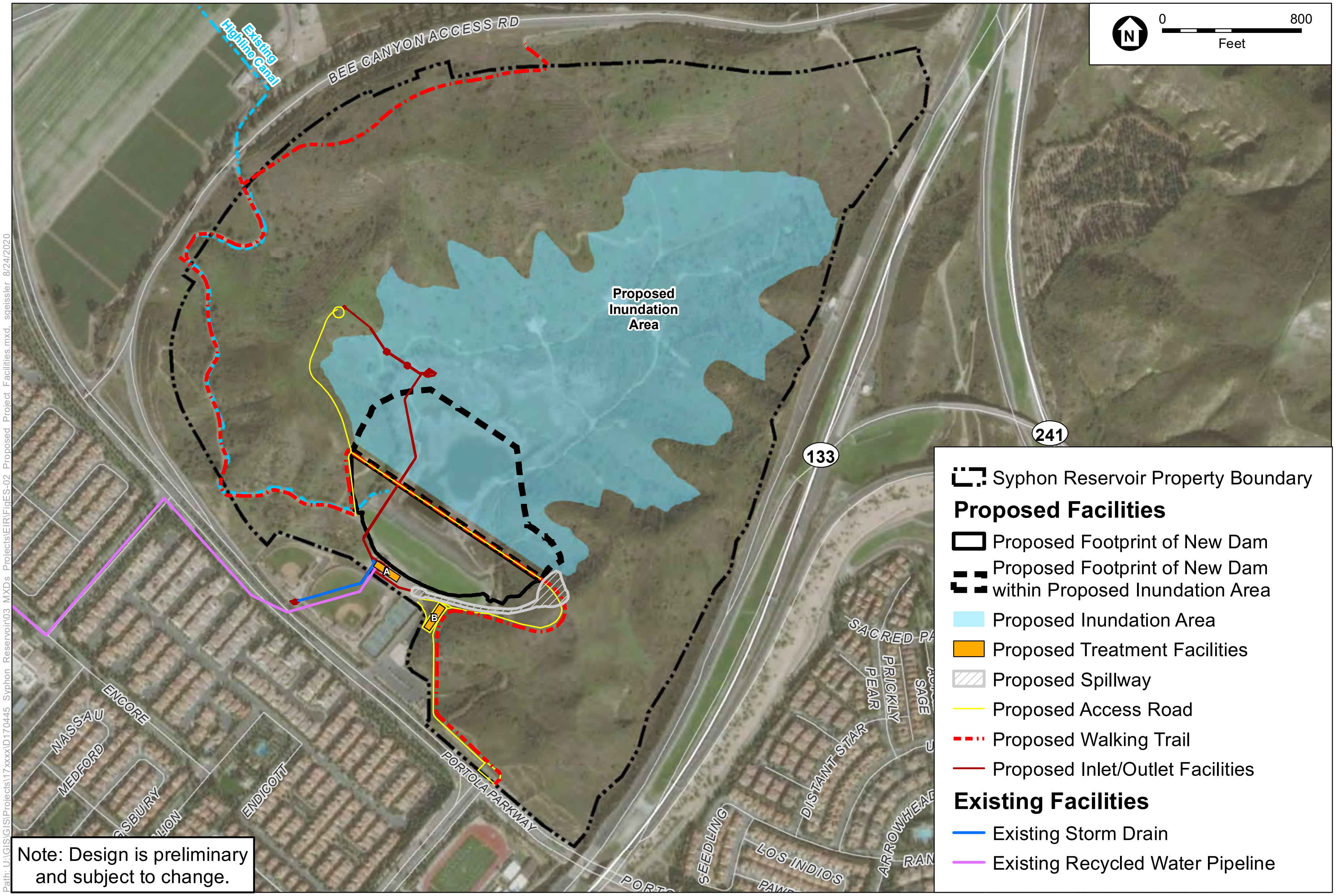


SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservoir Improvement Project

Figure 1
Existing Syphon Reservoir Location and Conveyance Facilities

ESA



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 2
Proposed Project Facilities

ESA

SYPHON RESERVOIR IMPROVEMENT PROJECT

Draft Environmental Impact Report

State Clearinghouse Number 2019080009

Prepared for
Irvine Ranch Water District

March 2021

ESA

SYPHON RESERVOIR IMPROVEMENT PROJECT

Draft Environmental Impact Report

State Clearinghouse Number 2019080009

Prepared for
Irvine Ranch Water District

March 2021

16755 Von Karman Avenue
Suite 200
Irvine, CA 92606
949.753.7001
esassoc.com

ESA

Bend
Camarillo
Delray Beach
Destin
Irvine
Los Angeles
Oakland
Orlando
Pasadena
Petaluma
Portland
Sacramento
San Diego
San Francisco
San José
Santa Monica
Sarasota
Seattle
Tampa

D170445.00

OUR COMMITMENT TO SUSTAINABILITY | ESA helps a variety of public and private sector clients plan and prepare for climate change and emerging regulations that limit GHG emissions. ESA is a registered assessor with the California Climate Action Registry, a Climate Leader, and founding reporter for the Climate Registry. ESA is also a corporate member of the U.S. Green Building Council and the Business Council on Climate Change (BC3). Internally, ESA has adopted a Sustainability Vision and Policy Statement and a plan to reduce waste and energy within our operations. This document was produced using recycled paper.

TABLE OF CONTENTS

Syphon Reservoir Improvement Project
Draft Environmental Impact Report

Page

Page

Page

Page

Appendices

List of Figures

Page

List of Tables

Page

This page intentionally left blank

ACRONYMS LIST

AADT	Annual Average Daily Traffic
AB	Assembly Bill
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing materials
ADOE	Archaeological Determination of Eligibility
ADT	average daily traffic
AELUP	Airport Environs Land Use Plans
AF	Acre-Feet
AFY	acre-feet per year
AHPA	Archaeological and Historic Preservation Act
ALUC	Airport Land Use Commission
APE	Area of Potential Effects
AWWA	American Water Works Association
BMP	best management practices
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CAL FIRE	California Department of Forestry and Fire Protection
CARB	California Air Resources Board
CBC	California Building Code
CBRA	Coastal Barriers Resources Act
CBRS	Coastal Barrier Resources System
CBSP	Commuter Bikeways Strategic Plan
CCC	California Coastal Commission
CCR	California Code of Regulations
CDC	California Department of Conservation
CDFW	California Department of Fish and Wildlife
CDHS	California Department of Health Services
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGC	California Government Code
CGS	California Geologic Survey
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CMP	Orange County Congestion Management Plan
CNEL	Community Noise Equivalent Level
CNG	compressed natural gas
CO_2	carbon dioxide
CPUC	California Public Utilities Commission

CRHR	California Register of Historical Resources
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dBA	A-weighted decibels
DSHA	deterministic seismic hazard analyses
DSOD	Division of Safety of Dams
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EAP	Emergency Action Plan
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EMZ	Evacuation Management Zones
ESA	Endangered Species Act
ESL	Environmental Screening Levels
Fed/OSHA	United States Department of Labor Occupational Safety and Health Administration
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHSZ	Fire Hazard Severity Zone
FIRM	Flood Insurance Rate Maps
FIWGEJ	Federal Interagency Working Group on Environmental Justice
FPPA	Farmland Protection Policy Act
FRAP	Fire Resource Assessment Program
FTA	Federal Transit Administration
GDP/RMP	General Development Plan/Resource Management Plan
GEI	GEI Consultants, Inc.
GHG	greenhouse gas emissions
GWh	gigawatt-hours
HCP	Habitat Conservation Plan
HMBP	Hazardous Materials Business Plan
hp	horsepower
HRI	California State Historic Resources Inventory
HSC	California Health and Safety Code
Hz	hertz
ICU	Intersection Capacity Utilization
IPD	Irvine Police Department
IRWD	Irvine Ranch Water District
IS	Initial Study
IUSD	Irvine Unified School District
kWh	kilowatt-hour
LACM	Natural History Museum of Los Angeles County
LBP	lead-based paint
LED	light-emitting diode
LUST	leaking underground storage tank

MBTA	Migratory Bird Treaty Act
MCAS	Marine Corps Air Station
ML	Richter magnitude
MLD	Most Likely Descendant
MMRP	Mitigation Monitoring and Reporting Program
MND	Mitigated Negative Declaration
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MW	megawatts
MWD	Metropolitan Water District of Southern California
MWDOC	Municipal Water District of Orange County
MWh	megawatt-hours
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHSTA	National Highway Traffic Safety Administration
NOAA	National Oceanic and Atmospheric Administration
NOD	Notice of Determination
NOP	Notice of Preparation
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
OCEHD	Orange County Environmental Health Division
OCFA	Orange County Fire Authority
OCGP	Orange County Great Park
OCHMP	Orange County Fire Hazard Mitigation Plan
OCLAFCO	Orange County Local Agency Formation Commission
OCSD	Orange County Sanitation District
OCTA	Orange County Transportation Authority
OEM	City of Irvine Office of Emergency Management
OES	California Governor’s Office of Emergency Services
OHP	Office of Historic Preservation
OPR	Office of Planning and Research
OSHA	California Division of Occupational Safety and Health
OSR	Open Space Reserve
PGA	peak ground acceleration
PM_{10}	particulate matter in 10 micrometers or less in diameter
$PM_{2.5}$	particulate matter in 2.5 micrometers or less in diameter
PMF	probable maximum flood
PPV	peak particle velocity
PRC	California Public Resources Code
PSHA	probabilistic seismic hazard assessment
RCRA	Resources Conservation and Recovery Act
RIDM	Risk-Informed Decision-Making
RPS	Renewables Portfolio Standards

RSL	Regional Screening Levels
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
RWQCB	Regional Water Quality Control Board
SA	spectral acceleration
SAFE	Safer Affordable Fuel-Efficient Vehicles Rule
SARA	Superfund Amendments and Reauthorization Act
SCADA	Supervisory Control and Data Acquisition
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCCIC	South Central Coastal Information Center
SCE	Southern California Edison
SDWA	Safe Drinking Water Act
SGMA	Sustainable Groundwater Management Act
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLF	Sacred Lands File
SLIC	spills, leaks, investigation and cleanup
SOC	Statement of Overriding Considerations
SR	State Route
SVP	Society of Vertebrate Paleontology
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
UCI	University of California, Irvine
USBR	United States Bureau of Reclamation
USC	United States Code of Laws
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
USPS	United States Postal Service
UST	underground storage tank
UWMP	Urban Water Management Plan
VHFHSZ	Very High Fire Hazard Severity
VMT	vehicle miles traveled
W	watts
WGCEP	Working Group on California Earthquake Probabilities
Wh	watt-hour
WQMP	Water Quality Management Plan
WRP	Water Recycling Plant
WUI	Wildland-Urban Interface

EXECUTIVE SUMMARY

ES.1 Introduction

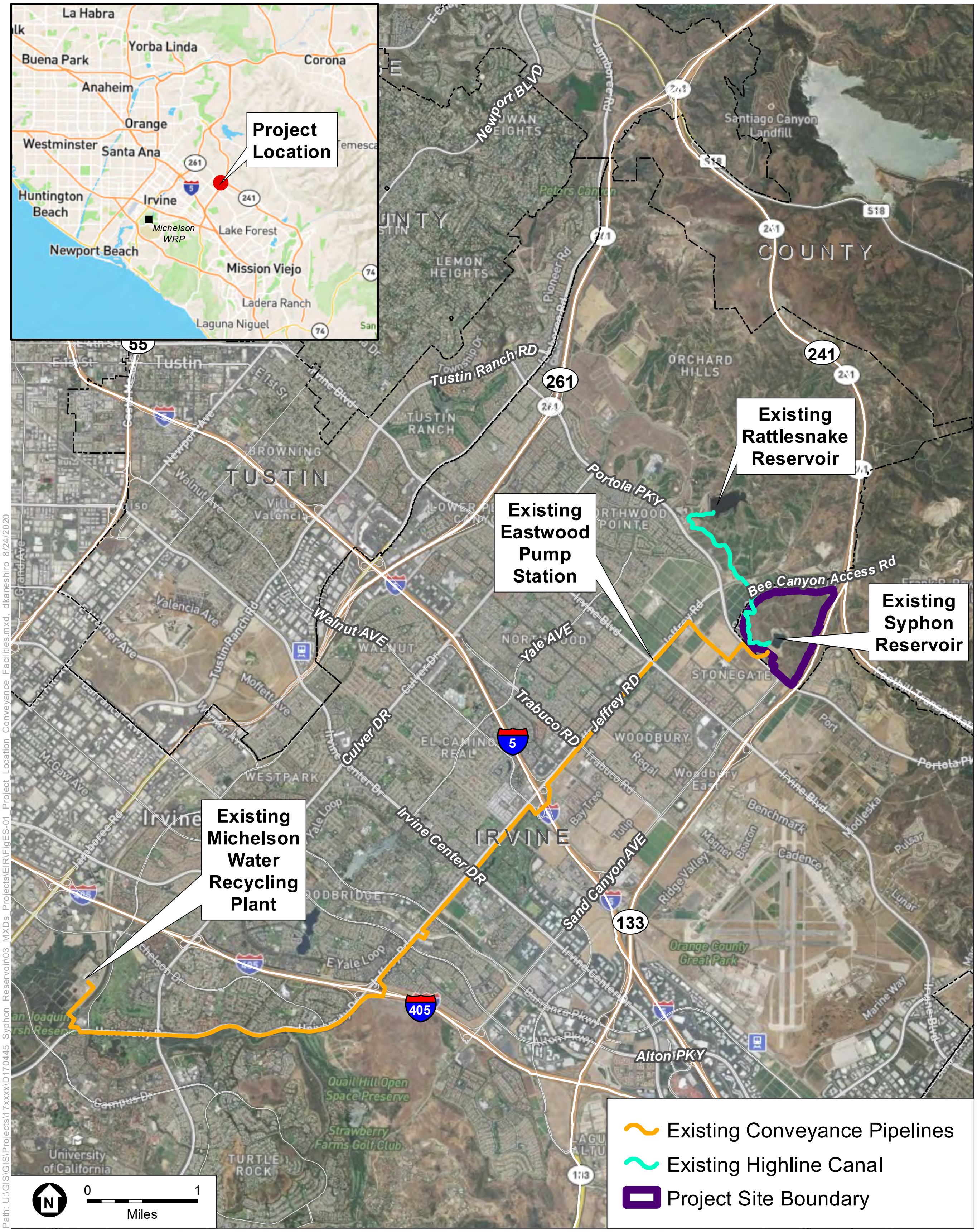
Irvine Ranch Water District (IRWD or District) is proposing to construct the Syphon Reservoir Improvement Project (proposed project). The Syphon Reservoir is an existing recycled water storage reservoir located within IRWD's service area, northeast of Portola Parkway between Bee Canyon Access Road and State Route 133 (SR-133) in the County of Orange. The proposed project would allow IRWD to increase the storage capacity of the existing Syphon Reservoir to help IRWD become more self-sufficient by reducing its dependence on costly and less reliable imported water during summer months, and support the increased use of recycled water for public landscaping, agricultural, business and industrial uses in IRWD's service area. Increased use of recycled water for these non-drinking water purposes would make more drinking water available to the region to better withstand future water shortages.

As the Lead Agency, IRWD has prepared this Draft Environmental Impact Report (Draft EIR) to provide information about the potential environmental effects associated with the proposed project. This Draft EIR has been prepared in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended), codified at California Public Resources Code (PRC) Sections 21000 et. seq., and the State CEQA Guidelines in the Code of Regulations, Title 14, Division 6, Chapter 3. A project-level analysis, which evaluates the construction and operation of the proposed project at a site-specific level, is included in this Draft EIR. The analysis is consistent with CEQA Guidelines Section 15161 and 15378(a). The proposed project site is shown in **Figure ES-01**. The State Clearinghouse Number is 2019080009.

In addition, this Draft EIR has been prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA).

ES.2 Project Background

IRWD is a local, not-for-profit, independent special district that provides reliable drinking water, sewage collection and treatment, recycled water and urban runoff treatment to the approximately 422,000 residents that are in its 181 square mile-district area in central Orange County, California. IRWD's service area includes the City of Irvine and portions of Costa Mesa, Lake Forest, Newport Beach, Orange, Tustin, and unincorporated areas of Orange County. IRWD provides service to approximately 20 percent of Orange County's total land area and has a diverse water supply that includes local groundwater, recycled water, imported water, and local surface water.



SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservoir Improvement Project

Figure ES-01
Existing Syphon Reservoir Location and Conveyance Facilities

ESA

Approximately 54 percent of IRWD's water supply comes from 26 local groundwater wells in the Orange County Groundwater Basin; approximately 18 percent of IRWD's water supply is imported from the Metropolitan Water District of Southern California (MWD); and roughly 26 percent of IRWD's water demands are met with recycled water.

Recycled water produced by IRWD is stored at Syphon Reservoir, as well as other recycled water storage reservoirs operated by IRWD, including San Joaquin, Rattlesnake, and Sand Canyon Reservoirs. IRWD is an experienced reservoir operator with a strong track record in reservoir and facilities' construction, maintenance, performance, and safety. All of IRWD's reservoirs are state-inspected and meet all requirements for safe use. Additionally, IRWD goes above and beyond the required safety standards by monitoring its dams daily, and inspecting them monthly. IRWD also retains dam safety experts to inspect its dams annually.

While IRWD's existing reservoirs provide storage for recycled water, once the storage reservoirs are full to capacity in winter months, recycled water supplies are either diverted to Orange County Sanitation District (OCSD) or discharged to the ocean. Under such conditions, IRWD is left short of recycled water to meet customer demands and must then purchase costly supplemental imported water from MWD to meet the summer demands of IRWD's recycled water customers. Based on projected demands and supplies, IRWD estimates that it will need approximately an additional 4,500 AF by the year 2030.

The existing Syphon Reservoir was constructed in 1949 and was acquired by IRWD in 2010 from the Irvine Company, which previously used the reservoir to store water for agricultural irrigation. As early as 2011, IRWD began studying the feasibility of expanding the Syphon Reservoir to accommodate additional recycled water storage capacity. In 2012, IRWD prepared the *Syphon Reservoir Expansion Engineering Feasibility Study* and the *Syphon Reservoir Expansion Engineering Feasibility Study, Constructability Analysis* (GEI 2012a; 2012b), which provided baseline geotechnical information for the project site and generalized construction techniques and procedures. The studies evaluated existing site characteristics, geologic conditions, facilities integration, and inundation from any potential dam failure. Additional investigative studies were evaluated in conjunction with the 2012 engineering studies. These studies include the *Syphon Reservoir Water Quality Study*, *Syphon Reservoir Seasonal Storage Requirements*, *Syphon Reservoir System Integration Study*, *Syphon Reservoir Pump Station & Treatment Feasibility Study* (GEI 2012a), and the *Syphon Reservoir Environmental Regulatory Evaluation* (Dudek 2012).

In 2013, IRWD converted the facilities at Syphon Reservoir for interim storage of recycled water produced at IRWD's Michelson Water Recycling Plant (WRP). All recycled water flowing into and out of the Syphon Reservoir for storage is controlled directly by IRWD. The interim facilities included housing for chlorination equipment, storage for sodium bisulfite and sodium hypochlorite, and metering pumps; mechanical strainers; a backwash water supply pump and lift station; reservoir aeration system; and a 48-inch storm drain pipe. IRWD anticipated that the interim facilities could be replaced in the future with larger facilities to handle a higher rate of flow.

In 2016, IRWD conducted a dry lakebed geotechnical exploration to obtain information on the extent and character of sediments that have accumulated in the Syphon Reservoir over time (GEI 2016). The geotechnical investigations provided information on the character of subsurface materials that had accumulated in the reservoir that could be excavated to provide suitable materials for construction and to increase the capacity of the reservoir (GEI 2016).

In 2018, IRWD began construction of the Eastwood Pump Station to increase operational flexibility in IRWD's recycled water delivery systems and maximize the use of recycled water. In addition, the Eastwood Pump Station would eventually pump recycled water to the proposed expansion of Syphon Reservoir.

In 2019 and 2020, IRWD conducted the Syphon Reservoir Geotechnical Investigations Project, which evaluated geologic and seismic conditions at the existing Syphon Dam and Reservoir. Results of the geotechnical investigations are used to inform the evaluation of project-related impacts in this Draft EIR and would be used for the design of the proposed project. The Syphon Reservoir Geotechnical Investigations Project included a fault study that confirmed the Central Valley Fault is a regional U-shape fault with two main splays that extend northeast to southwest under the existing Syphon Dam. The fault splays are concealed by the lake bottom sediments, alluvium, and slopewash/colluvium soils in the reservoir and in the drainage. The fault study concluded that the Central Valley Fault has not moved within Quaternary time (the last 1.6 million years) and has no potential for future movement. Faults that have no suggestion of Quaternary activity are considered inactive (AECOM 2020).

ES.3 Objectives

The primary objective of the proposed project is to allow for an increase in IRWD's seasonal recycled water storage capacity. In implementing the proposed project, IRWD would:

- Improve local water supply reliability by reducing the need to purchase costly imported water from MWD by storing additional recycled water during low demand periods for use when needed during high demand periods;
- Ensure the new engineered dam and reservoir meet or exceed the current safety and design requirements established by the California Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which is the governing state agency associated with this project;
- Reduce diversions of sewage to OCSD;
- Maximize the use of recycled water produced by IRWD for the benefit of IRWD customers; and
- Reduce recycled water discharges to the ocean.

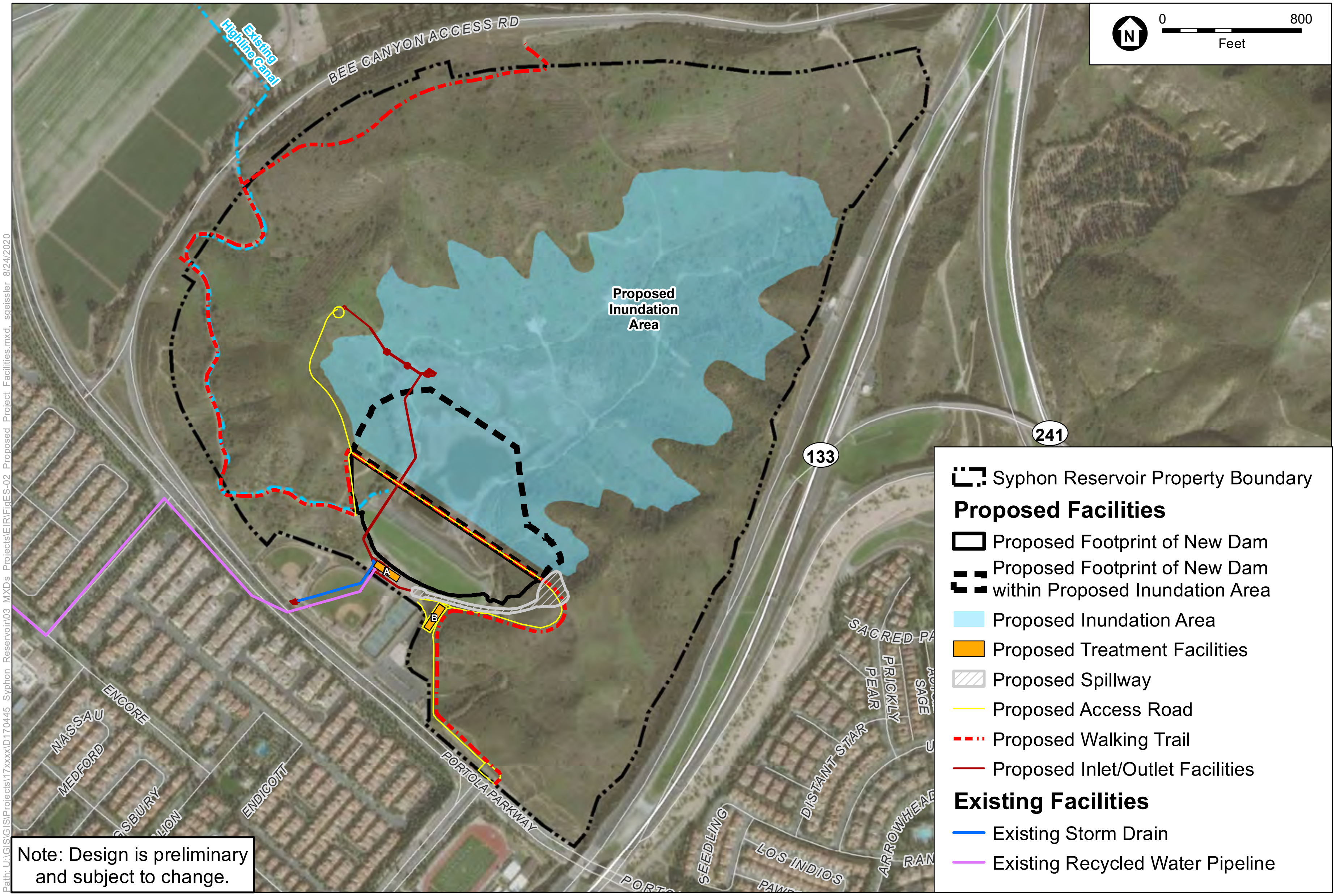
IRWD's current dam safety program falls under the jurisdiction of the DSOD. The intent of the Syphon Reservoir Improvement Project would be to not only meet the requirements of DSOD, but to exceed those requirements by considering the current state of practice of Risk-Informed Decision-Making (RIDM) during design and construction. The overarching goal of this approach would be to construct an expanded Syphon Reservoir that would comply not only with state requirements but would also leverage the significant benefits that a risk-informed dam safety approach can provide in protecting dam facilities and the public. Agencies, owners and regulators from around the world (including all US federal dam owners and regulators such as the Bureau of Reclamation, the US Army Corps of Engineers, and the Federal Energy Regulatory Commission) use RIDM and associated risk management strategies to assess and manage risks for dams, including making decisions about the safety of their facilities and necessary actions to reduce risk. The risk-informed design approach for the Syphon Reservoir Improvement Project will result in a dam design that avoids failures and associated consequences to downstream communities consistent with IRWD's priority of public safety.

ES.4 Project Description

The proposed project would replace the existing engineered dam with a new engineered dam, increasing the existing 59-foot dam height to 136 feet and increasing the elevation of the dam crest from the existing 388 feet above mean sea level (amsl) to 466 feet amsl. A spillway would be included with the new dam to protect the reservoir from overtopping. The existing dam includes a spillway that has never been used during its 62-year history, including during IRWD's ownership and operation of Syphon Reservoir (GEI 2012a). The new engineered dam would result in an increase in the reservoir's maximum water surface elevation from the existing 376 feet amsl to 456 feet amsl and increase the reservoir's approximate capacity from the existing 500 AF to 5,000 AF. As part of the new design, the engineered embankment dam would include a seepage control drainage system and a circulation/aeration system for the reservoir. The existing strainer and disinfection facilities would be demolished, reconstructed and expanded at the toe of the new dam to provide filtration, chlorination and de-chlorination. Additional project features include new onsite access and maintenance roads; wetland and riparian mitigation areas; and potential recreational facilities. Project features are shown on **Figure ES-02**.

Similar to existing operations, all recycled water flowing into and out of the Syphon Reservoir for storage would be controlled directly by IRWD. The delivery of recycled water to and from Syphon Reservoir would be accomplished by the addition of pumps within the offsite Eastwood Recycled Water Pump Station. The Eastwood pump station structure is currently under construction to enhance IRWD's recycled water delivery systems. The pump station can accommodate the Syphon Reservoir Improvement Project with the installation of additional pump equipment. Installation of the equipment would be coordinated as a separate "equipping project" in parallel to the construction of the proposed project. As shown in Figure ES-01, existing offsite conveyance facilities would be used to deliver tertiary-treated recycled water from the Michelson WRP to the Eastwood Recycled Water Pump Station, and then to Syphon Reservoir via an existing 36-inch recycled water pipeline. The existing Highline Canal would be abandoned in place and no longer used to deliver water from Rattlesnake Reservoir to Syphon Reservoir. Under normal operating conditions, all flow out of Syphon Reservoir would be conveyed back to the Eastwood Recycled Water Pump Station through the same 36-inch recycled water pipeline, for connection to IRWD's recycled water distribution system (see Figure ES-01).

During the design phase, IRWD intends to establish an independent Technical Advisory Group (TAG) comprised of nationally recognized industry experts, which may include the disciplines of dam geology/site characterization, seismic analysis, hydrology/hydraulics, dam construction, potential failure mode analysis and RIDM. The purpose of the TAG is to provide an independent assessment of the design development including, but not limited to, review of design criteria, design details, technical approach, and other aspects of the design engineer's work to confirm that the project design is in full compliance with or exceeds governing standards and requirements.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure ES-02
Proposed Project Facilities

ESA

ES.5 Project Alternatives

An EIR must describe a range of reasonable alternatives to the proposed or alternative project locations that could feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the significant environmental impacts of the proposed project. The alternatives analysis must include the "No Project Alternative" as a point of comparison. The No Project Alternative includes existing conditions and reasonably foreseeable future conditions that would exist if the proposed project were not approved (CEQA Guidelines Section15126.6). The following alternatives are discussed further in Chapter 6, Alternatives Analysis.

No Project Alternative

Under the No Project Alternative, IRWD would not demolish the existing Syphon Dam and Syphon Reservoir and would not build a new dam and reservoir with a capacity of approximately 5,000 AF and associated infrastructure. The existing 500 AF reservoir would continue to be operated by IRWD, with excess sewage continuing to be sent to OCSD for disposal. IRWD would continue to purchase costly imported water from MWD to meet recycled water customer demands. The benefits of the proposed project, which include maximizing the use of recycled water produced by IRWD for the benefit of IRWD customers, would not occur. The No Project Alternative would avoid all of the mitigated environmental impacts associated with the proposed project but would meet none of the project objectives.

Sand Canyon Reservoir Alternative

The Sand Canyon Reservoir Alternative would involve enlarging the existing reservoir at Sand Canyon. The Sand Canyon Reservoir currently has a 768 AF storage capacity (IRWD 2020a), and an early feasibility study indicated that raising the dam 28 feet above its existing elevation would increase the reservoir storage capacity to approximately 3,000 AF. Site constraints include quality and quantity of the onsite borrow and embankment materials and costs associated with property acquisitions (Woodward-Clyde 1992). Existing pipelines and pump stations would be sized appropriately for the expansion, and no additional pipelines or pump stations would be required (Woodward-Clyde 1992).

The Sand Canyon Reservoir Alternative would result in greater impacts, when compared to the proposed project, to air quality and noise during construction due to sensitive receptors located approximately 80 feet from construction activities. Temporary increases in noise levels and construction health risk impacts would be greater than the proposed project, resulting in potentially significant impacts. Additionally, the Sand Canyon Reservoir Alternative may eliminate portions of adjacent recreational facilities, requiring a relocation of recreational facilities which could have an adverse physical effect on the environment. As a result, the Sand Canyon Reservoir Alternative would result in greater environmental impacts when compared to the proposed project. The Sand Canyon Reservoir Alternative would not fully achieve all of the project objectives. Most notably, with the Sand Canyon Reservoir Alternative storage capacity capped at 3,000 AF, IRWD would need to purchase additional costly, imported supplies to offset approximately 2,000 AF of recycled water that could not be stored when compared to the proposed project

Upper Rattlesnake Reservoir Alternative

The Upper Rattlesnake Reservoir Alternative would involve expansion of storage capacity at the existing Rattlesnake Dam complex. Rattlesnake Reservoir currently has a capacity of up to 1,480 AF of recycled water storage (IRWD 2020b). This alternative would involve construction of a new dam and upper reservoir that would be 3,000 feet upstream of the existing Rattlesnake Dam and would provide approximately 6,000 AF of recycled water storage. Water would flow from the new Upper Rattlesnake Reservoir downstream to the existing Rattlesnake Reservoir (Woodward-Clyde 1996). In addition, the expanded reservoir would require 5,500 linear feet of new pipeline and a new 1,200 horsepower pump station.

The Upper Rattlesnake Reservoir Alternative would result in greater impacts, when compared to the proposed project, to air quality and noise during construction due to proximity of pipelines to adjacent sensitive receptors. Temporary increases in noise levels and construction health risk impacts would be greater than the proposed project, resulting in potentially significant impacts. Additionally, the Upper Rattlesnake Reservoir Alternative would involve installation of a new separate reservoir, not an expansion of an existing reservoir, which would result in greater impacts to aesthetic resources in surrounding Irvine communities. As a result, the Upper Rattlesnake Reservoir Alternative would result in greater environmental impacts when compared to the proposed project. The Upper Rattlesnake Reservoir Alternative would fully achieve all of the project objectives due to reservoir capacity, resulting in maximization of recycled water produced by IRWD and elimination of the need to purchase expensive imported water, among other objectives.

Reduced Project Alternative

The Reduced Project Alternative would result in expansion of Syphon Reservoir but not at the capacity proposed under the project. Instead of raising the existing 59-foot dam height to 136 feet as proposed for the project, the Reduced Project Alternative would raise the existing dam to 98 feet. The Reduced Project Alternative would provide approximately 2,500 AF of recycled water storage, or about half of the proposed project’s capacity. The Reduced Project Alternative would involve similar activities as the project, such as excavation of large amounts of onsite sediment, import of dam embankment material, construction of a spillway, treatment facility, access roads, and recreation trails.

The Reduced Project Alternative would generally result in similar environmental impacts to the proposed project. The extent of earth moving activities would be the same for the project and the Reduced Project Alternative, with the main difference being the height of the dam. Because the proposed project does not result in any significant and unavoidable impacts, the Reduced Project Alternative does not avoid or substantially lessen significant environmental effects. The Reduced Project Alternative would not fully achieve all of the project objectives.

Alternatives Rejected from Further Consideration

An EIR should identify any alternatives considered but rejected as infeasible by the lead agency during the scoping process and briefly explain the reasons for the exclusion (CEQA Guidelines Section 15126.6(c)). Alternatives may be eliminated from detailed consideration in the EIR if they fail to meet most of the project objectives, are infeasible, or do not avoid any significant environmental effects. Additional alternatives that were considered but rejected from further consideration by IRWD include expansion of existing reservoirs such as Peter's Canyon and San Joaquin reservoirs; construction of a new reservoir at Round Canyon; use of above ground storage tanks for recycled water storage; implementation of a new ocean outfall to dispose of recycled water; and expansion of the Orange County Water District Green Acres Project. These alternatives did not meet the project objectives, were found to result in significant environmental impacts, were not cost-effective, or were otherwise determined to be infeasible. The alternatives rejected from further consideration are discussed in this Draft EIR in Chapter 6.2.1, *Alternatives Considered but Rejected*.

In response to the Notice of Preparation (NOP) for this EIR, IRWD received comments regarding certain alternative project scenarios and associated life cycle costs. As a result of specific public comments received, IRWD engaged the services of HDR to evaluate alternative project scenarios and associated life cycle costs in meeting IRWD's goals for future recycled water storage and distribution management. HDR's evaluation is documented in a Technical Memorandum titled *Evaluation of Syphon Reservoir Expansion in Response to EIR Notice of Preparation Comments* referenced in this EIR as "(HDR 2020)." A copy of HDR's Technical Memorandum is available from IRWD's District Secretary.

Environmentally Superior Alternative

One of the primary purposes of the alternatives analysis is to identify project alternatives that may avoid or substantially lessen significant project impacts (CEQA Guidelines Section 15126.6). The proposed project would not result in any significant impacts as documented in the analyses provided in Chapters 3, 4, and 5 of this Draft EIR. CEQA requires that a Draft EIR shall assess the No Project Alternative. A comparison of the proposed project to the No Project Alternative presents a tradeoff between achieving project objectives and impacting the environment. The No Project Alternative would avoid all the environmental impacts of the proposed project but would not meet any of the project objectives. The No Project Alternative also would forego any environmental benefits to the IRWD service area, such as improving local water supply reliability.

CEQA requires that an EIR identify the environmentally superior alternative of a project other than the No Project Alternative (CEQA Guidelines Section 15126.6(e)(2)). The Sand Canyon Reservoir Alternative and the Upper Rattlesnake Reservoir Alternative would result in greater environmental impacts due to proximity to sensitive receptors, when compared to the proposed project. The Reduced Project Alternative would generally result in similar environmental impacts to the proposed project without fully achieving its objectives. Overall, none of the alternatives would avoid any impacts or mitigation measures associated with the proposed project. Only the

Upper Rattlesnake Reservoir Alternative would fully achieve all of the project objectives, but with much greater environmental impacts than the proposed project.

ES.6 Areas of Controversy

Pursuant to CEQA Guidelines Section 15123(b)(2), a lead agency is required to include areas of controversy raised by agencies and the public in the EIR summary. Areas of controversy have been identified for the proposed project, based on comments made during the 45-day public review period in response to information published in the NOP.

During the NOP public review period and during the August 21, 2019, community meeting held for the proposed project, concerns were raised regarding potential adverse impacts to environmental resources, as well as potential impacts to nearby residents in the communities of Stonegate Village, Stonegate East, Woodbury, and Woodbury East. Oral comments recorded during the public scoping meeting consisted of concerns about potential project impacts including the following: inundation and flooding, earthquake risks, increased traffic on Sand Canyon Avenue, and safety and operational impacts on the Crean Lutheran High School Athletic Complex and Stonegate Elementary School. In addition, IRWD received comments on the need to consider alternatives to the project, and public involvement with emergency evacuation planning.

Comment letters received from the public included concerns related to environmental resources impacts that have been addressed in Chapter 3 of this Draft EIR. The greatest area of known controversy from an environmental perspective is safety of downstream communities and schools due to potential flooding and inundation in the unlikely event of a dam failure. Those concerns are the reason why great efforts have been made by IRWD to analyze site conditions for dam safety, to design the proposed project to meet or exceed dam safety requirements to avoid failures and consequences to downstream communities, and to conduct public outreach workshops with the local community.

As discussed in this Draft EIR, Section 3.6.3, *Geology and Soils,* the design and operation requirements for dams are established and regulated by the California Department of Water Resources, Division of Safety of Dams (DSOD), which requires specific rigorous design standards, risk analysis, and site-specific geotechnical investigations to inform the design. The existing Syphon Reservoir meets the DSOD requirements for safe use, and for the proposed project, IRWD would exceed these current requirements by implementing state-of-the-art Risk-Informed Decision-Making (RIDM) processes that further improve dam safety and substantially reduce the risk of dam failure. The design of the proposed project would first be peer-reviewed through a rigorous process overseen by a TAG, an independent technical advisory group comprised of a panel of respected reservoir experts. Upon approval, the design would then be submitted to DSOD for their review and approval.

As discussed in this Draft EIR, Section 3.9.3, *Hydrology and Water Quality,* under Impact 3.9-4, the new proposed dam would be constructed to withstand a variety of site conditions to maintain capacity for the purpose of water storage with improved stability. The proposed design would include withstanding damage from earth displacements or a seiche caused by a seismic event, while maintaining stability of the dam structure to prevent breaching or overtopping. A monitoring system would be installed to continuously monitor the stability of the dam. New proposed dam instrumentation would also be implemented to identify situations that may require intervention, such as a controlled emergency release of water from the reservoir. In the event of an emergency, IRWD would draw down the reservoir through an existing 48-inch pipeline that discharges the recycled water to the existing storm drain, located in Portola Parkway.

As discussed in this Draft EIR, Section 3.9.3, *Hydrology and Water Quality,* under Impact 3.9-4, DSOD requirements include requiring IRWD to update and recirculate the Emergency Action Plan for Syphon Reservoir to account for the increased size of the new reservoir. This process would facilitate input from public safety agencies and local stakeholders, including approval from the City of Irvine, the City of Tustin Police Departments, Orange County Sheriff, and Orange County Fire Authority. The Emergency Action Plan would establish updated emergency notification processes and procedures and identify the responding agencies, to mitigate risks to downstream communities. The updated inundation map for areas downstream of the reservoir and dam, which is included as Figure 3.9-4 in Section 3.9.3, *Hydrology and Water Quality*, would be included in the Emergency Action Plan and would assist public safety agencies in planning for emergency response.

Concerns regarding biological resource protection were received during the comment period, including requests to offset project impacts with various mitigation measures, NCCP/HCP and sensitive biological resources protection, compliance with the existing Grant Deed at the project site, and wetland and riparian habitats. These topics are addressed in Section 3.3.12, *Biological Resources.* Concerns were also raised about the proposed project's location on a liquefaction and landslide overlap zone, and the project's close proximity to the Puente Hills Fault. These topics are addressed in Section 3.6.3, *Geology and Soils.*

Other comments not related to environmental issues include concerns about impacts to private property values and flood insurance rates in nearby communities, as well as concerns about the necessity for the proposed project in the proposed location, impacts to businesses, and water pricing. As explained in Section 3.9, *Hydrology and Water Quality*, the federal government does not require flood insurance for any properties due to Syphon Reservoir in its current or proposed form. As explained above and in Chapter 6, *Alternatives Analysis*, IRWD has considered alternative project locations. CEQA requires lead agencies to consider environmental effects associated with project approvals, but it does not require a financial impact analysis regarding either the cost of the project itself or potential impacts to property values for any parcels or communities adjacent to the project site. Rather, CEQA requires an analysis of consistency with land use classifications that are established by local jurisdictions, such as the City of Irvine, though General Plans and zoning ordinances. This Draft EIR includes an analysis of land use consistency at the project site in Section 3.02, *Effects Found Not to be Significant*.

IRWD understands the natural concern that local property owners have for property values adjacent to the project site. The proposed project would not develop any permanent built facilities that would conflict with or change the land use of the project site, which would continue to be used as a water storage facility similar to existing conditions. The proposed enlargement of the existing dam would not modify or change the intended use of the project site. Views would not be significantly affected from neighboring communities (see Draft EIR, Section 3.1 *Aesthetics*), and long-term operational noise and traffic would be similar to existing conditions once project construction is complete (see Draft EIR, Section 3.10 *Noise* and Section 3.12 *Transportation*).

ES.7 Summary of Impacts

Table ES-1, at the end of this chapter, presents a summary of the impacts and mitigation measures identified for the proposed project. The complete impact statements and mitigation measures are presented in Chapter 3 of this Draft EIR. The level of significance for each impact was determined using significance criteria (thresholds) developed for each category of impacts; these criteria are presented in the appropriate sections of Chapter 3. Significant impacts are those adverse environmental impacts that meet or exceed the significance thresholds; less than significant impacts would not exceed the thresholds. **Table ES-1** indicates the measures that will be implemented to avoid, minimize, or otherwise reduce significant impacts to a less than significant level.

The CEQA Guidelines require that an EIR discuss the significant environmental effects of the proposed project (Section 15126.2(a)), which is summarized in **Table ES-1** and provided in Chapters 3 and 4 of the Draft EIR. The CEQA Guidelines also require that an EIR discuss the significant environmental effects which cannot be avoided (Section 15126.2(c)); significant irreversible environmental changes which would be caused by the proposed project should it be implemented (Section 15126.2(d)); and growth-inducing impacts of the proposed project (Section 15126.2(e)). These are discussed below.

Significant Unavoidable Environmental Effects

As required by CEQA Guidelines Section 15126.2(c), an EIR must describe any significant impacts that cannot be avoided, including those impacts that can be mitigated but not reduced to a less than significant level. Where there are impacts that cannot be alleviated without imposing an alternative design, their implications and the reasons the project is being proposed, notwithstanding their effect, should be described. The proposed project would not result in any significant impacts as documented in the analyses provided in Chapters 3, 4, and 5 of this Draft EIR.

Significant Irreversible Environmental Changes

Section 15126.2(d) of the CEQA Guidelines require that an EIR analyze the extent to which a project's primary and secondary effects would affect the environment and commit nonrenewable resources to uses that future generations would not be able to reverse. "Significant irreversible environmental changes" include the use of nonrenewable natural resources during the initial and continued phases of the project, should this use result in the unavailability of these resources in the future. Also, irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of these resources are required to be evaluated in an EIR to ensure that such consumption is justified.

Construction and operation activities for the proposed project would require the commitment of renewable and non-renewable sources. Proposed project implementation would necessitate the consumption of resources including, but not limited to: building materials (such as concrete), fuel and operational materials/resources, energy resources, and transportation of persons and goods to and from the proposed project site. Construction activities would specifically require the use of concrete and asphalt, and would require the consumption of fossil fuels, including gasoline and oil, in order to provide power to construction vehicles and equipment. The recycled water currently diverted to OCSD for disposal would be stored and reused under the proposed project. Therefore, the proposed project would result in a benefit to the reuse of water versus discharging treated wastewater to the ocean.   The use of nonrenewable resources for the implementation of the proposed project is justified and would not result in the unavailability of such resources.

Growth-Inducing Impacts

Section 15126.2(e) of the CEQA Guidelines require that an EIR discuss the potential growth-inducing impacts of a proposed project. A project can have direct and/or indirect growth-inducement potential. Direct growth inducement would result if a project involves construction of new housing. A project can have indirect growth-inducement potential if it establishes substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises) or if it involves a construction effort with substantial short-term employment opportunities that indirectly stimulates the need for additional housing and services to support the new employment demand. Similarly, under CEQA, a project would indirectly induce growth if it removes an obstacle to additional growth and development, such as removing a constraint on a required public service.

As explained in this Draft EIR, Chapter 5, *Growth Inducement*, implementation of the proposed project would not have a direct growth inducement effect, as it does not propose development of new housing that would attract additional population to the area. Further, implementation of the proposed project would not result in substantial permanent employment that could indirectly induce population growth. Although construction activities would create some short-term construction employment opportunities over the approximately 36-month duration of construction, the amount of opportunities created would not require persons outside of the Orange County work force. Further, no new permanent employees would be required to operate the proposed dam and reservoir.

The proposed project would expand recycled water infrastructure to store and use recycled water that is already produced by IRWD. The proposed project would support planned population growth within IRWD's service area by providing recycled water to meet the current and planned demand for irrigation of public landscaping such as street medians, parks and golf courses, agricultural irrigation, office building uses such as toilet flushing and cooling towers. The proposed project would not create a new recycled water supply that would induce future growth. Rather, the proposed project would accommodate the population growth already planned by local and regional jurisdictions, such that water infrastructure reliability would not be an impediment to already-planned growth. As a result, the proposed project neither supports nor encourages growth within the IRWD service area to a greater degree than presently estimated by the City of Irvine, County of Orange, and Southern California Association of Governments, as the land use agencies with jurisdiction over the proposed project area. The proposed project would not remove any obstacles to growth and would not indirectly have a significant impact on growth inducement. As a result, impacts to growth inducement would be less than significant.

ES.8 Organization of the Draft EIR

This Draft EIR has been organized into the following chapters:

ES. Executive Summary. This chapter summarizes the contents of the Draft EIR.

Chapter 1, Introduction and Project Background. This chapter discusses the CEQA process, explains the purpose of the Draft EIR, and summarizes the background studies and processes that influenced the development of the proposed project.

Chapter 2, Project Description. This chapter provides an overview of the proposed project, describes the need for and objectives of the proposed project, explains planning for construction, operation, and management of the proposed project, and presents a preliminary list of the agencies and entities, in addition to IRWD, that would use this EIR in their consideration of specific permits and other discretionary approvals for the proposed project.

Chapter 3, Environmental Setting, Impacts, and Mitigation Measures. This chapter describes the environmental setting and identifies the direct, indirect, and cumulative impacts of the proposed project for each of the following environmental topics: Aesthetics; Air Quality; Biological Resources; Cultural Resources; Geology and Soils; Greenhouse Gas Emissions; Energy; Hazards and Hazardous Materials; Hydrology and Water Quality; Noise; Recreation; Transportation; Tribal Cultural Resources; and Wildfire. For the assessment of cumulative impacts, this chapter includes a list of past, current, and probable future projects to be considered together with the proposed project. Measures to mitigate the impacts of the proposed project are presented for each environmental topic where potential significant impacts have been identified. Potential hazards from flooding associated with the construction and operation of the proposed project, including dam safety issues, are discussed in Section 3.9, *Hydrology and Water Quality*.

Chapter 4, CEQA-Plus Considerations: This chapter summarizes the proposed project's compliance with CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with NEPA.

Chapter 5, Growth Inducement. This chapter analyzes whether the proposed project would induce growth.

Chapter 6, Alternatives Analysis. According to CEQA, an EIR must describe a reasonable range of alternatives to a proposed project that would feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the proposed project's significant environmental effects This chapter presents an overview of the alternatives development process, describes the alternatives to the proposed project that were considered, and describes potential impacts of feasible alternatives relative to those of the proposed project.

Chapter 7, Report Preparers. This chapter identifies the parties involved in preparing this Draft EIR, including persons and organizations consulted.

Appendices: The appendices include materials related to the NOP and scoping process (**Appendix A**), as well as technical studies that support the impact analyses, such as an Air Quality and Greenhouse Gas Emissions Technical Report (**Appendix B**), Biological Resources Technical Report (**Appendix C**), Noise and Vibration Technical Report (**Appendix D**), Traffic Study (**Appendix E**), and the Tribal Cultural Resources Consultation (**Appendix F**).

ES.9 References

AECOM. 2020. *Local Fault Considerations for Proposed Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA*, May 7.

Dudek. 2012. *Syphon Reservoir Environmental Regulatory Evaluation. Prepared for Irvine Ranch Water District*, October 2012.

GEI. 2012a. *Syphon Reservoir Expansion Engineering Feasibility Study, Engineering Summary Report*, August 2012.

GEI. 2012b. *Syphon Reservoir Expansion Engineering Feasibility Study, Constructability Analysis*, August 12, 2012.

GEI. 2016. *Syphon Reservoir Dry Lakebed Geotechnical Exploration*.

HDR. 2020. Technical Memorandum: Evaluation of Syphon Reservoir Expansion in Response to EIR Notice of Preparation Comments. December, 2020.

IRWD. 2020a. Recycled Water Reservoirs. Accessed: https://www.irwd.com/construction/recycled-water-reservoirs, on August 13, 2020.

IRWD. 2020b. 50 Years of Recycled Water. Accessed: https://www.irwd.com/about-us/50-years-recycled-water, on August 13, 2020.

Woodward-Clyde. 1992. Feasibility Study for Sand Canyon Reservoir Expansion – Phase I. Prepared for Irvine Ranch Water District, September 1992, 924E168A.

Woodward Clyde. 1996. Alternative Reservoir Development Concepts. Prepared for Irvine Ranch Water District, May 1996, 924E384A.

TABLE ES-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Potential Impact	Mitigation Measure	Significant Determination
Aesthetics		
Impact 3.1-1: The proposed project could have a substantial adverse effect on a scenic vista or other scenic viewscapes.	**Mitigation Measure AES-1:** Aboveground buildings/structures/retaining walls shall be designed to have earth-tone color palettes that blend in with the surrounding landscape and vegetation.	Less than Significant Impact with Mitigation.
Impact 3.1-2: The proposed project would not substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.	None required	No Impact
Impact 3.1-3: The proposed project could substantially degrade the existing visual character or quality of the site and its surroundings (Public views are those that are experienced from publicly accessible vantage point).	**Implement Mitigation Measure AES-1**	Less than Significant Impact with Mitigation
Impact 3.1-4: The proposed project could create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.	**Mitigation Measure AES-2:** All new permanent exterior lighting associated with the proposed project shall be shielded and directed downward to avoid light spill onto neighboring parcels and visibility from surrounding public vantage points.	Less than Significant Impact with Mitigation
Impact 3.1-5: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative short-term and long-term impacts to aesthetics.	Implement **Mitigation Measures AES-1** and **AES-2**	Less than Significant Impact with Mitigation
Air Quality		
Impact 3.2-1: The proposed project could conflict with or obstruct implementation of the applicable air quality plan.	**Mitigation Measure AIR-1:** IRWD shall require the construction contractor to implement construction equipment features for equipment operating at the project site during certain construction phases. Construction features will include the following: The proposed project shall utilize off-road diesel-powered construction equipment that meet or exceed CARB and USEPA Tier 4 off-road emissions standards for	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
	standard construction equipment rated at 50 horsepower (hp) or greater during project construction. Such equipment will be outfitted with BACT devices including a CARB certified Level 3 Diesel Particulate Filter or equivalent. At a minimum, this measure shall apply during implementation of the following construction sub-phases: upstream excavation and foundation treatment, dam excavation and foundation treatment, installation of embankment to the bottom of the blanket drain, and installation of the chimney/remaining embankment.	
Impact 3.2-2: The proposed project could result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard.	Implement **Mitigation Measure AIR-1**	Less than Significant Impact with Mitigation
Impact 3.2-3: The proposed project could expose sensitive receptors to substantial pollutant concentrations.	Implement **Mitigation Measure AIR-1**	Less than Significant Impact with Mitigation
Impact 3.2-4: The proposed project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	None required	Less than Significant Impact
Impact 3.2-5: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative short-term and long-term impacts to air quality.	Implement **Mitigation Measure AIR-1**	Less than Significant Impact with Mitigation
Biological Resources		
Impact 3.3-1: The proposed project could have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or U.S. Fish and Wildlife Service (USFWS).	**BIO-1:** IRWD has been engaged in close coordination with the Wildlife Agencies (i.e., USFWS and CDFW) since 2018 to develop a multi-faceted mitigation strategy to address impacts to California gnatcatcher, as well as to address the additional mitigation the agencies mandate to compensate for displacement of habitat and land previously set aside for mitigation and subject to the restrictions and requirements imposed under the Mitigation Grant Deed, of which USFWS is a	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
	third party beneficiary. To date, IRWD has researched numerous off-site lands with high value habitat and biological resources, and initiated negotiations with landowners for possible acquisition. IRWD shall implement one, or a combination, of the following measures to mitigate permanent impacts to special-status wildlife species: a. Use of Incidental Take Credits for participating landowners (within the Reserve, or outside of the Reserve) to offset permanent impacts to coastal sage scrub (e.g., California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/non-native herbaceous cover, and non-native herbaceous cover/California sagebrush scrub) at a 1:1 impact-to-mitigation ratio. b. On- and/or off-site creation, restoration, and/or enhancement containing natural communities suitable for special-status species or comparable, as determined acceptable by the USFWS and CDFW. c. Off-site land acquisition, preservation, creation, restoration, and/or enhancement containing natural communities suitable for special-status species or comparable, as determined acceptable by the USFWS and CDFW. d. Areas where temporary impacts occur would be returned to pre-project conditions (i.e., pre-project elevation contours and revegetated with native upland scrub species) within one-year after construction is completed, and will be monitored for three years, or until a qualified biologist determines that the project site has returned to pre-project conditions. A revegetation plan would be prepared to re-seed/re-plant the area with local species, and would include performance standards, success criteria, maintenance, and future monitoring.	

Potential Impact	Mitigation Measure	Significant Determination
	BIO-2: In accordance with the NCCP/HCP, certain construction-related mitigation measures are required to minimize impacts to the coastal California gnatcatcher and other coastal sage scrub species. The removal of coastal sage scrub communities will be conducted in compliance with the NCCP/HCP's Construction Related Minimization Measures: a. To the maximum extent practicable, no grading of coastal sage scrub habitat that is occupied by nesting gnatcatchers will occur during the breeding season (February 15 through July 15). b. Prior to the commencement of grading operations or other activities involving significant soil disturbance, all areas of coastal sage scrub habitat to be avoided under the provisions of the NCCP/HCP shall be identified with temporary fencing or other markers clearly visible to construction personnel. Additionally, prior to the commencement of grading operations or other activities involving disturbance of coastal sage scrub, a survey will be conducted to locate gnatcatchers and cactus wrens within 100 feet of the outer extent of projected soil disturbance activities and the locations of any such species shall be clearly marked and identified on the construction/grading plans. c. A monitoring biologist, acceptable to USFWS/CDFW, will be on-site during any clearing of coastal sage scrub. IRWD will advise USFWS/CDFW at least seven calendar days (and preferably fourteen calendar days) prior to the clearing of any habitat occupied by Identified Species1 to allow USFWS/CDFW to work with the monitoring biologist in connection with bird flushing/capture activities. The monitoring biologist will flush Identified Species (avian or	

1 NCCP/HCP Identified Species that occur, or have potential to occur, on-site include the following: coastal California gnatcatcher, coastal cactus wren, orange-throated whiptail, coastal western whiptail, red-diamond rattlesnake, coast horned lizard, northern harrier, sharp-shinned hawk, prairie falcon, American peregrine falcon, red-shouldered hawk, southern California rufous-crowned sparrow, San Diego desert woodrat, gray fox, and coyote.

Potential Impact	Mitigation Measure	Significant Determination
	other mobile Identified Species) from occupied habitat areas immediately prior to brush-clearing and earth-moving activities. If birds cannot be flushed, they will be captured in mist nets, if feasible, and relocated to areas of the site to be protected or to the NCCP/HCP Reserve System. It will be the responsibility of the monitoring biologist to assure that Identified bird species will not be directly impacted by brush-clearing and earth-moving equipment in a manner that also allows for construction activities on a timely basis. d. Following the completion of initial grading/earth moving activities, all areas of coastal sage scrub habitat to be avoided by construction equipment and personnel will be marked with temporary fencing and other appropriate markers clearly visible to construction personnel. No construction access, parking, or storage of equipment or materials will be permitted within such marked areas. e. In areas bordering the NCCP Reserve System or Special Linkage/Special Management areas containing significant coastal sage scrub identified in the NCCP/HCP for protection, vehicle/equipment transportation routes and staging areas will be restricted to a minimum number during construction consistent with project construction requirements. Waste dirt or rubble will not be deposited on adjacent coastal sage scrub identified in the NCCP/HCP for protection. Pre-construction meetings involving the monitoring biologist, construction supervisors, and equipment operators will be conducted and documented to ensure maximum practicable adherence to these measures. f. Coastal sage scrub identified in the NCCP/HCP for protection and located within the likely dust drift radius of construction areas shall be periodically sprayed with water to reduce	

Potential Impact	Mitigation Measure	Significant Determination
	accumulated dust on the leaves as recommended by the monitoring biologist. **BIO-3:** Impacts to nesting birds would be avoided by conducting all clearing and grubbing outside of the bird nesting season (i.e., work should occur September 1 to February 14, or July 1 to January 14 for raptors). If clearing and grubbing cannot avoid the bird nesting season, the following measures would be implemented: a. Prior to work during the bird nesting season (February 15 to August 31, or January 15 to June 31 for raptors), a qualified biologist should conduct a pre-construction survey of all suitable habitat for the presence of nesting birds no more than 7 days prior to construction and/or maintenance activities. The results of the pre-construction survey would be valid for 7 days; if vegetation removal activities do not commence within 7 days following the survey, a new pre-construction nesting bird survey should be conducted before these activities begin again. If no active nests are found, then no further mitigation is required. b. If any active nests are found during a pre-construction nesting bird survey, a buffer of 300 feet (500 feet for raptors), or as determined appropriate by the qualified biologist (based on species-specific tolerances and site-specific conditions) in consultation with IRWD, would be delineated, flagged, and avoided until the nesting cycle is complete (i.e., the qualified biologist determines that the young have fledged or the nest has failed). The qualified biologist may also recommend other measures to minimize disturbances to the nest, which may include, but are not limited to, erection of sound barriers (e.g., noise blankets), erection of visual barriers (e.g., hay bales), or full-time monitoring by a qualified biologist.	

Potential Impact	Mitigation Measure	Significant Determination
	BIO-4: With the creation of on-site riparian and wetland habitat areas, as part of the proposed project, there will be no net loss of woody riparian habitat for least Bell's vireo and no net loss of any wetland habitat. Nevertheless, there will be a temporary loss of these habitats until construction is completed and riparian habitat can be reestablished that the species can use again. IRWD is engaged with the Wildlife Agencies and is collaboratively developing a comprehensive program to address temporal impacts to least Bell's vireo and other riparian-associated special-status wildlife species (e.g., yellow warbler, yellow-breasted chat). IRWD shall implement the following measure to compensate for temporal impacts to least Bell's vireo and associated riparian special-status wildlife species (e.g., yellow warbler, yellow-breasted chat): a. Off-site land acquisition and preservation, and/or creation, restoration, and/or enhancement, of areas containing habitat suitable for least Bell's vireo and associated riparian special-status wildlife species (e.g., yellow warbler, yellow-breasted chat) to compensate for temporal loss in an amount or at a ratio determined acceptable by the USFWS and CDFW. Any private lands acquired and/or restored for this mitigation would be permanently preserved and dedicated for habitat conservation. **BIO-5:** IRWD shall implement the following measure to mitigate indirect impacts to special-status wildlife species: a. Educational signage shall be posted at the entrances of the proposed walking trail to inform the public about the sensitive biological resources in the area and local wildlife in the area (e.g., rattlesnakes, coyotes). Signage would also be posted periodically along the proposed trail to remind public to keep on the trail and out of sensitive habitat areas.	

Potential Impact	Mitigation Measure	Significant Determination
	b. The proposed trail shall only be open during daylight hours (e.g., dawn to dusk). c. A Resource Management Plan (RMP) shall be prepared to outline long-term maintenance and management responsibilities for the preservation of the biological resources on-site (e.g., invasive species management, monitoring access issues, off-trail use, erosion, trash). The RMP should also provide guidance to ensure that all operations and maintenance activities performed on-site must also comply with all applicable requirements of the NCCP/HCP and the preservation of the biological resources on-site. The RMP would also outline monitoring requirements for species populations for federal and state-listed species (i.e., least Bell's vireo and California gnatcatcher).	
Impact 3.3-2: The proposed project could have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or USFWS.	**BIO-6:** IRWD shall implement one, or a combination, of the following measures to mitigate impacts to sensitive natural communities: a. Use of Incidental Take Credits for NCCP/HCP participating landowners (within the Reserve, or outside of the Reserve) to offset permanent impacts to coastal sage scrub (e.g., California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/non-native herbaceous cover, and non-native herbaceous cover/California sagebrush scrub) at a 1:1 impact-to-mitigation ratio. b. On- and/or off-site land acquisition and preservation, and/or creation, restoration, and/or enhancement of sensitive natural communities comparable or equivalent to a 1:1 impact-to-mitigation ratio, or as determined acceptable by the USFWS and CDFW. c. Areas where temporary impacts occur to sensitive natural communities (e.g., California	Less than Significant Impact with Mitigation.

Potential Impact	Mitigation Measure	Significant Determination
	sagebrush scrub) would be returned to pre-project conditions (i.e., pre-project elevation contours and revegetation initiated) within one-year after the construction is completed, and will be monitored for three years, or until a qualified biologist determines that affected natural communities have been restored to equivalent or better condition as compared to pre-project conditions. A revegetation plan would be prepared to re-seed/re-plant the area with locally indigenous native species, and would include performance standards, success criteria, maintenance, and future monitoring. **BIO-7:** IRWD shall negotiate and execute a Lake or Streambed Alteration Agreement under Section 1602 of the California Fish and Game Code with CDFW.	
Impact 3.3-3: The proposed project would not have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.	None required	Less than Significant Impact
Impact 3.3--4: The proposed project could interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	Implement **Mitigation Measure BIO-3**	Less than Significant Impact with Mitigation
Impact 3.3-5: The proposed project could conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	Implement **Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5,** and **BIO-6**	Less than Significant Impact with Mitigation
Impact 3.3-6: The proposed project could conflict with provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan.	Implement **Mitigation Measures BIO-1, BIO-2,** and **BIO-3**	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
Impact 3.3-7: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to biological resources.	Implement **Mitigation Measures BIO-1** through **BIO-7**	Less than Significant Impact with Mitigation
Cultural Resources		
Impact 3.4-1: The proposed project could cause a substantial adverse change in the significance of a historical resource pursuant to CEQA Guidelines Section 15064.5.	**CR-1:** Avoidance of Unevaluated Resources. Two resources (CA-ORA-1237 and the Latrine Site) are considered historical resources for purposes of this project. Both resources occur within close proximity to proposed project activities. Prior to work in the vicinity of the resources (i.e., within 100 feet), Environmentally Sensitive Areas consisting of protective fencing or flagging shall be established around the boundary of each resource, including a 50-foot buffer. The establishment of the Environmentally Sensitive Areas and installation of required fencing or flagging shall be carried out under the supervision of a Qualified Archaeologist, defined as an archaeologist meeting the Secretary of the Interior's standards for archaeology (USDI 2008), or an archaeologist working under the direction of the Qualified Archaeologist. Environmentally Sensitive Areas should be clearly marked in the field and on design plans with exclusion markers to ensure avoidance during project-related ground disturbance. The protective fencing or flagging should not identify the Environmentally Sensitive Areas as cultural resource areas to discourage unauthorized disturbance or collection of artifacts. Ground disturbing activities in the vicinity of the Environmentally Sensitive Areas should be monitored, as described in Mitigation Measure CR-3. **CR-2:** Worker Sensitivity Training. Prior to the start of construction activities, all construction personnel should be trained to identify the types of cultural resources that may be encountered during project implementation. These include both prehistoric and historic period archaeological resources. In addition to cultural resources recognition, the training should convey procedures to follow in the event of a potential	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
	cultural resources discovery, including notification procedures. The training should be provided by the Qualified Archaeologist or an archaeologist working under their supervision. **CR-3:** Construction Monitoring. An archaeological monitor (working under the direct supervision of the Qualified Archaeologist) shall observe all ground-disturbing activities, including but not limited to brush clearance, vegetation removal, grubbing, grading, and excavation, in undisturbed areas of the project site. In addition, the Qualified Archaeologist, in coordination with IRWD, may reduce or discontinue monitoring if it is determined that the possibility of encountering buried archaeological deposits is low based on observations of soil stratigraphy or other factors. Archaeological monitoring shall be conducted by an archaeologist familiar with the types of archaeological resources that could be encountered within the project site. The archaeological monitor, in consultation with IRWD, shall be empowered to halt or redirect ground-disturbing activities away from the vicinity of a discovery until the Qualified Archaeologist has evaluated the discovery, consulted with IRWD, and determined appropriate treatment (as prescribed in CR-4). The archaeological monitor shall keep daily logs detailing the types of activities and soils observed, and any discoveries. After monitoring has been completed, the Qualified Archaeologist shall prepare a monitoring report that details the results of monitoring. The report shall be submitted to IRWD and any Native American groups who request a copy. The Qualified Archaeologist shall submit a copy of the final report to the California Historic Resources Information System (CHRIS) South Central Coastal Information Center (SCCIC). In addition, prior to the commencement of earthwork activities, IRWD shall provide written notification to the Native American representatives from the Gabrieleno Band of Mission Indians - Kizh Nation indicating the date and time of the commencement of earthwork activities. The representatives from the Gabrieleno	

Potential Impact	Mitigation Measure	Significant Determination
	Band of Mission Indians - Kizh Nation (“tribal representative”) shall be provided reasonable access to the project site in a manner that does not interfere with the earthwork activities. Tribal representatives, at their own expense, and in a manner that does not interfere with earthwork activities, shall be allowed to monitor subsurface ground-disturbing construction activities. The monitoring may consist of either direct observation of the earthwork activities or the examination of the excavated soils prior to disposal for evidence of cultural resources. If any cultural resources are identified during the monitoring and evidence is presented that the discovery proves to be potentially significant under CEQA, as determined by IRWD’s consulting Qualified Archaeologist, additional measures such as data recovery excavation, avoidance of the area of the find, documentation, testing, data recovery, reburial, archival review and/or transfer to the appropriate museum or educational institution, or other appropriate actions may be warranted as recommended by IRWD’s consulting Qualified Archeologist in consultation with the tribal representative. **CR-4:** Protocols for Unanticipated Discoveries. If cultural resources are encountered during project implementation, all activity within 50 feet of the find should cease until the find can be evaluated by the Qualified Archaeologist. If the Qualified Archaeologist determines that the resources may be significant, he or she will notify IRWD and together with IRWD, shall develop an appropriate treatment plan for the resource. IRWD should consult with the Native American monitor or other appropriate Native American representatives in determining appropriate treatment for unearthed cultural resources if the resources are prehistoric or Native American in nature. Under CEQA, preservation in place is the preferred manner of mitigating impacts to archaeological sites. However, if avoidance is infeasible, other appropriate measures will be instituted, which could include, among other options, detailed documentation, or data	

Potential Impact	Mitigation Measure	Significant Determination
	recovery excavation. Work may proceed on other parts of the project area while mitigation for cultural resources is being carried out.	
Impact 3.4-2: The proposed project could cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5..	Implement **Mitigation Measures CR-1** through **CR-4**	Less than Significant Impact with Mitigation
Impact 3.4-3: The proposed project would not disturb human remains, including those interred outside of formal cemeteries.	None required	Less than Significant Impact
Impact 3.4-4: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to cultural resources.	Implement **Mitigation Measures CR-1** through **CR-4**	Less than Significant Impact with Mitigation
Energy		
Impact 3.5-1: The proposed project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.	None required	Less than Significant Impact
Impact 3.5-2: The proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.	None required	Less than Significant Impact
Impact 3.5-3: Concurrent construction and operation of the project and related projects in the geographic scope would not result in cumulative impacts to energy.	None required	Less than Significant Impact
Geology and Soils		
Impact 3.6-1a: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault zone.	None required	Less than Significant Impact

Potential Impact	Mitigation Measure	Significant Determination
Impact 3.6-1b: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic groundshaking.	None required	Less than Significant Impact
Impact 3.6-1c: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction.	None required	Less than Significant Impact
Impact 3.6-2: The proposed project would not result in substantial soil erosion or the loss of topsoil.	None required	Less than Significant Impact
Impact 3.6-3: The proposed project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.	None required	Less than Significant Impact
Impact 3.6-4: The proposed project would not be located on expansive soil creating substantial direct or indirect risks to life or property.	None required	Less than Significant Impact
Impact 3.6-5: The proposed project would not have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.	None required	No Impact
Impact 3.6-6: The proposed project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	**GEO-1:** Appoint a Qualified Paleontologist. A qualified paleontologist meeting the Society of Vertebrate Paleontology (SVP) Standards (SVP 2010) (Qualified Paleontologist) shall be retained prior to the start of ground disturbing activities. The Qualified Paleontologist shall provide technical and compliance oversight of all work as it relates to paleontological resources, shall attend the project kick-off meeting and project progress meetings on a regular basis, and shall report to the site in the event potential paleontological resources are encountered. **GEO-2:** Worker Sensitivity Training. The Qualified Paleontologist shall conduct construction worker	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
	paleontological resources sensitivity training prior to the start of ground disturbing activities (including vegetation removal, pavement removal, etc.). This can occur in coordination with Cultural Resources Worker Sensitivity Training (Mitigation Measure CR-1). In the event construction crews are phased, additional trainings shall be conducted for new construction personnel. The training session shall focus on the recognition of the types of paleontological resources that could be encountered within the project site and the procedures to be followed if they are found. Documentation shall be retained demonstrating that all construction personnel attended the training. **GEO-3:** Paleontological Monitoring. Paleontological resources monitoring shall be conducted for ground disturbing activities occurring in previously undisturbed sediments with high paleontological sensitivity, including any areas containing the Silverado Formation or Sespe/Vaqueros Formation, very old Quaternary Alluvium, and deeper layers of younger Quaternary Alluvium (which overly sensitive older Quaternary Alluvium). Ground disturbing activities include vegetation removal, grading, excavation, pavement removal, roadway improvements, or other similar activities within these sensitive formations. For undisturbed sediments mapped as the Silverado Formation, Sespe/Vaqueros Formation, or very old Quaternary Alluvium, monitoring of all ground disturbance is initially required. A depth of 5 feet bgs is established as the depth at which high sensitivity and paleontological monitoring should begin in the younger Quaternary Alluvium. The Qualified Paleontologist shall evaluate ground disturbing activities on an intermittent basis and consult with IRWD on whether the depth or frequency of required monitoring should be revised or may cease. Paleontological resources monitoring shall be performed by a qualified paleontological monitor (meeting the standards of the SVP 2010) under the direction of the Qualified Paleontologist, and in conjunction with IRWD. Monitors shall have the	

Potential Impact	Mitigation Measure	Significant Determination
	authority to temporarily halt or divert work away from exposed fossils in order to recover the fossil specimens. Any significant fossils collected during project-related excavations shall be salvaged and prepared to the point of identification following the standards of the SVP (2010). Monitors shall prepare daily logs detailing the types of activities and soils observed, and any discoveries. The Qualified Paleontologist shall prepare a final monitoring and mitigation report to document the results of the monitoring effort. Any salvaged fossils shall be offered for donation to an accredited repository with a scientific interest in the materials. If no accredited repository accepts the donation, then the fossils may be donated to a local museum, historical society, school, or other institution for educational purposes. **GEO-4:** Fossil Discovery. If personnel or workers discover any potential fossils during project implementation, regardless of the depth of work or location, work at the discovery location shall cease in a 50-foot radius of the discovery until the Qualified Paleontologist has assessed the discovery, consulted with IRWD, and made recommendations as to the appropriate treatment. If the find is deemed significant, the qualified paleontologist shall salvage the resource following the standards of the SVP (2010). Any salvaged fossils shall be offered for donation to an accredited repository with a scientific interest in the materials. If no accredited repository accepts the donation, then the fossils may be donated to a local museum, historical society, school, or other institution for educational purposes.	
Impact 3.6-7: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to geology, soils, and paleontological resources.	Implement **Mitigation Measures GEO-1** through **GEO-4**	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
Greenhouse Gas Emissions		
Impact 3.7-1: The proposed project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	None required	Less than Significant Impact
Impact 3.7-2: The proposed project would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	None required	Less than Significant Impact
Impact 3.7-3: Concurrent construction and operation of the proposed project and related projects in the geographic scope would not result in cumulative impacts regarding greenhouse gas emissions.	None required	Less than Significant Impact
Hazards and Hazardous Materials		
Impact 3.8-1: The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, disposal, or the accidental release of hazardous materials.	None required	Less than Significant Impact
Impact 3.8-2: The proposed project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.	None required	Less than Significant Impact
Impact 3.8-3: The proposed project would not be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment.	None required	No Impact
Impact 3.8-4: The proposed project is not located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport; the proposed project would not result in a safety hazard or excessive noise for people residing or working in the project area.	None required	No Impact

Potential Impact	Mitigation Measure	Significant Determination
Impact 3.8-5: The proposed project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	Implement **Mitigation Measure TRA-1**	Less than Significant Impact with Mitigation
Impact 3.8-6: The proposed project could expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.	Implement **Mitigation Measure WDF-1**	Less than Significant Impact with Mitigation
Impact 3.8-7: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative short-term and long-term impacts to hazards, hazardous materials, and wildfires.	Implement **Mitigation Measures TRA-1** and **WDF-1**	Less than Significant Impact with Mitigation
Hydrology and Water Quality		
Impact 3.9-1: The proposed project would not violate water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.	None required	Less than Significant Impact
Impact 3.9-2: The proposed project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.	None required	Less than Significant Impact
Impact 3.9-3: The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation onsite or offsite; or substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite or offsite; or create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide	None required	Less than Significant Impact

Potential Impact	Mitigation Measure	Significant Determination
substantial additional sources of polluted runoff; or impede or redirect flood flows.		
Impact 3.9-4: The proposed project would not result in a flood hazard, tsunami, or seiche, and risk release of pollutants due to project inundation.	None required	Less than Significant Impact
Impact 3.9-5: The proposed project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	None required	Less than Significant Impact
Impact 3.9-6: Concurrent construction and operation of the proposed project and related projects in the geographic scope would not result in cumulative impacts to hydrology and water quality.	None required	Less than Significant Impact
Noise		
Impact 3.10-1: The proposed project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	None required	Less than Significant Impact
Impact 3.10-2: The proposed project would not generate excessive groundborne vibration or groundborne noise levels.	None required	Less than Significant Impact
Impact 3.10-3: The proposed project would not expose people residing or working in the project area to excessive noise levels within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport.	None required	No Impact
Impact 3.10-4: Concurrent construction and operation of the proposed project and related projects in the geographic scope would not result in cumulative impacts to noise and vibration.	None required	Less than Significant Impact

Potential Impact	Mitigation Measure	Significant Determination
Recreation		
Impact 3.11-1: The proposed project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	None required	Less than Significant Impact
Impact 3.11-2: The proposed project could include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.	Implement **Mitigation Measures BIO-1** through **BIO-6** and **CR-1** through **CR-4**	Less than Significant Impact with Mitigation
Impact 3.11-3: Concurrent construction and operation of the proposed project and related projects in the geographic scope would not result in cumulative impacts to recreation.	None required	Less than Significant Impact
Transportation		
Impact 3.12-1: The proposed project could conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.	**TRA-1:** Traffic Control Plan. Prior to the start of construction, IRWD shall require the construction contractor to prepare and have approved a Traffic Control Plan. The Traffic Control Plan will show all signage, striping, delineated detours, flagging operations, and any other devices that will be used during installation of the improvements at the intersection of Sand Canyon Avenue and Portola Parkway to guide motorists, bicyclists, and pedestrians safely through the construction area and allow for adequate access and circulation to the satisfaction of the City of Irvine, as applicable. The Traffic Control Plan shall be prepared in accordance with the City of Irvine's traffic control guidelines and will be prepared to ensure that emergency access will not be restricted. Additionally, the Traffic Control Plan will ensure that congestion and traffic delays are not substantially increased as a result of the construction activities. Further, the Traffic Control Plan will include detours or alternative routes for bicyclists using on-street bicycle lanes as well as for pedestrians using adjacent sidewalks.	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
	IRWD shall also notify local emergency responders of any planned partial or full lane closures required for project construction. Emergency responders include fire departments, police departments, and ambulances that have jurisdiction within the project area. Written notification and disclosure of lane closure location must be provided at least 30 days prior to the planned closure to allow emergency response providers adequate time to prepare for lane closures.	
Impact 3.12-2: The proposed project would not conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b).	None required	Less than Significant Impact
Impact 3.12-3: The proposed project would not substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	None required	Less than Significant Impact
Impact 3.12-4: The proposed project could result in inadequate emergency access.	Implement **Mitigation Measure TRA-1**	Less than Significant Impact with Mitigation
Impact 3.12 5: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to transportation.	Implement **Mitigation Measure TRA-1**	Less than Significant Impact with Mitigation
Tribal Cultural Resources		
Impact 3.13-1a: The proposed project could cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).	Implement **Mitigation Measures CR-3** and **CR-4**	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
Impact 3.13-1b: The Proposed Project could cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	Implement **Mitigation Measures CR-3** and **CR-4**	Less than Significant Impact with Mitigation
Impact 3.13-2: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to tribal cultural resources.	Implement **Mitigation Measures CR-3** and **CR-4**	Less than Significant Impact with Mitigation
Wildfire		
Impact 3.14-1: The proposed project could substantially impair an adopted emergency response plan or emergency evacuation plan.	Implement **Mitigation Measure TRA-1**	Less than Significant Impact with Mitigation
Impact 3.14-2: The proposed project could, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.	**WDF-1:** Fire Hazard Reduction Measures. During project implementation, IRWD shall require all spark arrestors on construction and maintenance equipment to be in good working order. Contractors shall require all vehicles and crews to have access to functional fire extinguishers at all times.	Less than Significant Impact with Mitigation
Impact 3.14-3: The proposed project could require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.	Implement **Mitigation Measure WDF-1**	Less than Significant Impact with Mitigation

Potential Impact	Mitigation Measure	Significant Determination
Impact 3.14-4: The proposed project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.	None required	Less than Significant Impact
Impact 3.14-5: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to wildfire.	Implement **Mitigation Measure WDF-1**	Less than Significant Impact with Mitigation

CHAPTER 1
Introduction and Project Background

1.1 Introduction

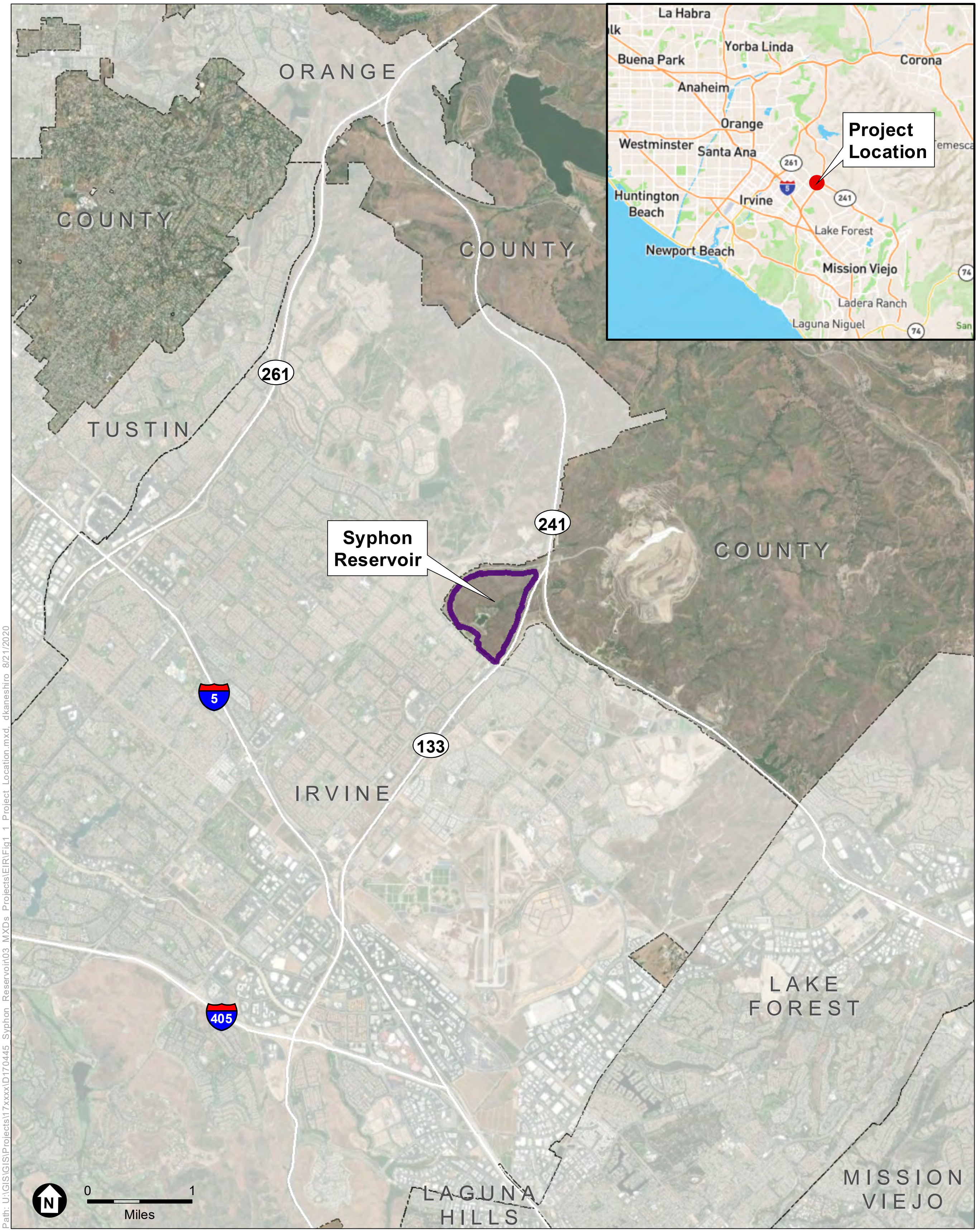
Irvine Ranch Water District (IRWD or District) is proposing to construct the Syphon Reservoir Improvement Project (proposed project). The Syphon Reservoir is an existing recycled water storage reservoir located within IRWD's service area, northeast of Portola Parkway between Bee Canyon Access Road and State Route 133 (SR-133) in the County of Orange (**Figure 1-1**). The proposed project would increase the storage capacity of the existing Syphon Reservoir to serve the community's seasonal and future recycled water needs. As a part of the reservoir expansion, the existing engineered dam would be replaced with a new engineered dam that would meet or exceed the current safety and design requirements established by the California Department of Water Resources (DWR), Division of Safety of Dams (DSOD). The project design would avoid failures and consequences to downstream communities. The proposed project would increase the reservoir capacity from approximately 500 acre-feet (AF) to 5,000 AF.

1.2 Purpose of the Draft EIR

IRWD is the Lead Agency pursuant to the California Environmental Quality Act (CEQA), and has prepared this Draft Environmental Impact Report (EIR) in compliance with CEQA of 1970 (as amended), codified at California Public Resources Code Sections 21000 et. seq., and the State CEQA Guidelines in the Code of Regulations, Title 14, Division 6, Chapter 3. The purpose of the Draft EIR is to provide the public and pertinent agencies with information about the potential effects on the local and regional environment associated with construction and operation of the proposed project. This Draft EIR describes the environmental impacts of the proposed project and suggests mitigation measures where necessary to avoid or reduce any significant impacts. The impact analyses are based on a variety of sources, including publicly available documents, agency consultation, technical studies and field surveys.

In addition, this Draft EIR has been prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA).

IRWD intends to use this EIR to consider implementation of the proposed project. IRWD's Board of Directors, as the decision-making body for the Lead Agency, shall consider and certify prior to approving the proposed project that the Draft EIR has been completed in compliance with CEQA, and that the EIR reflects its independent judgment and analysis (CEQA Guidelines Section 15090(a)).



SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservior Improvement Project

Figure 1-1
Project location

1.3 Draft EIR Organization

This Draft EIR has been organized into the following chapters:

- **Executive Summary.** This chapter summarizes the contents of the Draft EIR.
- **Chapter 1, Introduction and Project Background.** This chapter discusses the CEQA process, explains the purpose of the Draft EIR, and summarizes the background studies and processes that influenced the development of the proposed project.
- **Chapter 2, Project Description.** This chapter provides an overview of the proposed project, describes the need for and objectives of the proposed project, explains planning for construction, operation, and management of the proposed project, and presents a preliminary list of the agencies and entities, in addition to IRWD, that would use this EIR in their consideration of specific permits and other discretionary approvals for the proposed project.
- **Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.** This chapter describes the environmental setting and identifies the direct, indirect, and cumulative impacts of the proposed project for each of the following environmental topics: Aesthetics; Air Quality; Biological Resources; Cultural Resources; Geology and Soils; Greenhouse Gas Emissions; Energy; Hazards and Hazardous Materials; Hydrology and Water Quality; Noise; Recreation; Transportation; Tribal Cultural Resources; and Wildfire. For the assessment of cumulative impacts, this chapter includes a list of past, current, and probable future projects to be considered together with the proposed project. Measures to mitigate the impacts of the proposed project are presented for each environmental topics where potential significant impacts have been identified. Potential hazards from flooding associated with the construction and operation of the proposed project, including dam safety issues, are discussed in Section 3.9, *Hydrology and Water Quality*.
- **Chapter 4, CEQA-Plus Considerations:** This chapter summarizes the proposed project's compliance with CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with NEPA.
- **Chapter 5, Growth Inducement.** This chapter describes the potential for the proposed project to induce growth.
- **Chapter 6, Alternatives Analysis.** According to CEQA, an EIR must describe a reasonable range of alternatives to a proposed project that would feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the proposed project's significant environmental effects This chapter presents an overview of the alternatives development process, describes the alternatives to the proposed project that were considered, and describes potential impacts of feasible alternatives relative to those of the proposed project.
- **Chapter 7, Report Preparers.** This chapter identifies the parties involved in preparing this Draft EIR, including persons and organizations consulted.
- **Appendices:** The appendices include materials related to the NOP and scoping process (**Appendix A**), as well as technical studies that support the impact analyses, such as an Air Quality and Greenhouse Gas Emissions Technical Report (**Appendix B**), Biological Resources Technical Report (**Appendix C**), Noise and Vibration Technical Report (**Appendix D**), Traffic Study (**Appendix E**), and the Tribal Cultural Resources Consultation (**Appendix F**).

1.4 CEQA Environmental Review Process

1.4.1 CEQA Process Overview

The basic purposes of CEQA are to (1) inform decision makers and the public about the potential, significant adverse environmental effects of proposed governmental decisions and activities, (2) identify the ways those environmental effects can be avoided or significantly reduced, (3) prevent significant, avoidable and adverse environmental effects by requiring changes in projects through the use of alternatives or mitigation measures when feasible, and (4) disclose to the public the reasons why an implementing agency may approve a project even if significant unavoidable environmental effects are involved.

An EIR uses a multidisciplinary approach, applying social and natural sciences to make a qualitative and quantitative analysis of all the foreseeable environmental impacts that a proposed project would exert on the surrounding area. As stated in *CEQA Guidelines* section 15151:

> *An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible.*

This Draft EIR has been prepared to comply with CEQA and the CEQA Guidelines and is to be used by local regulators and the public in their review of the potential significant adverse environmental impacts of the proposed project and alternatives, and mitigation measures that would minimize or avoid those potential environmental effects. IRWD will consider the information presented in this Draft EIR, along with other factors, prior to considering and making any final decisions regarding the proposed project.

CEQA-Plus Requirements

As noted above, this Draft EIR has been prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency (USEPA) to fulfill the requirement of potential federal funding partners to comply with NEPA. The CEQA-Plus requirements are intended to supplement CEQA and the CEQA Guidelines with specific requirements for environmental documents. They are not intended to supersede or replace CEQA Guidelines.

Prior to the approval of a federal funding agreement, federal consultation with agencies such as the U.S. Fish and Wildlife Service and the State Historic Preservation Office must be completed. As such, to support federal consultations, this Draft EIR demonstrates compliance with the federal Endangered Species Act (FESA) and Section 106 of the National Historic Preservation Act, and includes a Clean Air Act conformity analysis (if in a nonattainment area or an attainment area subject to a maintenance plan). In addition, this Draft EIR also demonstrates compliance with federal laws and cross-cutter regulations, including the Clean Water Act, Farmland Protection Policy Act, Migratory Bird Treaty Act, Flood Plain Management Act, Wild and Scenic Rivers Act, and Coastal Zone Management Act. Chapter 4 of this Draft EIR addresses all federal laws and regulations in fulfillment of CEQA-Plus requirements.

1.4.2 Notice of Preparation and Public Scoping

Pursuant to CEQA Guidelines Section 15082, the lead agency is required to send a Notice of Preparation (NOP) stating that an EIR will be prepared to the State Office of Planning and Research (OPR), Responsible and Trustee agencies, and federal agencies involved in funding or approving the project. The NOP must provide sufficient information in order for responsible agencies to make a meaningful response. At a minimum, the NOP must include a description of the project, location of the project, and probable environmental effects of the project (CEQA Guidelines Section 15082(a)(1)). Within 30 days after receiving the NOP, Responsible and Trustee agencies and OPR shall provide the lead agency with specific detail about the scope and content of the environmental information related to that agency's area of statutory responsibility that should be included in this Draft EIR (CEQA Guidelines Section 15082(b)).

On August 2, 2019, IRWD published a Notice of Preparation (NOP) of an EIR for a 45-day review period and circulated it to OPR and local, state, and federal agencies, including Responsible and Trustee agencies, as well as organizations and persons who expressed interest in the proposed project. The NOP comment period extended through September 16, 2019. The NOP provided a general description of the proposed project, a description of the proposed project areas, and an overview of environmental topics that will be evaluated within the EIR. The NOP was made available on the IRWD website. A copy of the NOP and comment letters are included in this Draft EIR in **Appendix A**. Thirty-five comment letters were received in response to the NOP. As a result of specific public comments received, IRWD engaged the services of HDR to evaluate alternative project scenarios and associated life cycle costs in meeting IRWD's goals for future recycled water storage and distribution management. HDR's evaluation is documented in a Technical Memorandum titled *Technical Memorandum: Evaluation of Syphon Reservoir Expansion in Response to EIR Notice of Preparation Comments* referenced in this EIR as "(HDR, 2020)." A copy of HDR's Technical Memorandum is available from IRWD's District Secretary.

On August 21, 2019, in accordance with CEQA Guidelines Section 15082, IRWD held a public scoping meeting to describe the proposed project, to identify the environmental topics that would be addressed, and to describe the CEQA process for the EIR. To notify the public of the Scoping Meeting, IRWD published the legal notification in the *Orange County Register* in five languages, mailed a notification to area residents and posted information about the meeting on IRWD's website. The District provided an opportunity for attendees to submit written comments on the scope of the environmental evaluation; the written comments received at the scoping meeting are included in Appendix A. Verbal comments raised during the scoping meeting included concerns over public safety in a potential inundation zone, property values and flood insurance costs for residences in a potential inundation zone, an increase in traffic, length of the new dam, and impacts to daily operations and safety at nearby schools. These verbal comments were summarized and are included in the scoping comments set forth in Appendix A.

1.4.3 Draft EIR

This Draft EIR has been prepared pursuant to the requirements of CEQA Guidelines Section 15126. This Draft EIR provides an analysis of reasonably foreseeable impacts associated with the construction, operation, and maintenance of the proposed project. The environmental baseline for determining potential impacts is the date of publication of the NOP for the proposed project unless otherwise indicated (CEQA Guidelines Section 15125(a)). The baseline setting for each environmental topic assessed in this Draft EIR describes the existing conditions as of the publication of the NOP. The impact analysis is based on changes to existing conditions that would result due to implementation of the proposed project.

In accordance with the CEQA Guidelines Section 15126, Chapter 3 of this Draft EIR describes the proposed project site and the existing baseline environmental setting, identifies potential short-term, long-term, and cumulative adverse environmental impacts associated with project implementation, and identifies mitigation measures for potentially significant adverse impacts. Significance criteria are defined at the beginning of each impact analysis section for each environmental topic analyzed in this Draft EIR. In addition, Chapter 5 of this Draft EIR analyzes potential growth-inducing impacts, and Chapter 6 of this Draft EIR provides an analysis of alternatives to the project.

1.4.4 Draft EIR Public Review

In accordance with Section 15105 of the CEQA Guidelines, this Draft EIR has been submitted to the OPR State Clearinghouse for review by state agencies. In addition, this Draft EIR has been circulated to federal, state, and local agencies and interested parties who may wish to review and provide comments on its contents. A minimum 45-day public review period is required for a Draft EIR submitted to the OPR State Clearinghouse; however, IRWD is making the Draft EIR available for public review and comment for a 60-day review period from March 19, 2021 to May 18, 2021. Please submit all comments to:

Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, California 92619-7000
Attn: Jo Ann Corey, Environmental Compliance Specialist
SyphonEIR@irwd.com

IRWD will hold one virtual public meeting via Zoom and telephonically to receive public comments on the environmental analysis in the Draft EIR. The virtual public meeting will include a brief presentation providing an overview of the proposed project and findings of the Draft EIR. After the presentation, oral comments will be accepted. Written comments also may be submitted anytime during the 60-day review period. The virtual public meeting will be held on April 21, 2021, at 6:00 p.m. For information on how to access the virtual public meeting, please visit http://www.syphonreservoir.com.

1.4.5 Final EIR Publication and Certification

Once this Draft EIR public review period has ended, IRWD will prepare written responses to all timely submitted comments. The Final EIR will be comprised of this Draft EIR, responses to comments received on this Draft EIR, and any changes or corrections to this Draft EIR that are made as part of the responses to comments. As the Lead Agency, IRWD will make the Final EIR available for public review prior to it considering any final decision regarding approval of the proposed project (CEQA Guidelines Section 15089(b)). The Final EIR must be available to commenting agencies at least 10 days prior to certification (CEQA Guidelines Section 15088(b)).

Prior to considering the proposed project for approval, IRWD will review and consider the information presented in the Final EIR and will certify that the Final EIR has been adequately prepared in accordance with CEQA. Once the Final EIR is certified, the IRWD Board of Directors may proceed to consider any final decisions regarding the proposed project (CEQA Guidelines Sections15090, 15096(f)). Prior to approving the proposed project, IRWD must make written Findings in accordance with Section 15091 of the CEQA Guidelines. In addition, IRWD must adopt a Statement of Overriding Considerations (SOC) concerning each significant environmental effect identified in the Final EIR (if any) that cannot be fully mitigated to a less than significant level. If one is needed, then the SOC will be included in the record of the proposed project's approval and mentioned in the Notice of Determination (NOD) following CEQA Guidelines Section 15093(c). Pursuant to CEQA Guidelines Section 15094, IRWD will file an NOD with the State Clearinghouse and County Clerk within five working days, if the proposed project is approved.

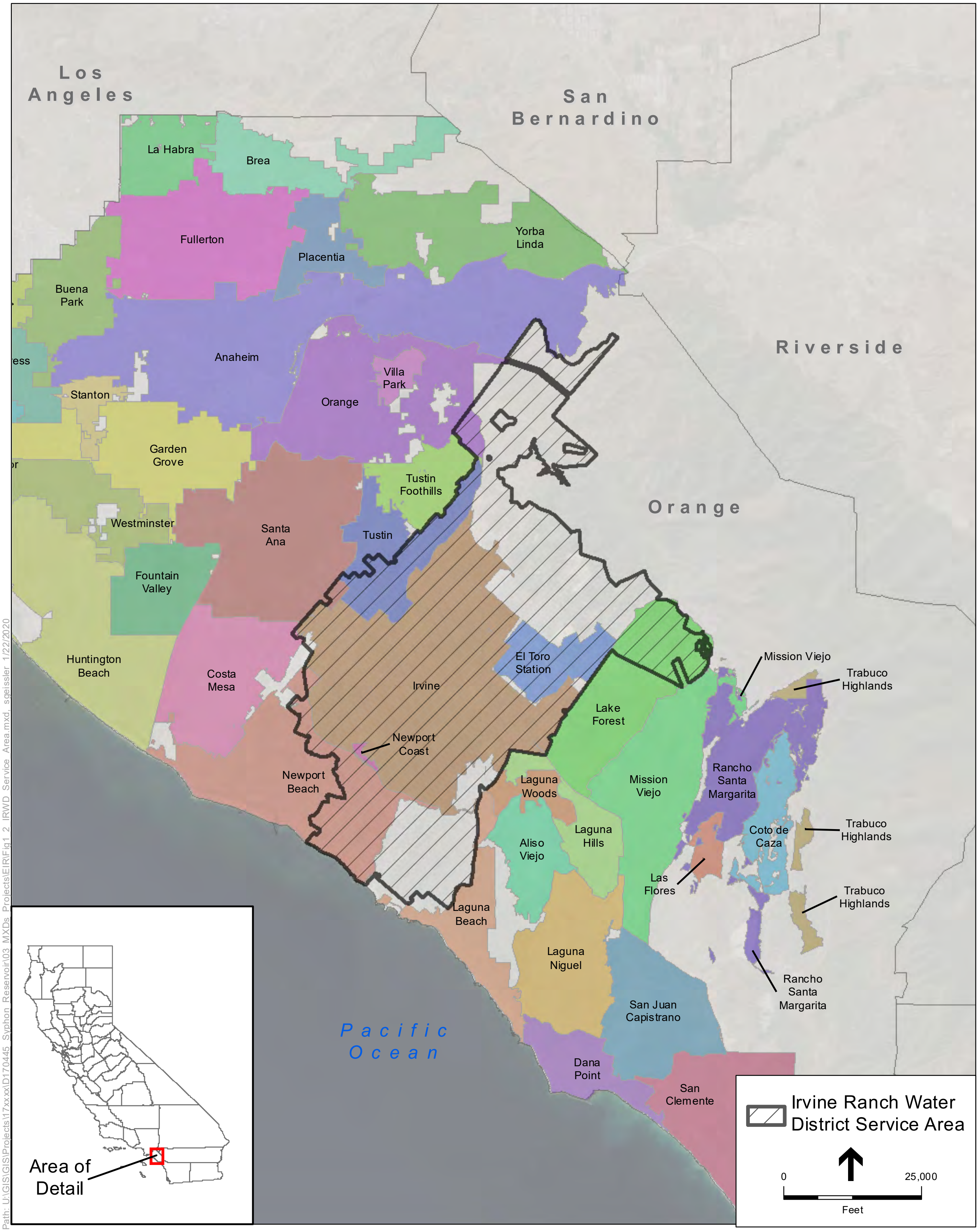
1.4.6 Mitigation Monitoring and Reporting Program

CEQA Guidelines Section 15097 requires lead agencies to "adopt a reporting or monitoring project for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment." The mitigation measures, if any, adopted as part of the Final EIR will be included in a Mitigation Monitoring and Reporting Program (MMRP) and implemented by IRWD.

1.5 Project Background

1.5.1 District Overview

Established in 1961 as a California Water District under the provisions of the State of California Water Code, IRWD is a local, not-for-profit, independent special district serving residents and businesses in central Orange County, California. IRWD provides drinking water, reliable sewage collection and treatment, recycled water and urban runoff treatment to approximately 422,000 residents. As an independent public agency, IRWD is governed by a five-member publicly elected Board of Directors, who live in the community and are responsible for the District's policies and decision-making. Day-to-day operations are supervised by the General Manager and District staff. IRWD's service area is located in central Orange County and encompasses 181 square miles extending from the Pacific Coast to the foothills (**Figure 1-2**). IRWD's service area includes the City of Irvine and portions of Costa Mesa, Lake Forest, Newport Beach, Orange, Tustin, and unincorporated areas of Orange County. IRWD is bordered to the west by the cities of Orange, Tustin, Santa Ana, Costa Mesa, and unincorporated Orange County areas; to the north by unincorporated Orange County; to the east by Lake Forest, Mission Viejo, and unincorporated Orange County areas; and to the south by Newport Beach, Laguna Beach, and the Pacific Ocean. IRWD provides service to approximately 20 percent of Orange County's total land area.



SOURCE: ESRI, 2019.

Syphon Reservoir Improvement Project

Figure 1-2
Irvine Ranch Water District - Service Area

ESA

IRWD has a diverse water supply that includes local groundwater, recycled water, imported water, and local surface water. Approximately 54 percent of the IRWD water supply comes from 26 local groundwater wells in the Orange County Groundwater Basin; approximately 18 percent of the District's water supply is imported from the Metropolitan Water District of Southern California (MWD); and roughly 26 percent of the District's water demands are met with recycled water. IRWD produces recycled water at its Michelson Water Recycling Plant (WRP) located in the City of Irvine and at its Los Alisos WRP located in the City of Lake Forest. Recycled water is provided to customers primarily for irrigation of public landscaping such as street medians, parks and golf courses as well as agricultural irrigation. It is also used in industrial processes such as mixing concrete, office building uses such as toilet flushing and cooling towers, as well as for firefighting.

When recycled water production exceeds seasonal demands, recycled water is stored at Syphon Reservoir, as well as other recycled water storage reservoirs operated by IRWD, including San Joaquin, Rattlesnake, and Sand Canyon Reservoirs. IRWD is an experienced reservoir operator with a strong track record in reservoir and facilities' construction, maintenance, performance, and safety. All of IRWD's reservoirs are state-inspected and meet all requirements for safe use. Additionally, IRWD goes above and beyond the required safety standards by monitoring its dams daily, and inspecting them monthly. IRWD also retains dam safety experts to inspect its dams annually.

Although IRWD's existing recycled water reservoirs provide storage for recycled water, once the storage reservoirs are filled to capacity in winter months, recycled water supplies are either diverted to Orange County Sanitation District (OCSD) or discharged to the ocean. During the dry season, service area demands for recycled water depletes existing reservoir storage and exceeds the rate at which new recycled water is produced by the WRPs. IRWD must then purchase supplemental imported water from MWD to meet the summer demands of IRWD's recycled water customers. Based on projected demands and supplies, IRWD estimates that it will need an additional 4,500 AF of recycled water seasonal storage capacity by the year 2030.

1.5.2 Existing Syphon Reservoir Facility Operations

The existing Syphon Reservoir was constructed in 1949 and was acquired by IRWD in 2010 from the Irvine Company, which previously used the reservoir to store water for agricultural irrigation. The existing reservoir is located within unincorporated Orange County within the City of Irvine's sphere of influence.[1] The reservoir is located within the Central and Coastal Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and is included as an operating reservoir allowed within the NCCP/HCP Reserve. As early as 2011, IRWD began studying the feasibility of expanding the Syphon Reservoir to accommodate additional recycled water storage capacity. In 2013, IRWD converted the facilities at Syphon Reservoir for interim storage of recycled water produced at IRWD's Michelson WRP, by adding strainer and disinfection facilities. IRWD also enhanced the pipeline capacity by replacing the existing pipes connecting

[1] A sphere of influence is a planning boundary that designates an agency's probable future boundary and service area. Spheres of influence ensure the provision of efficient services while discouraging urban sprawl and the premature conversion of land uses such as agricultural and open space.

the reservoir to IRWD's existing system and the associated storm drain with new, larger diameter pipes (**Figure 1-3**).

The existing engineered dam is comprised of compacted on-site geologic materials, approximately 59 feet high, with a crest[2] length of 843 feet and width of 10 to 12. The surface area of the existing reservoir is approximately 28 acres when filled to capacity, and the current capacity of the reservoir below the existing spillway crest is approximately 535 AF. The 2011 topography survey of the dam indicates its crest to be at an elevation of 387.7 feet above mean sea level (amsl).

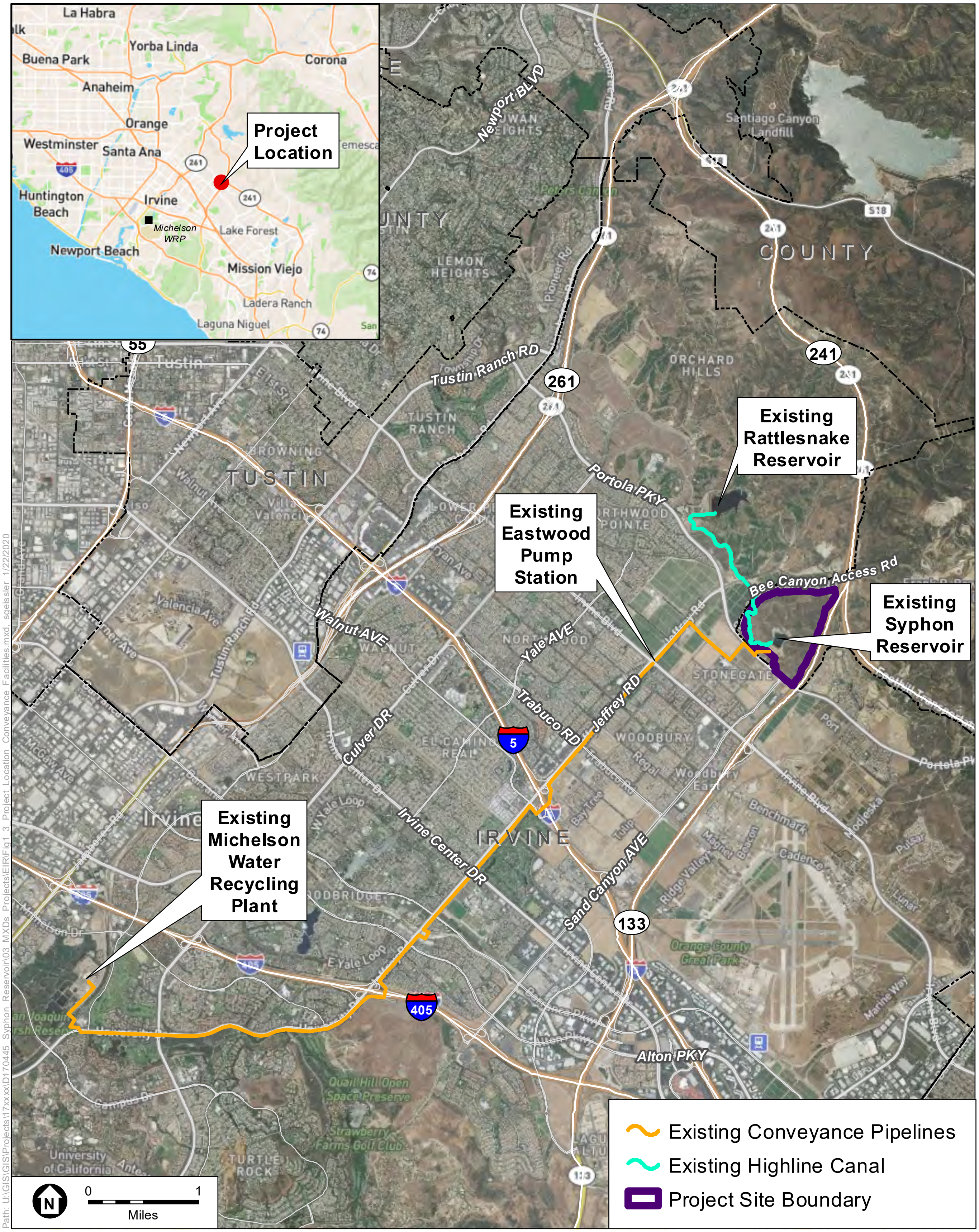
The existing dam spillway was constructed as a 12-foot-wide, broad-crested weir, located at the left abutment of the dam with a crest at 380 feet amsl (**Figure 1-4**). The existing spillway structure is designed to prevent overtopping by conveying recycled water to the existing storm drain in Portola Parkway. However, IRWD directly controls the flow of water into and out of Syphon Reservoir and can lower the water surface to allow for storage of the minor amounts of runoff that result from storm events. The reservoir does not receive water from rivers or streams. Since 2010 when IRWD purchased the reservoir, the spillway has never been used. The reservoir includes a small watershed that is approximately 205 acres and is not capable of generating significant amounts of runoff that need to be managed through the use of the spillway. In addition, an existing storm drain discharges storm water from SR-133 properties into the Syphon Reservoir (GEI 2012a). The spillway sidewalls and floor are constructed from gunite,[3] reinforced with steel wire mesh adjacent to the embankment dam crest. The spillway discharge channel consists of an unpaved access road and earthen drainage ditch along the southernmost areas of the dam on the left abutment.

The existing Highline Canal is used to fill Syphon Reservoir via gravity flows from IRWD's Rattlesnake Reservoir. Flows from the Highline Canal enter the site at Bee Canyon Access Road. Branching off from the existing Highline Canal, a gunite-lined channel leads to an existing 30-inch reinforced concrete pipe covered with embankment fill (Figure 1-3). The pipeline emerges on the left side of the dam, where flows continue into an open channel (GEI 2012a).

Under normal operating conditions, all flow out of the reservoir is conveyed through a series of underground pipes that lead to the strainer and disinfection facilities and then to an existing 36-inch recycled water pipeline that connects to IRWD's recycled water system for distribution to customers. Alternatively, the existing reservoir can be drawn down through an existing 48-inch pipeline that discharges to the existing storm drain, located in Portola Parkway (see Figure 1-4).

2 The elevation of the uppermost surface of a dam, usually a road or walkway, excluding any parapet wall, railing, curb. etc. On embankment dams, the crest of the dam is the top of the embankment, not including camber, crown, or roadway surfacing (U.S Department of the Interior, Bureau of Reclamation 2019).

3 A mixture of cement, sand, and water applied through a pressure hose, producing a dense hard layer of concrete used in building for lining tunnels and structural repairs.



SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservoir Improvement Project

Figure 1-3
Existing Syphon Reservoir Location and Conveyance Facilities

ESA

SOURCE: ESRI, 2020; ESA, 2020.

Syphon Reservoir Improvement Project

Figure 1-4
Existing Project Site and Vicinity

ESA

1.5.3 Syphon Reservoir Studies and Reports

Multiple studies have been conducted at the project site to support the use of the reservoir to store and distribute recycled water. In 2012, IRWD prepared the *Syphon Reservoir Expansion Engineering Feasibility Study* and the *Syphon Reservoir Expansion Engineering Feasibility Study, Constructability Analysis* (GEI 2012a; 2012b), which provided baseline geotechnical information for the project site and generalized construction techniques and procedures. The studies evaluated existing site characteristics, geologic conditions, facilities integration, and inundation from any potential dam failure. Additional investigative studies were evaluated in conjunction with the 2012 engineering studies. These studies include the *Syphon Reservoir Water Quality Study*, the *Syphon Reservoir Seasonal Storage Requirements*, the *Syphon Reservoir System Integration Study*, the *Syphon Reservoir Pump Station & Treatment Feasibility Study* (GEI 2012a), and the *Syphon Reservoir Environmental Regulatory Evaluation* (Dudek 2012).

In 2013, IRWD prepared an Initial Study and subsequent Addendum for the Syphon Reservoir Interim Facilities Project (IRWD 2013a; 2013b). The Initial Study described potentially significant impacts on biological resources, cultural resources, hazards and hazardous materials, and noise. Mitigation measures were identified for these environmental topics to reduce impacts to less than significant levels. IRWD determined that the Interim Facilities Project would not have a significant effect on the environment and adopted a Mitigated Negative Declaration.

The Syphon Reservoir Interim Facilities Project was constructed at the base of the existing Syphon Reservoir to allow IRWD to operate the reservoir for recycled water use. The interim facilities included housing for chlorination equipment, storage for sodium hypochlorite, and metering pumps; mechanical strainers; a backwash water supply pump and lift station; reservoir aeration system; and a 48-inch storm drain pipe. The Syphon Reservoir Interim Facilities Project anticipated the facilities could be replaced in the future with larger facilities to handle a higher rate of flow.

In 2016, IRWD conducted a dry lakebed geotechnical exploration to obtain information on the extent and character of sediments that have accumulated in the Syphon Reservoir over time (GEI 2016). The geotechnical investigations provided information on the character of subsurface materials that had accumulated in the reservoir that could be excavated to provide suitable materials for construction and to increase the capacity of the reservoir (GEI 2016).

In 2018, IRWD prepared an Initial Study for the Eastwood Recycled Water Pump Station (IRWD 2018). The Eastwood Pump Station is being constructed to support IRWD's recycled water services, including pumping recycled water to Syphon Reservoir. and provide a high degree of operational flexibility. The Initial Study described potentially significant impacts on cultural resources, hazards and hazardous materials, and noise. Mitigation measures were identified for these environmental topics to reduce impacts to less than significant levels. IRWD determined that the Eastwood Recycled Water Pump Station would not have a significant effect on the environment and adopted a Mitigated Negative Declaration.

In 2019, IRWD prepared an Initial Study for the Syphon Reservoir Geotechnical Investigations Project (IRWD 2019). The Initial Study described potentially significant impacts on biological resources, cultural resources, geology and soils, hazards and hazardous materials, and wildfire.

Mitigation measures were identified for these environmental topics to reduce impacts to less than significant levels. IRWD determined that the Syphon Reservoir Geotechnical Investigations Project would not have a significant effect on the environment and adopted a Mitigated Negative Declaration. In August 2019, IRWD began the geotechnical investigations as outlined in the Geotechnical Investigations Work Plan developed by HDR (2019) for the project. The Syphon Reservoir Geotechnical Investigations Project evaluated geologic and seismic conditions at the existing dam embankment, spillway, outlet, and borrow sites. Results of the geotechnical investigations are used to inform the evaluation of project-related impacts in this Draft EIR and would be used for the design of the proposed project.

The Syphon Reservoir Geotechnical Investigations Project included a fault study that confirmed the Central Valley Fault is a regional U-shape fault with two main splays that extend northeast to southwest under the existing Syphon Dam. The fault splays are concealed by the lake bottom sediments, alluvium, and slopewash/colluvium soils in the reservoir and in the drainage. The fault study concluded that the Central Valley Fault has not moved within Quaternary time (the last 1.6 million years).and has no potential for future movement. Based on the DSOD criteria, this fault is considered inactive (AECOM 2020).

1.6 References

AECOM. 2020. *Local Fault Considerations for Proposed Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA*, May 7.

Dudek. 2012. *Syphon Reservoir Environmental Regulatory Evaluation. Prepared for Irvine Ranch Water District*, October 2012.

GEI. 2012a. *Syphon Reservoir Expansion Engineering Feasibility Study, Engineering Summary Report*, August 2012.

GEI. 2012b. *Syphon Reservoir Expansion Engineering Feasibility Study, Constructability Analysis*, August 12, 2012.

GEI. 2016. *Syphon Reservoir Dry Lakebed Geotechnical Exploration*.

HDR. 2019. *Geotechnical Investigation Work Plan, Syphon Reservoir Improvements Project, Irvine, California*, February 14

HDR. 2020. *Technical Memorandum: Evaluation of Syphon Reservoir Expansion in Response to EIR Notice of Preparation Comments*. December, 2020.

IRWD. 2013a. *Final Syphon Reservoir Interim Facilities Initial Study/Mitigated Negative Declaration*, January 2013.

IRWD. 2013b. *Addendum No. 1 to the Syphon Reservoir Interim Facilities Initial Study/Mitigated Negative Declaration*, February 2013.

IRWD. 2018. *Final Initial Study/Mitigated Negative Declaration Eastwood Recycled Water Pump Station. Project*, January 2018.

IRWD. 2019. *Final Initial Study/Mitigated Negative Declaration Syphon Reservoir Geotechnical Investigations Project*, June 2019.

CHAPTER 2
Project Description

2.1 Overview and Project Location

Irvine Ranch Water District is proposing to implement the Syphon Reservoir Improvement Project (proposed project). The Syphon Reservoir is an existing recycled water storage reservoir in IRWD's service area. IRWD is limited in its ability to supply recycled water to its customers year-round with its existing recycled water storage capacity. The proposed project would increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam, while meeting or exceeding the current safety and design requirements. The proposed project would allow the storage of additional recycled water produced at IRWD's Michelson WRP during periods of low demand (winter months) for use during periods of high demand (summer months). The proposed project would expand the reservoir's storage capacity from the current 500 AF to approximately 5,000 AF and would help IRWD become more self-sufficient by reducing its dependence on costly and less-reliable imported water from both Northern California and the Colorado River. The proposed project would help IRWD to store more drought-proof recycled water during the winter months for use during the summer months and maximize the use of recycled water for public landscaping, agricultural, business and industrial uses. Every gallon of recycled water IRWD uses for non-drinking water purposes saves a gallon of drinking water, helping the region's existing and planned future development to better withstand future water shortages. By reducing IRWD's dependence on costly imported water, the proposed project would allow IRWD to replace an expensive source of water for one that is both less expensive and a drought-resilient supply, which increases IRWD's water supply reliability.

The proposed project would be implemented within IRWD's service area at the location of the existing Syphon Reservoir, northeast of Portola Parkway between Bee Canyon Access Road and SR-133 in the County of Orange (**Figure 2-1**). The Crean Lutheran High School Athletic Complex is located between Portola Parkway and the toe of the existing dam. Residential neighborhoods are located on the southwest side of Portola Parkway. The ground surrounding the reservoir is hilly with ridgelines and terraced slopes. Ground surface elevations at the site range from about 675 feet above mean sea level (amsl) in the northeast corner of the project site to about 319 feet amsl at Portola Parkway immediately downstream of the existing reservoir. The reservoir is located within the Central and Coastal Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and is included as an operating reservoir allowed within the NCCP/HCP Reserve. Implementation of expanded seasonal storage for recycled water purposes was anticipated and identified as a permitted use in the NCCP/HCP.


Existing (Google Earth, 2018)


Proposed (Fuscoe, 2020)

D170445.00

Figure 2-1
Existing and Proposed Syphon Reservoir

2.2 Project Purpose and Need

The purpose of the proposed project is to increase the recycled water storage capacity at Syphon Reservoir in order to meet the seasonal demand of recycled water customers and to enhance IRWD's water supply reliability. Water recycling is an essential component of IRWD's water supply portfolio, as any demand met with recycled water reduces the demand for high-quality drinking water. The expansion of Syphon Reservoir would assist in meeting projected demands within the service area by allowing the storage of additional recycled water produced at the Michelson WRP during periods of low demand (winter months) for use during periods of high demand (summer months). Although IRWD's existing recycled water reservoirs provide some storage for recycled water, once the storage reservoirs are filled to capacity in winter months, recycled water supplies are either diverted to Orange County Sanitation District (OCSD), Orange County Water District or discharged to the ocean. During the dry summer season, when irrigation demands are highest, service area demand for recycled water depletes existing reservoir storage and exceeds the rate at which new recycled water is produced by the WRPs. IRWD must then purchase supplemental imported water from Metropolitan Water District of Southern California (MWD) to meet the seasonal demands of IRWD's recycled water customers. Based on projected demands and supplies, IRWD estimates that it will need 4,500 AF of additional recycled water storage capacity by the year 2030 to meet demand. The expansion of Syphon Reservoir's storage capacity from the current 500 AF to approximately 5,000 AF would help IRWD become more self-sufficient by reducing its dependence on costly and less-reliable imported water during summer months, and would increase the use of recycled water to maintain community landscaping, as well as agricultural, business and industrial uses. IRWD produces up to 28 million gallons of recycled water every day at its WRPs. Every gallon of recycled water IRWD uses for these non-drinking water purposes saves a gallon of drinking water. The proposed project would prepare IRWD for the future by storing more drought-proof water, helping the region better withstand future water shortages. By expanding water recycling infrastructure, the proposed project would be consistent with California Water Code Section 13512, which states, "[i]t is the intention of the Legislature that the state undertake all possible steps to encourage development of water recycling facilities so that recycled water may be made available to help meet the growing water requirements of the state."

2.3 Project Objectives

The primary objective of the proposed project is to allow for an increase in IRWD's seasonal recycled water storage capacity. In implementing the proposed project, IRWD would:

- Improve local water supply reliability by reducing the need to purchase costly imported water from MWD by storing additional recycled water during low demand periods for use when needed during high demand periods;
- Ensure the new engineered dam and reservoir meet or exceed the current safety and design requirements established by the California Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which is the governing state agency associated with this project;
- Reduce diversions of sewage to OCSD;
- Maximize the use of recycled water produced by IRWD for the benefit of IRWD customers; and
- Reduce recycled water discharges to the ocean.

IRWD's current dam safety program falls under the jurisdiction of the DSOD. The intent of the Syphon Reservoir Improvement Project would be to not only meet the requirements of DSOD, but to exceed those requirements by considering the current state of practice of Risk-Informed Decision-Making (RIDM) during design and construction. The overarching goal of this approach would be to construct an expanded Syphon Reservoir that would comply not only with state requirements but would also leverage the significant benefits that a risk-informed dam safety approach can provide in protecting dam facilities and the public. Agencies, owners and regulators from around the world (including all US federal dam owners and regulators such as the Bureau of Reclamation, the US Army Corps of Engineers, and the Federal Energy Regulatory Commission) use RIDM and associated risk management strategies to assess and manage risks for dams, including making decisions about the safety of their facilities and necessary actions to reduce risk. The risk-informed design approach for the Syphon Reservoir Improvement Project would result in a dam design that avoids failures and associated consequences to downstream communities consistent with IRWD's priority of public safety.

2.4 Project Description

The proposed project primarily involves the expansion of three on-site facilities: Syphon Reservoir Dam, Syphon Reservoir, and Syphon Reservoir Treatment Facilities. Other operational design features would include an internal seepage control system within the new engineered dam; a circulation/aeration system for the reservoir; new onsite access and maintenance roads; wetland and riparian mitigation areas; and potential recreational facilities. These project facilities and components are described further below. It should be noted that sizes, dimensions, and locations of the various project components and configurations as further described herein, are based on feasibility-level evaluations and are subject to change with final design.

The delivery of recycled water to and from Syphon Reservoir would be accomplished with existing offsite facilities. Modifications to offsite facilities would be limited to the addition of pumps within the existing structures as further described below. As shown in Figure 1-3, existing offsite conveyance facilities would be used to deliver tertiary-treated recycled water from the Michelson WRP to the Eastwood Recycled Water Pump Station, and then to Syphon Reservoir via an existing 36-inch recycled water pipeline. The Eastwood Recycled Water Pump Station is a multi-zone pump station that pumps recycled water from IRWD's Zone A to Zone B through one set of pumps, and Zone A to Zone C through a separate set of pumps. The pump station structure is currently under construction. When completed, the Eastwood Recycled Water Pump Station can accommodate the Syphon Reservoir Improvement Project with additional pump equipment. Installation of the additional pump equipment would be coordinated as a separate "equipping project" in parallel to the construction of the proposed Syphon Reservoir improvements. The existing Highline Canal would be abandoned in place and no longer used to deliver water to Syphon Reservoir from IRWD's Rattlesnake Reservoir. Under normal operating conditions, all flow out of Syphon Reservoir would be conveyed back to Eastwood Recycled Water Pump Station through the same 36-inch recycled water pipeline, for connection to IRWD's recycled water distribution system (refer to Figure 1-3).

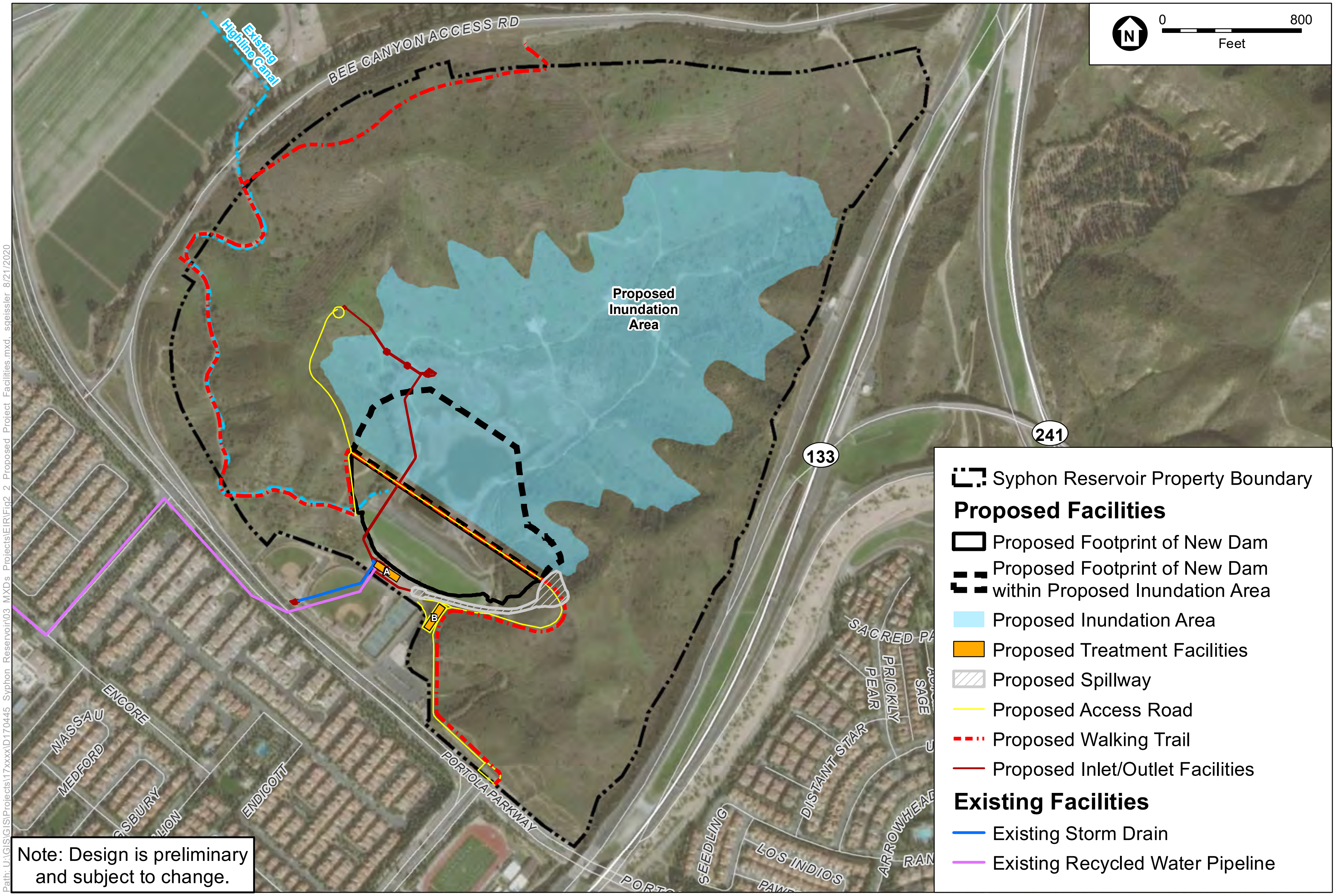
2.4.1 Dam Replacement

The proposed project would replace the existing engineered dam with a new engineered dam, increasing the existing 59-foot dam height to 136 feet and increasing the elevation of the dam crest from the existing 388 feet amsl to 466 feet amsl. The new dam would be an earthfill embankment. The embankment slopes would provide adequate stability including for seismic loading conditions. The freeboard of the dam is 10 feet, the difference between the dam crest elevation (466 feet amsl) and spillway crest elevation (456 feet amsl).

The crest of the new dam would be approximately 20 feet wide and approximately 1,300 feet long. **Figure 2-2** shows the preliminary footprint of the proposed dam, which would be constructed primarily from on-site materials, although the importation of some specialty materials is anticipated. Onsite materials would be obtained from excavation of the existing earthen embankment dam and spillway, excavation below the new dam footprint and borrow excavations within the existing and proposed reservoir area. The proposed project would require an estimated 2.3 million cubic yards of fill, of which approximately 2.2 million cubic yards would be available onsite. Approximately 0.1 million (100,000) cubic yards of material would be imported from offsite sources, including rock, gravel and other materials required to construct portions of the dam.

Slope protection for the new dam would consist of rip-rap on the upstream slope and vegetation on the downstream slope. The rip-rap on the upstream slope would provide erosion protection from wave action resulting from water in the reservoir. Similar to the existing dam, the vegetation on the downstream slope would consist of grass and would provide erosion protection from rainfall runoff.

The existing dam includes a spillway that has never been used during its 62-year history, including during IRWD's ownership and operation of Syphon Reservoir (GEI 2012a, page 4-18). Similar to the existing dam, it is a requirement of DSOD that a spillway be included with the new dam to protect the reservoir from overtopping. The new proposed spillway would be designed to meet or exceed the current safety and design requirements established by the DSOD. The elevation of the spillway crest would be approximately 456 feet amsl, providing 10 feet of freeboard relative to the dam crest at 466 feet amsl and thus ensuring that overtopping of the dam would not occur. In addition, IRWD would operate the reservoir with additional freeboard below the spillway to capture the volume of water generated by the probable maximum flood (PMF) and 100-year storm events to ensure the water surface elevation remains safely below the spillway crest elevation at all times. Furthermore, IRWD's current and future operating procedures include monitoring the local weather forecasts, and in the event of a major storm event, IRWD will lower the reservoir's water surface by distributing the stored water throughout IRWD's recycled water system, or sending a controlled flow to the existing storm drain in advance of the predicted storm event.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 2-2
Proposed Project Facilities

ESA

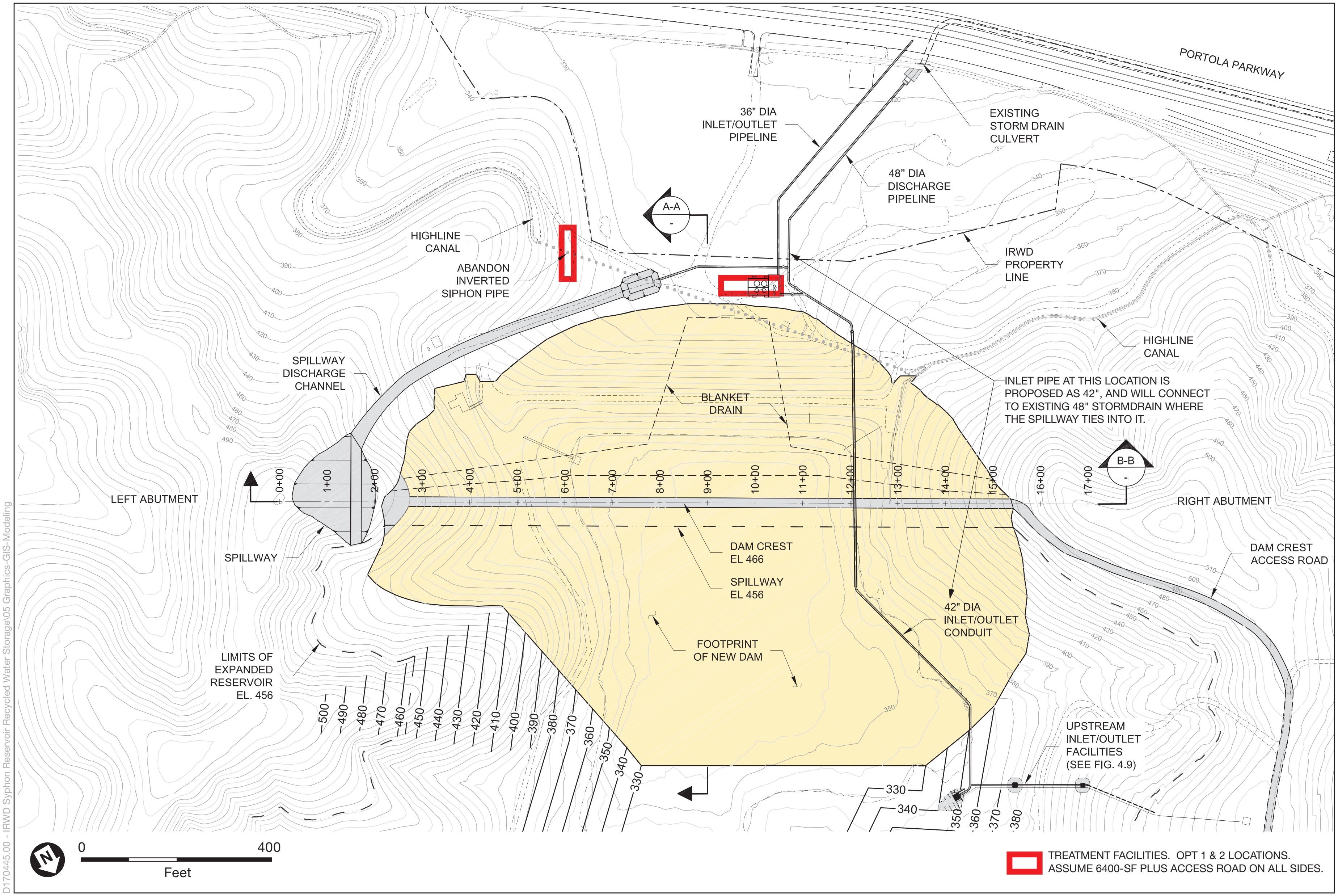
The conceptual design of the spillway is shown on **Figure 2-3** and consists of a 22-foot-wide by approximately 220-foot-long channel cut into the left abutment of the dam. The new spillway would be constructed and lined with reinforced concrete to prevent erosion of the abutment and embankment materials. Flows through the spillway would discharge into a channel lined with grouted rip-rap (concrete grout placed in void spaces between rip-rap pieces), and then would enter a partially below-grade retention basin designed to dissipate the energy of the flow. Water would exit the retention basin via a new 48-inch conduit connecting to the existing 48-inch discharge pipeline that would route flows to the existing storm drain box culvert, located in Portola Parkway. A baffled concrete energy dissipation structure and short rip-rap lined channel are located at the end of the 48-inch discharge pipeline to reduce flow velocities to safe levels for entry into the box culvert.

The spillway system would be designed to accommodate inflow to the reservoir during precipitation events, including the PMF and 100-year storm events. During such events, stormwater runoff could add up to approximately 257 AF of water to the reservoir and raise the water surface elevation by approximately 2 to 3 feet. The proposed spillway would be designed to pass 280 cubic feet per second (cfs), although during precipitation events, IRWD would maintain reservoir levels well below the spillway crest to create sufficient storage space for stormwater runoff to enter the reservoir and avoid the need for outflow through the spillway. The spillway would convey flow into a concrete energy dissipation basin and into a 48-inch pipeline connected to the existing Portola Parkway storm drain culvert. The existing storm drain capacity is capable of receiving and safely conveying the storm event flows.

2.4.2 Reservoir Enlargement

The replacement dam would result in an increase in the reservoir's maximum water surface elevation from 376 feet amsl to 456 feet amsl and increase the reservoir's capacity from approximately 500 AF to 5,000 AF. As shown in Figure 2-1 and Figure 2-2, the proposed project would expand the reservoir's shoreline and inundate up to approximately 82 acres upstream of the dam that currently support upland and wetland vegetation communities, some of which are within the NCCP/HCP Reserve area and deed restricted lands. The existing reservoir ground surface would be excavated non-uniformly to obtain approximately 2.2 million cubic yards of material to construct the new engineered dam.

As part of the new design, the engineered embankment dam would include a seepage control drainage system consisting of a steeply inclined chimney drain and a gently sloping blanket drain constructed on the downstream side of the dam. The purpose of the drainage system is to safely route seepage through the dam. This prevents erosion in the embankment area and ensures slope stability. Each drain component would be approximately 5 feet thick and would be positioned within the dam structure as shown in **Figure 2-4**. The blanket drain would discharge to a piped-collection system near the toe of the dam.

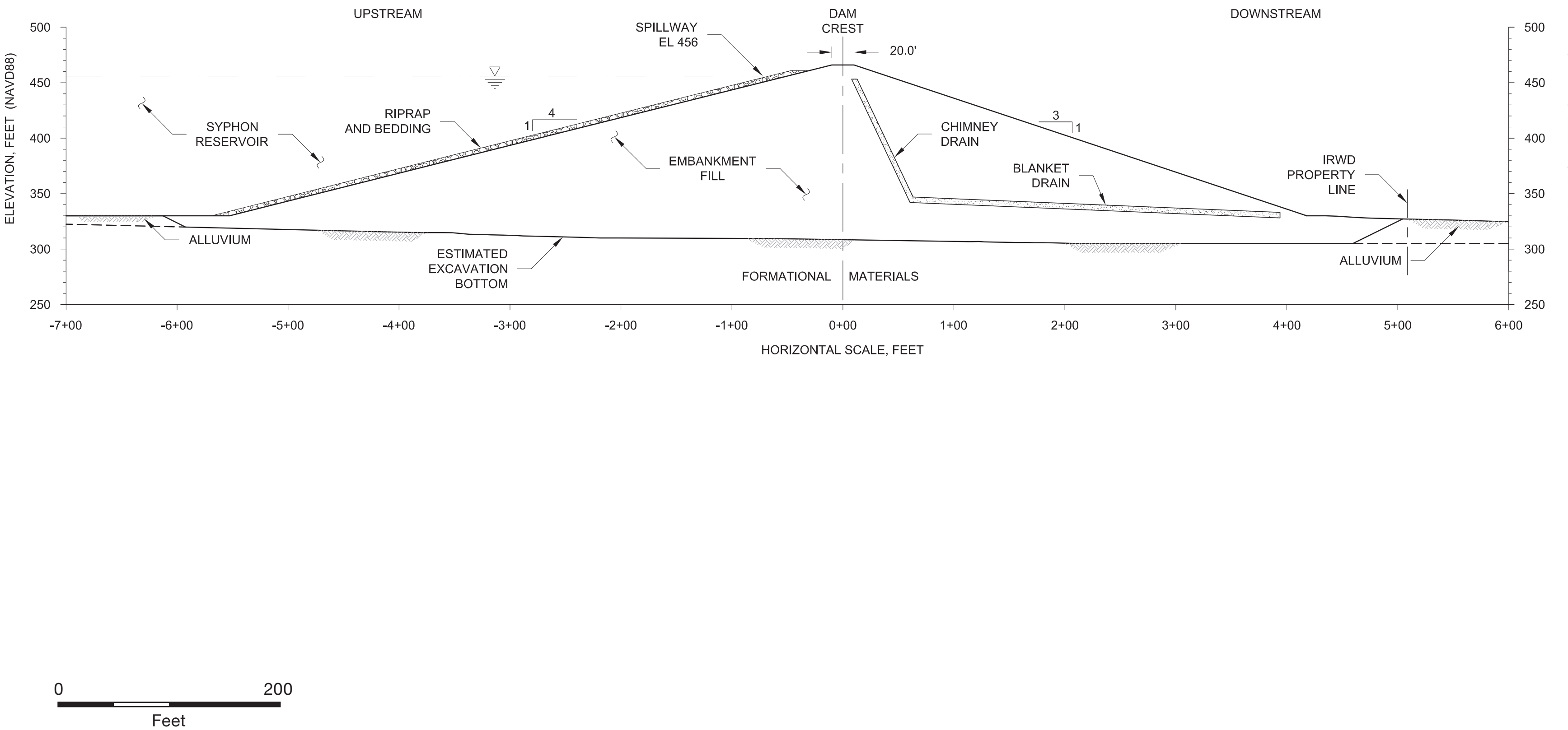


SOURCE: GEI Consultants, 2012

Syphon Reservoir Improvement Project

Figure 2-3
Plan View of Proposed Embankment Dam

ESA



SOURCE: GEI Consultants, 2012

Figure 2-4
Proposed Cross Section of New Dam

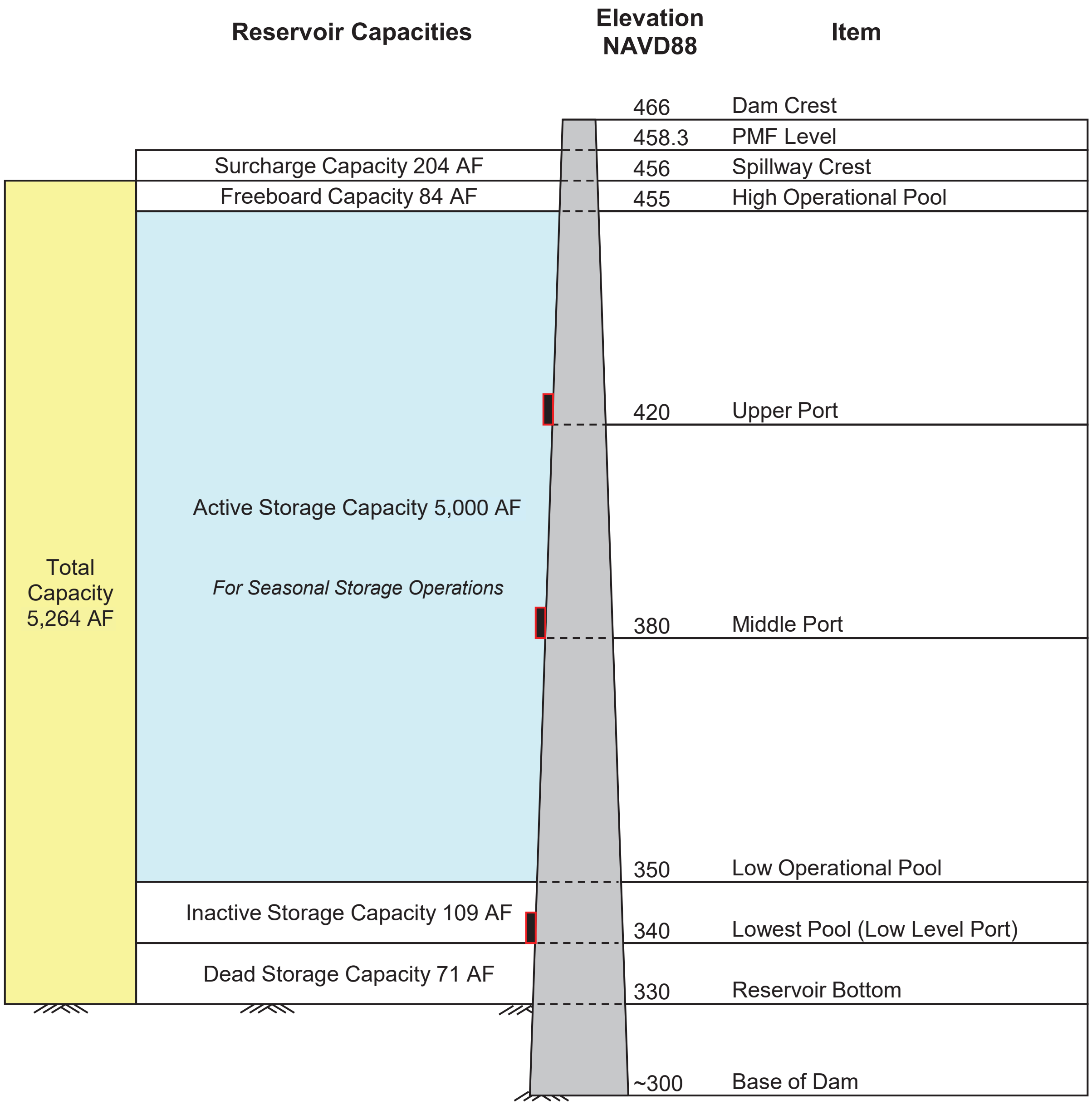
A series of existing and proposed pipelines would be used to transport water to/from IRWD's existing recycled water distribution system to the enlarged reservoir. Recycled water would be delivered to Syphon Reservoir via an existing 36-inch recycled water pipeline and the Eastwood Recycled Water Pump Station, which is located off-site and currently under construction (see Figure 1-3). Currently, the existing 36-inch recycled water pipeline is only used for outlet of recycled water from the reservoir; the project would require bi-directional flow through this pipeline, allowing it to be used for inlet as well as outlet of recycled water, into and out of the enlarged reservoir, respectively. The existing 48-inch discharge pipeline would be used for emergency drainage (as described above under Section 2.4.1), similar to existing conditions. A new, approximately 42-inch, inlet/outlet conduit would be constructed to connect two proposed inlet/outlet ports along the north-facing reservoir slope to the existing onsite 36-inch inlet/outlet pipeline that ends near the toe of the existing dam. The inlet/outlet ports allow for selective withdrawal of recycled water from the reservoir and provides IRWD with flexibility to select water from different heights in the reservoir based on water quality considerations. Pipelines and appurtenant facilities are shown on Figure 2-2 and Figure 2-3. The size and location of proposed pipelines are subject to change with final design. **Figure 2-5** is a diagram (not to scale) showing key features of the proposed dam and their elevation relative to the reservoir storage capacities and water surface.

Similar to the existing reservoir, the proposed project would be provided with a water circulation/aeration system to maintain water quality within the reservoir. The benchmarks for acceptable water quality include maintaining sufficient dissolved oxygen concentrations to prevent excessive odors and internal nutrient recycling, minimizing algal biomass, and minimizing the need for chemical treatment. The water circulation/aeration system would be detailed during final design, and would likely consist of a compressed air distribution system or surface mixer/aeration system.

2.4.3 Treatment Facilities

The existing strainer and disinfection facilities would be demolished, reconstructed and expanded at the toe of the new dam to provide filtration, chlorination and de-chlorination. The potential locations of the treatment facilities, which would be determined during detailed design, are depicted in Figure 2-2 and Figure 2-3. The layout would consist of an enclosed masonry building. The footprint of the proposed treatment facilities would be determined during the detailed design, but is anticipated to be approximately 40 feet by 160 feet. The purpose of the treatment facilities would be to de-chlorinate the recycled water as it enters the reservoir, filter the recycled water as it leaves the reservoir to remove algae and leaves, and chlorinate the recycled water as it leaves the reservoir to provide a chlorine residual as the water is delivered through IRWD's recycled water distribution system.

As recycled water enters the reservoir from the Michelson WRP, the water would be de-chlorinated with sodium bisulfite prior to entering the reservoir for storage. Approximately 11,000 gallons of sodium bisulfite would be stored onsite and metering pumps would be used to facilitate the de-chlorination process. Sodium bisulfite would be stored within two tanks inside a building adjacent to the filtration facility. A masonry block wall building would house the storage tanks, metering pumps, and control system. Spill containment pads would be integrated into the facility.



Notes:
AF = acre-feet

Actual capacities will depend on final grading of the reservoir area.

SOURCE: GEI Consultants, Inc., 2012a

Figure 2-5
Proposed Dam Elevations and Reservoir Capacities

As water is withdrawn from storage, the filters would screen out debris (algae, leaves, etc.) that may have entered the reservoir during storage. The filters would come equipped with a backwash system and associated pump station that is used to clean the filters. The spent filter backwash water would drain to a new pump station that would pump the spent backwash water back into Syphon Reservoir.

The disinfection facility would add sodium hypochlorite prior to re-introduction into IRWD's recycled water distribution system. The hypochlorite system would pump metered sodium hypochlorite to achieve an approximate 5-part-per-million chlorine residual in the recycled water. Approximately 17,000 gallons of sodium hypochlorite would be stored onsite and metering pumps would be used to facilitate the chlorination process. Sodium hypochlorite would be stored within two tanks inside the same building as the dechlorination system.

2.4.4 Access and Maintenance Roads

The primary access point for construction traffic and future IRWD operation and maintenance is anticipated to be from the intersection at Portola Parkway and Sand Canyon Avenue. The current intersection consists of a "tee" intersection, where Sand Canyon Avenue ends at the intersection with Portola Parkway. The existing intersection includes traffic signals that allow two left-hand turn lanes and one right-hand turn lane onto Portola Parkway, as well as associated cross walks. As part of the proposed project, the intersection and associated traffic lights would be modified to allow construction and future IRWD operations access through the intersection, into the District's property. Construction vehicles and IRWD vehicles would also leave the site through the same intersection. Cross walks and associated pedestrian signals would also be modified to allow safe pedestrian crossing in both directions. The modification of the intersection, traffic signals, and crosswalks would be performed in accordance with City of Irvine requirements.

An unpaved road currently exists on the District's property in the vicinity of the intersection at Portola Parkway and Sand Canyon Avenue, which was used to access and maintain the existing Highline Canal. The Highline Canal in this area has since been abandoned. As part of the proposed project, this dirt road would be utilized and improved to allow two lanes (one in each direction) for ingress and egress for the construction and IRWD operation traffic. As part of the access road improvements, it is anticipated that excavation into the existing slope and construction of a retaining wall may be necessary to allow trucks to make the left turn onto the existing Highline Canal road after passing through the intersection. Figure 2-2 depicts the anticipated access road location.

Potential secondary construction access may be considered through existing IRWD maintenance roads off of Bee Canyon Access Road. If used, these roads would be considered as one-way access points and limited to specific construction activities as further determined during the detailed design phase.

2.4.5 On-Site Freshwater Wetland, Riparian and Upland Habitat Replacement Areas

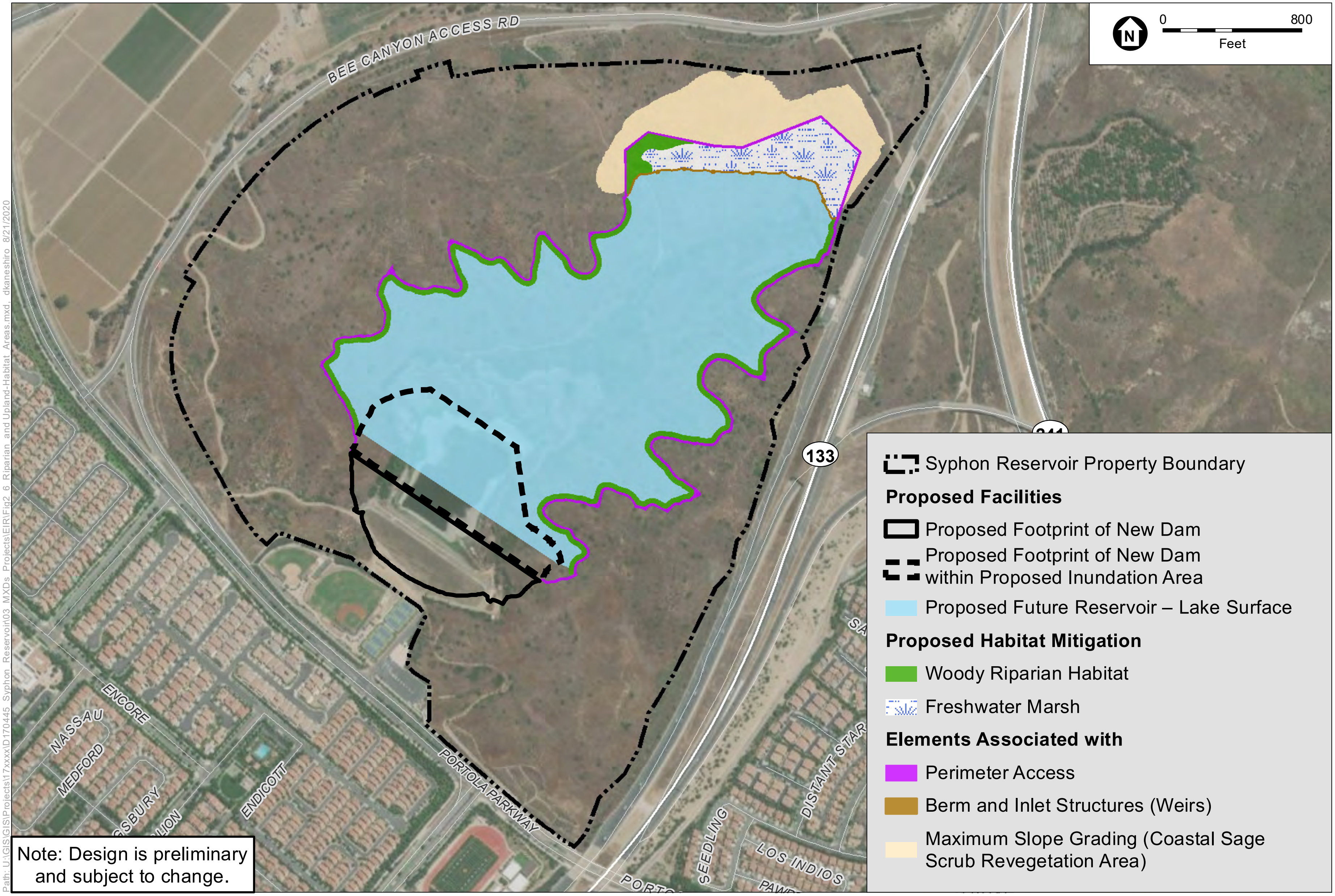
The displacement of the existing woody riparian and freshwater marsh communities resulting from expansion of the current facility would be offset on site at a 1:1 ratio, at minimum. At least 12.3 acres of riparian/wetland habitat consisting of native woody riparian vegetation and freshwater marsh habitat is proposed to be established onsite to replace habitat displaced by construction. Both freshwater marsh and woody riparian vegetation are proposed to be placed within a large patch at the northeast end of the proposed reservoir. Also, much of the woody riparian replacement habitat would be situated within a strip that would extend around the proposed reservoir at the same elevation as the planned water surface elevation when the reservoir is full as shown in **Figure 2-6**. A shallow trough would be constructed around the reservoir perimeter (excluding the dam face), which would support native trees and shrubs (e.g., willows, mulefat, etc.) forming a belt of riparian vegetation around the upper edge of the artificial lake. The trough would be formed with fine clayey material to reduce permeability and help retain water when the reservoir is periodically drained.

In addition to reserving a strip around the edge of the expanded reservoir for woody riparian habitat, an approximately 6- to 8-acre wetland area would also be established within a flat area extending northeast of the expanded reservoir (Figure 2-6). Like the perimeter trough for riparian habitat creation, this wetland area would be situated at an elevation just below the maximum water surface elevation of the reservoir. The underlying material in this area would consist of slowly permeable fine soil with very high clay content to retain water for extended periods when the reservoir is drained down. Freshwater marsh vegetation consisting primarily of tules (native cattail and bulrush species) would be planted or seeded in the area subject to periodic inundation. However, based on preliminary coordination with the wildlife agencies, additional woody riparian habitat and less freshwater marsh vegetation may be established in this flat area in order to increase habitat for State and federally Endangered least Bell's vireo on-site.

Significant grading would be necessary that would cut into the existing hill northeast of the future lake edge in order to create sufficient space for wetland and riparian habitat restoration in this area. This additional grading would occur in an area that is dominated by ruderal (weedy) vegetation and non-native grassland that provides relatively low wildlife habitat value. Once grading is completed, the graded slope would be seeded, planted and maintained to establish native coastal sage scrub habitat where none currently exists.

2.4.6 Recreational Facilities

During project design, IRWD would consider passive recreational facilities compatible with the project site. Recreational facilities could include a walking trail along existing access roads at the project site. As shown on Figure 2-2, this proposed walking trail could be located in the south and west portions of the project site, beginning at the new permanent access road at Portola Parkway and Sand Canyon Avenue and traveling along that route, across the dam crest, and following the alignment of the existing Highline Canal, which would be abandoned with implementation of the proposed project. Offsite recreational facilities are not part of this project and would be analyzed under separate environmental review if/when future offsite recreational facilities are established. Final design would determine the appropriateness and location of the proposed walking trail on existing access roads and any other optional recreational facilities. Coordination and approval from regulatory agencies, including U.S. Fish and Wildlife Service and California Department of Fish and Wildlife, would be required for onsite recreational components.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 2-6
Riparian and Upland Habitat Areas

ESA

2.4.7 Additional Geotechnical Investigations

As stated in Section 1.5.3, IRWD previously completed a comprehensive geotechnical investigation of the site from which the resulting data would be used during final design to develop the detailed construction documents. During the design phase, additional geotechnical investigations may need to be performed. If additional investigations are deemed necessary, the investigations may include the performance of exploratory test pits, soil borings, packer testing, and/or non-intrusive geologic investigations and observations. The additional geotechnical investigations, if needed, would remain within the proposed limits of disturbance defined by the project and would be mitigated as part of the overall project.

2.4.8 Technical Advisory Group

During the design phase, IRWD intends to establish an independent Technical Advisory Group (TAG) comprised of nationally recognized industry experts, which may include the disciplines of dam geology/site characterization, seismic analysis, hydrology/hydraulics, dam construction, potential failure mode analysis and RIDM. The purpose of the TAG is to provide an independent assessment of the design development including, but not limited to, review of design criteria, design details, technical approach, and other aspects of the design engineer's work to confirm that the project design is in full compliance with or exceeds governing standards and requirements.

2.5 Project Construction

Construction of the proposed project is estimated to require a total of 41 months. The preconstruction activities would begin in the fall of 2022 and would involve approximately 5 months of access road improvements. Preconstruction would be followed by approximately 36 months for construction of the new dam, reservoir, and associated facilities, depending on weather conditions and other variables. Construction is currently anticipated to begin in 2023. Most construction activities would be limited to 7:00 a.m. to 7:00 p.m. Monday through Friday and 9:00 am to 6:00 p.m. on Saturday. If construction work is conducted outside of these hours, IRWD would secure a variance/waiver from the appropriate entity. Construction of the proposed project would include activities implemented in phases as outlined below, which may involve overlap.

2.5.1 Preconstruction Activities and Intersection Modification

Before active construction activities are initiated onsite, all water within the reservoir would be drained and appropriate vegetation cleared outside of the bird nesting season. In addition, the proposed access road would be constructed starting at the intersection of Portola Parkway and Sand Canyon Avenue. As part of the proposed project, the intersection of Portola Parkway and Sand Canyon Avenue and associated traffic lights would be modified to allow access for construction vehicles and future IRWD operation and maintenance vehicles through the intersection, into the District's property. Cross walks and associated pedestrian signals would also be modified to allow safe pedestrian crossing in both directions. The modification of the intersection, traffic signals, and crosswalks would be performed in accordance with City of Irvine requirements.

A dirt or paved road would be graded from the new intersection at Portola Parkway and Sand Canyon Avenue for ingress and egress for the construction and IRWD operation traffic. As part of the access road improvements, it is anticipated that excavation into the existing slope and construction of a retaining wall may be necessary to allow trucks to make the left turn onto the existing Highline Canal road after passing through the intersection. Construction of the new access road would be completed within approximately 5 months and would require approximately 10 construction workers. A maximum of up to 42 daily trips would be required for haul trucks, equipment delivery, and employee vehicles throughout the duration of preconstruction activities.

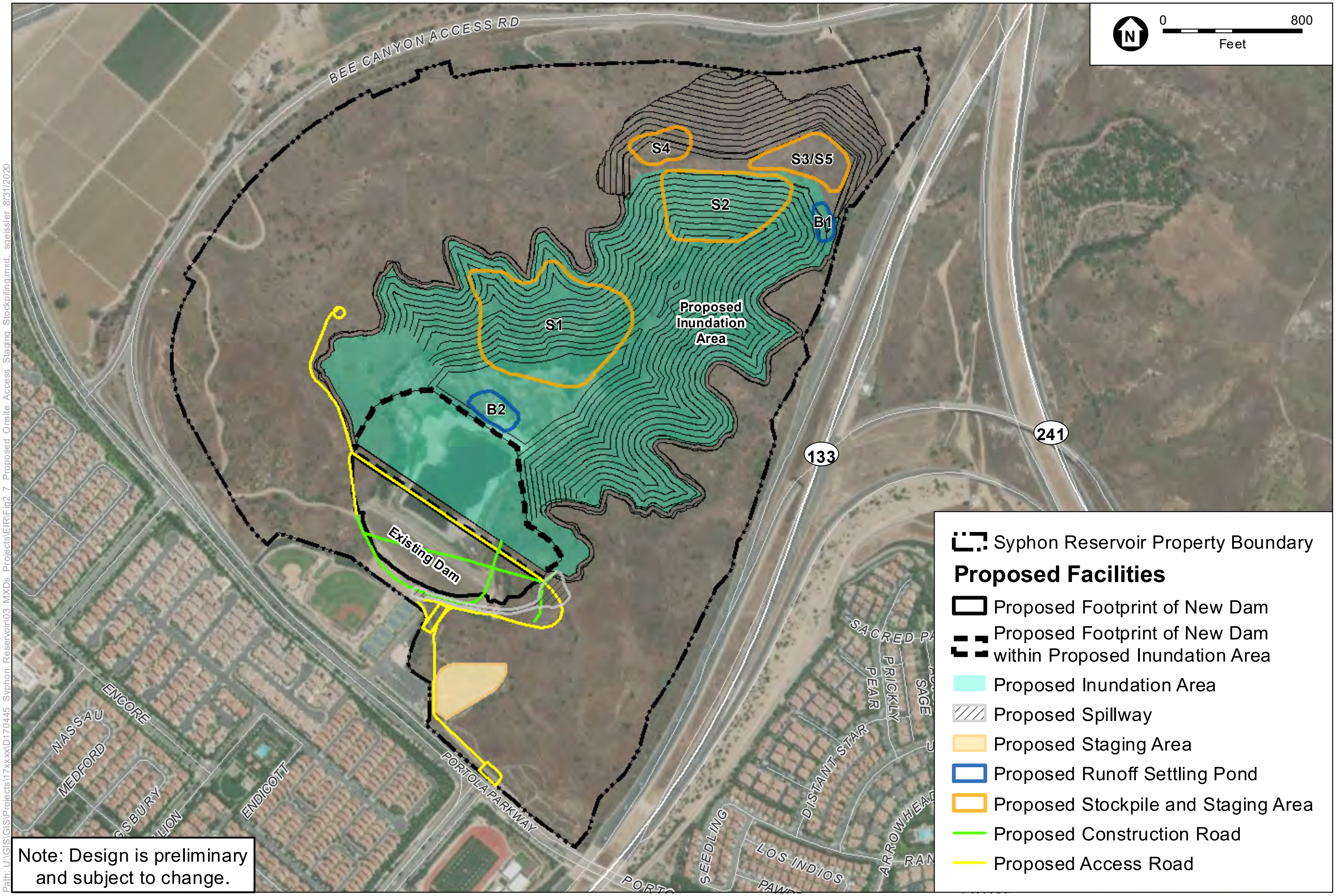
2.5.2 Construction Mobilization, Site Preparation and Staging Areas

Construction mobilization would involve initial mobilization of contractors, construction office trailers and equipment to the site, as well as initial site preparation. Stockpile and staging areas, runoff settling basins, as well as temporary construction access roads would be cleared and developed. The preliminary locations of these construction-related features are shown in **Figure 2-7** and are subject to change during final project design. Initial construction areas proposed for work also would be cleared. Ingress and egress areas would be delineated, fenced, or marked so that the surrounding habitat and riparian areas would not be impacted, to the extent possible.

The proposed stockpile/staging areas would hold reusable excavation materials, sediments, and topsoil, as well as material imported from offsite sources such as rock and gravel and would be located primarily within the proposed reservoir inundation area to avoid disturbance to surrounding conservation lands in the NCCP/HCP. The proposed stockpile/staging areas could also be used for excavating borrow materials once stockpiles are removed. Some stockpile/staging areas could be outside the reservoir expansion area and could hold materials to be used beyond the inundation area. These stockpile/staging locations would primarily be sited in areas that would later be used for upland restoration.

The construction access roads, shown in Figure 2-7, would be arterial roads used for the duration of the project construction period and have been designed to be primarily within the limits of disturbance for the reservoir enlargement and the new dam. As the site is developed, and borrow excavation areas are developed, utilized, and exhausted, the location of the roads may change and additional roads would be constructed. In addition, some of the construction access roads may transition to permanent maintenance and access roads.

The runoff settling basins would be constructed onsite to capture sediment and runoff during construction, including nuisance flow, flows from the storm drain conduit below SR-133, and flows from dewatering operations. The basins also could be used as a water source for dust control and soil moisture conditioning.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 2-7
Proposed Onsite Access, Staging, and Stockpiling

ESA

Temporary office facilities (likely consisting of multiple temporary trailers) would be established near the toe of the dam (see Figure 2-7), which would be used by the contractor for the duration of construction. This location could also provide some level of site security as a controlled access since all vehicles entering and leaving the site would pass this point. Additional mobilization of equipment to distinct areas onsite may occur on an ongoing basis, for each construction phase described below, based on the particular activity occurring onsite.

2.5.3 Excavation of Material/Existing Dam and Dewatering

Approximately 2.4 million cubic yards of material would be excavated from within the project site for use in construction of the proposed project components. These materials include topsoil, lake bottom sediments, alluvium, colluvium, slopewash, formational materials, as well as the existing dam. The majority of materials would be obtained from borrow excavations made within the enlarged reservoir inundation area; these reservoir area excavations also would contribute significantly to the capacity of the expanded reservoir. Each material type is briefly explained below, including suitability for each as embankment fill for the proposed new dam.

Lake bottom materials are present beneath the existing reservoir with sediment thickness ranging from zero at the edge of the reservoir (when full) to a maximum of 20 feet adjacent to the dam. Average sediment thickness is estimated at approximately 5 feet (AECOM 2020 & GEI 2012a). Lake bottom materials would not likely be suitable for use as embankment fill material. Alluvium is present at the project site in the valley bottom areas, near and below the existing dam. Alluvium is comprised of interlayered silt, sand, and clay with trace amounts of gravel and cobbles. Alluvium is not adequate foundational material for the proposed dam but would be suitable material for use as embankment fill in the proposed new dam. Mixtures of slopewash and colluvium are present on the hillsides above the valley bottom on the project site. The slopewash and colluvium thickness vary across the site from about 1 foot along the hillsides to about 35 feet in the valley bottom (AECOM 2020). These soils are comprised of interlayered silt, sand, and clay, typically with trace amounts of gravel. The slopewash and colluvium are suitable materials for use as embankment fill in the proposed dam. The formational materials underlying the project site are the Vaqueros/Sespe Formation and Silverado Formation. These formational materials are considered excellent foundation for an embankment dam and would be a good source of material for use as embankment fill as well.

The proposed embankment dam would be founded on the Vaqueros/Sespe and Silverado Formational materials. The estimated extent of excavations to provide a suitable foundation for the proposed embankment dam are shown on profile and cross-sectional views of the proposed new dam in Figure 2-3. The formational materials are expected to provide a foundation with high shear strength, low compressibility, and low permeability. Construction would consist of compaction of the upper layers of the foundation with heavy equipment prior to placement of embankment materials and treatment of the fault zone as discussed below. Special measures to improve the foundation materials may be included if their need is determined during the design phase.

A conceptual grading plan for the proposed reservoir area is shown in Figure 2-6 and Figure 2-7. This reservoir grading plan would achieve approximate balance between the volume of material needed for embankment fill construction, and the excavated volume of fill that would be produced from all onsite sources. Implementation of the grading plan would result in the excavation of topsoil, lake bottom materials, alluvium, colluvium, slopewash, and highly weathered formational materials as described below.

Lake bottom materials overlie the alluvium on the upstream side of the existing dam. These lake bottom materials would be removed from below the footprint of the proposed dam, as well as from the entire reservoir area. The alluvium below the proposed dam footprint would be removed due to the potential for liquefaction of loose sandy layers in the alluvium during seismic loading. Removal of the alluvium necessitates removal of the existing dam. The excavation depth of the alluvium in the valley bottom is anticipated to be up to about 35 feet. The existing dam would be excavated down to elevation 330 feet amsl. Both the alluvium and existing dam materials would be reused for construction of the proposed new embankment dam.

Topsoil, colluvium, slopewash, and highly weathered formational materials (if present) on the left and right abutments would also be removed below the footprint of the proposed new embankment dam. The depth of excavations to remove these materials is expected to range from less than 1 foot along the hillsides to about 35 feet in the valley bottom. All of these materials, except topsoil, could be reused for construction of the proposed embankment dam.

An ancient fault onsite that separates the Vaqueros/Sespe and Silverado Formations would likely be exposed following excavation of the alluvium. This fault is inactive, which was confirmed by the Syphon Reservoir Geotechnical Investigations Project (see Chapter 1), and has a negligible potential for future displacement. It is anticipated that treatment of the fault zone would include localized over-excavation of the fault zone and replacement with compacted embankment fill.

During excavation activities, saturated materials and shallow groundwater would be encountered. Groundwater depth at the downstream toe of the existing dam is approximately three feet below ground surface. Groundwater relief trenches for dewatering would be installed in materials and into the alluvium as needed during excavation. The area downstream of the toe of the dam would also be dewatered.

The borrow excavation could be accomplished with large excavators and articulated trucks. This equipment is well suited to the wet and soft nature of materials in the excavated zones and stockpile areas. Excavation productions by excavator and trucks may range between 2,500 and 5,000 cubic yards per 8-hour day.

The processing of all excavated material would be done in the stockpile areas. Processing and drying of saturated materials would be accomplished using various methods, including use of discs and tractors to expose the material to sun and wind, and mixing drier and wetter borrow materials together. Wet materials transported to stockpile areas could be spread with a dozer, such as a low ground pressure bulldozer.

Depending on weather conditions, the excavation phase of the proposed project would be completed within approximately 7 to 9 months. A maximum of 74 daily trips would be required for haul trucks, equipment delivery, and employee vehicles throughout the duration of excavation activities.

2.5.4 Construction of New Dam, Spillway and Reservoir

The proposed new engineered dam would be an earthfill embankment constructed primarily from onsite materials. The majority of materials for the embankment fill would be obtained from borrow excavations made in the reservoir area, as described above in Section 2.5.3. Approximately 2.2 million cubic yards of compacted material would be reused onsite for construction of the new engineered dam. Approximately 0.1 million cubic yards of material would be imported from offsite sources, including the rock, gravel and other materials required for the construction of portions of the dam, including riprap. A portion of the topsoil obtained during borrow excavation could be used on the downstream slope of the new dam to support the proposed vegetation for downstream slope protection. However, topsoil would not be suitable for embankment fill. Lake bottom sediments would also not be suitable for embankment fill.

Once all sediment has been appropriately excavated, stockpiled, and processed, the new proposed embankment dam would be installed. First, the new, approximately 42-inch inlet/outlet, conduit would be installed below the proposed new dam as outlined in Figure 2-3, at elevation 330 feet amsl. The new proposed pipeline would be approximately 700 feet in length and would connect the two proposed upstream inlet/outlet ports along the north-facing reservoir slope to the existing 36-inch inlet/outlet pipeline at the toe of the dam.

The dam embankment fill materials would be placed in thin horizontal layers and compacted with heavy equipment to create a material with the required strength and compressibility characteristics. The downstream embankment material would be placed and compacted below the existing dam area, including toe backfill. The embankment construction would continue, up to the bottom of the blanket drain, between 330 to 340 feet amsl (see Figure 2-4).

The blanket drain would then be installed, using drain aggregate material. The blanket drain and associated embankment would be installed simultaneously between approximately 330 feet amsl to 340 feet amsl. The proposed dam embankment and chimney drain would continue to be constructed above elevation 340 feet amsl. Depending on weather conditions, approximately 12 months of work would be required to construct the embankment above elevation 340 feet amsl, up to the dam crest. The rate of rise in the lower portion of the dam would be approximately one foot per 8-hour day, with production lessening in the upper portion of the dam especially near the crest. Riprap would be installed at approximate 10-foot increments along the top of the upstream embankment. Riprap may be stockpiled or delivered directly to placement areas as needed. Approximately 1,695 cubic yards of concrete would be required for construction of the proposed inlet/outlet encasement, port structures, and other associated facilities.

Construction of the proposed embankment may be done with scrapers, or a large excavator and articulated trucks. The embankment would be spread with bulldozers and compacted with sheepsfoot and vibratory rollers, depending on the materials. Support equipment would include graders and water wagons.

Continuous on-site inspection by certified geotechnical staff would occur during the contractor's placement of the embankment dam materials to ensure compliance with design criteria and requirements. DSOD would also have staff present periodically during construction to ensure the dam is being constructed in compliance with its requirements.

Monuments would be established on the dam crest to monitor settlements and lateral movements. Open wells and/or piezometers would be installed to monitor piezometric levels (groundwater pressures) in the embankment and foundation. A seepage collection system would be installed at a low point at the downstream toe of the dam to monitor embankment seepage.

The proposed new spillway would be constructed and lined with reinforced concrete to prevent erosion of the abutment and embankment materials. Approximately 164 cubic yards of concrete would be required for this phase. The spillway would be constructed once the construction of the dam embankment is near completion (overlap may occur).

Construction of the proposed dam, spillway and expanded reservoir would be completed within approximately 14 months, depending on weather conditions. Up to approximately 232 daily trips would be required for haul trucks, equipment delivery, and employee vehicles throughout the duration of construction activities.

2.5.5 Construction of Treatment Facilities

The existing filtration and disinfection facilities would be demolished during construction of the new embankment dam and rebuilt and enlarged in one of the optional locations as part of the proposed project. Construction of the proposed new treatment facilities would occur once construction of the new dam embankment is largely complete and would require site preparation and grading, followed by installation of buried and exposed piping, mechanical, electrical/control, and structural facilities. Construction of the proposed new treatment facilities would last approximately 12 months, depending on weather conditions, and would require a crew of up to 16 construction workers. Up to 104 total truck trips, vehicle deliveries and employee trips would be required per day. Construction equipment would include a front-end loader, backhoe, bobtail dump truck, transit mix concrete truck, vibratory walk-behind compactor and water truck. If water is encountered during excavation or trenching it would be dewatered and discharged to the existing Portola Parkway storm drain under a permit from the Regional Water Quality Control Board. Trench width would vary depending upon the size (diameter) of the pipeline but would generally be between 2 to 6 feet. Excavated soils would be placed back within the trench and spread over the site in other disturbed areas. No off-site trucking of soils would be necessary. Approximately 500 cubic yards of concrete would be required for these facilities, including for the concrete pad and masonry buildings.

2.5.6 Construction of Wetland, Riparian, and Upland Areas

Approximately 12.3 acres of riparian/wetland onsite habitat would be established at the eastern end and around the perimeter of the reservoir. These areas would be graded and contoured at the same time excavation and grading occurs as described under Section 2.5.3. A shallow trough would be constructed around the reservoir perimeter and would be formed with fine clayey material to reduce permeability and help retain water when the reservoir is periodically drained. After installation of the trough, irrigation would be installed through a series of pipelines that are around the perimeter of the reservoir, which connect to the reservoir water source. Subsequent planting and seeding of native trees and shrubs would form a belt of riparian vegetation around the upper edge of the reservoir. Additionally, up to 10.47 acres of onsite coastal sage scrub would be planted on the graded slope to the northeast of the riparian and wetland habitat area. Installation of the wetlands/riparian area would require up to 50 vehicle and equipment trips over the course of 12 months. Required equipment would include a skid steer loader, pick-up trucks, ATVs, and a water wagon.

2.5.7 Installation of Recreation Facility

A proposed recreation facility may consist of a walking trail installed on existing onsite roads and access points as shown on Figure 2-2. For example, the existing Highline Canal could be backfilled for installation of the proposed walking trail. Construction of a trail would occur through grading and compacting of native material. No existing vegetation would be impacted by the installation of the trail along existing roads or the Highline Canal. A potential on-site trail extension may be installed east from the existing Highline Canal and would be located on ridges or other relative gradual-sloped terrain. Up to 10 workers would be required to install the onsite trail over the course of 3 months. Up to approximately 30 total daily vehicle trips would be required to construct the trail, and equipment would include graders, pick-up trucks, and water trucks.

2.5.8 Site Restoration/Demobilization

Site restoration/demobilization would involve removal of all equipment, debris and personnel from the site. Site restoration would occur over the course of one month and would require up to 44 daily vehicle trips. Required equipment would include an excavator, rubber-tired loaders, a tool carrier, pick-up trucks, and a water truck.

2.5.9 Site Access, Workers, and Equipment Usage

As stated previously, the main access point to the project site would be from the intersection of Sand Canyon Avenue and Portola Parkway. The majority of materials for the embankment fill would be obtained from borrow excavations made in the reservoir area (Figure 2-7). Approximately 2.2 million cubic yards of compacted material would be reused onsite for construction of the new engineered dam. Approximately 0.1 million (100,000) cubic yards of material would be imported from offsite sources, including the rock, gravel and other materials required for the construction of portions of the dam, including riprap. This material is expected to be imported from local quarries in Corona, CA (e.g., Hanson Aggregates quarry approximately 28 miles away) or San Juan Capistrano, CA (e.g., Ortega Rock quarry approximately 26 miles away). It is not anticipated that any materials would need to be exported from the site; however, if this were necessary, local landfills that except soils or local construction sites that need soils would be used. There are two haul route options that could be used for material delivery. Haul route Option 1 would be SR-133, north on Irvine Boulevard, and east on Sand Canyon Avenue for trucks traveling inbound, and westbound on Sand Canyon Avenue and south on Irvine

Boulevard to SR-133 for trucks traveling outbound. Haul route Option 2 would be from Interstate Highway 5 (I-5) and then east on Sand Canyon Avenue for trucks traveling inbound, and westbound on Sand Canyon Avenue to I-5 for trucks traveling outbound.

The peak daily trip activity would occur during construction of the dam, expanded reservoir and spillway. In this phase, up to approximately 66 haul trips, 3 delivery trucks, and 46 employee vehicles would access the site each day, for a total of up to approximately 232 haul trucks per day for approximately 3 to 4 months. During other phases of construction, haul trucks and material deliveries would be expected in the range of 3 to 24 trucks per day, and approximately 10 to 31 construction workers would be onsite per day.

Construction of the proposed project would involve the use of a variety of heavy construction machinery onsite. The majority of equipment and vehicles would be associated with the intensive earthwork and the structural and paving phases of construction. Large construction equipment such as backhoes, compactors, cranes, excavators, scrapers, haul trucks, pavers, and rollers would be used during the construction phase of the proposed project.

2.6 Operation and Maintenance

Once operational, all project components would operate and be monitored via IRWD’s Supervisory Control and Data Acquisition (SCADA) system. Reservoir level sensors would be installed to monitor water levels in the reservoir. In addition, instrumentation and monitoring systems would be installed to continuously monitor the stability of the dam and to identify situations that may require intervention, such as a controlled emergency release of water from the reservoir. Instrumentation and monitoring will be determined during final design and may include, but are not limited to, survey monuments, inclinometer, seepage weirs, piezometers, reservoir level sensor, strong-motion accelerographs, and a weather station.

Similar to the current reservoir, operation of the proposed project would not require daily onsite staffing but, rather, would require only periodic maintenance. Water levels at Syphon Reservoir would fluctuate seasonally; water would be stored in winter when recycled water supply exceeds demand, and the reservoir would be drawn down in summer when recycled water demand exceeds supply. The estimated minimum operating capacity of the reservoir would be about 180 AF to maintain water quality. However, IRWD would develop an operating plan for Syphon Reservoir, updated each year to set targets for the volume of water to be contained in the reservoir on a daily, monthly, annual, or seasonal basis. Reservoir operations would vary with time, and would need to consider a wide variety of factors, such as: seasonal storage needs, water quality considerations, impound requirements based on rainfall projections, and operational compatibility with the IRWD recycled water system.

As mentioned previously in Section 2.4.1, during precipitation events, IRWD would maintain reservoir levels well below the spillway crest to create sufficient space for stormwater runoff to enter the reservoir and avoid use of the spillway. The annual operating plan would identify a maximum water surface elevation that would ensure overtopping of reservoir and spillway would not occur due to stormwater inflow, wave action, or overfilling of the reservoir from IRWD’s recycled water system. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands, and other factors as needed.

Under normal operating conditions, all flow in or out of the reservoir would be conveyed through the existing 36-inch inlet/outlet pipeline. In the event of an emergency, IRWD would draw down the reservoir through the existing 48-inch pipeline that discharges the recycled water to the existing storm drain, located in Portola Parkway.

The proposed new treatment facilities would require monthly or bi-monthly chemical deliveries of sodium bisulfite and sodium hypochlorite, similar to existing conditions. IRWD Operations and Maintenance staff would continue to conduct routine safety and security checks of the site, similar to existing conditions.

Maintenance of the proposed wetland/riparian areas would be required for up to 5 years after construction is complete to ensure success of the vegetated areas. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The wetland/riparian areas would be irrigated as needed using the series of pipelines installed around the perimeter of the reservoir that connect to the reservoir water source. More information about maintenance of the wetland/riparian areas can be found in Section 3.3 Biological Resources.

If IRWD includes a recreational walking trail as part of the proposed project, hours of operation may be restricted to daily or seasonal use.

2.6.1 Energy Use

The proposed project facilities would be supplied with electrical power from Southern California Edison (SCE). The District's electricity usage to operate Syphon Reservoir and associated facilities was approximately 217,272 kilowatt hours (kWh) in 2018. The proposed project would use up to 1,300,000 kWh annually to operate the proposed project facilities.

2.7 Project Permits and Approvals

Table 2-1 presents a preliminary list of the agencies and entities that would use this Draft EIR in their consideration of specific permits and other discretionary approvals that may apply to the project. This Draft EIR is intended to provide those agencies with information required in CEQA Guidelines Section 15124, including, "(A) A list of the agencies that are expected to use the EIR in their decision making, and (B) A list of permits and other approvals required to implement the project" to support their decision-making processes. Additionally, discretionary approval may be needed from federal agencies to meet federal funding requirements. For more information on federal cross-cutter regulations and requirements please see Chapter 4, *CEQA Plus Considerations*.

TABLE 2-1
DISCRETIONARY PERMITS OR APPROVALS POTENTIALLY REQUIRED

Agency	Permits and Authorizations Required
California Department of Fish and Wildlife (CDFW)	Streambed Alteration Agreement, Fish and Game Code, Section 1602
California Department of Water Resources, Division of Safety of Dams	Dam Safety Inspection and Approval
State Water Resources Control Board; Regional Water Quality Control Board	Compliance with the National Pollutant Discharge Elimination System (NPDES) General Construction Permit, SWPPP Construction Dewatering Permit
State Historic Preservation Officer (SHPO)	National Historic Preservation Act Section 106 compliance
U.S. Fish and Wildlife Service (USFWS); CDFW	NCCP/HCP Compliance (provides Coverage under the Federal Endangered Species Act and Section 2080.1 under California Endangered Species Act)
Transportation Corridor Agency; USFWS	Mitigation Grant Deed Approval
City of Irvine	Approval for Portola Parkway/Sand Canyon Avenue intersection modification

2.8 References

AECOM. 2020. *Local Fault Considerations for Proposed Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA*, May 7.

GEI. 2012. *Syphon Reservoir Expansion Engineering Feasibility Study, Engineering Summary Report*, August 2012.

This page intentionally left blank

CHAPTER 3

Environmental Setting, Impact Analysis, and Mitigation Measures

3.0 Introduction to the Analysis

In compliance with CEQA Guidelines Sections 15125 and 15126, Chapter 3 of this Draft EIR provides an analysis of the significant environmental effects of the Syphon Reservoir Improvement Project (proposed project) with respect to existing baseline conditions. The following environmental topics are assessed in detail in this chapter in accordance with CEQA Guidelines Appendix G:

- Aesthetics
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Noise
- Recreation
- Transportation
- Tribal Cultural Resources
- Wildfire

The CEQA Guidelines Section 15128 requires that an EIR "contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and therefore were not discussed in detail in the EIR." The following environmental topics from CEQA Guidelines Appendix G are not discussed in detail in this Draft EIR because no significant impacts could occur as a result of implementation of the proposed project:

- Agriculture and Forestry Resources
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Utilities and Service Systems

The effects found not to be significant associated with these environmental topics are explained further below in Section 3.0.2, *Effects Found Not to Be Significant*.

3.0.1 Format of the Environmental Analysis

This Draft EIR provides analysis of impacts for those environmental topics where it was determined in the NOP, or through subsequent analysis, that the proposed project would result in "potentially significant impacts." Sections 3.1 through 3.14 discuss the environmental impacts that may result with approval and implementation of the proposed project. The format of the environmental analysis for each environmental topic included in Sections 3.1 through 3.14 includes an environmental setting, regulatory framework summary, impact analysis and mitigation measures (if required), and references.

"Significant effect" is defined by the CEQA Guidelines Section 15382 as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant."

Determining the severity of project impacts is fundamental to achieving the objectives of CEQA. The level of significance for each impact examined in this Draft EIR was determined by considering the predicted magnitude of the impact to baseline environmental conditions against the applicable threshold. Thresholds were developed using criteria from the CEQA Guidelines and Appendix G Checklist; state, federal, and local schemes; local/regional plans and ordinances; accepted practice; consultation with recognized experts; and other professional opinions.

The assessment of each issue area begins with any relevant baseline setting information that is needed to provide context for the impact analysis that follows. Extraneous setting information that does not shed light on the impact analysis is not included in this Draft EIR.

The impact analysis includes any necessary description of methodologies used and the "significance thresholds," which are those criteria adopted by the State, County, City, or other agencies, universally recognized, or developed specifically for this analysis to determine whether potential effects are significant. Each effect under consideration for an issue area is separately listed with the discussion of the effect and its significance following. Each potentially significant impact includes a numbered impact statement and significance determination.

Following each environmental effect discussion is a list of mitigation measures (if required) and the residual effects or level of significance remaining after the implementation of the measures. In those cases, where the mitigation measure for an impact could have a significant environmental impact in another issue area, this impact is discussed as a residual effect.

Environmental Setting and Baseline

In accordance with CEQA Guidelines Section 15125(a), the environmental setting contains a description of the regional and local physical environmental conditions in the project vicinity at the time of the publication of the NOP. This environmental setting constitutes the baseline physical condition against which the implementation of the proposed project is assessed in order to determine whether an environmental impact would occur (CEQA Guidelines Section 15126.2(a)).

Regulatory Framework

Where the project site and/or surrounding area falls within the jurisdiction of federal, state, and local regulatory agencies, the proposed project would be subject to the laws, rules, regulations, and policies of those agencies. These regulations are intended to guide development, reduce adverse effects on sensitive resources, and/or offer general guidance on the protection of such resources. The regulatory framework section summarizes the applicable laws, rules, regulations, and policies for the proposed project. These rules may also set the standards, in the form of significance criteria or thresholds of significance as discussed below, by which the potential impacts of the proposed project are evaluated.

Impact Analysis and Mitigation Measures

Significance Criteria and Methodology

This section presents the significance criteria against which potential impacts are evaluated. As defined by CEQA Guidelines Section 15064.7(a), thresholds of significance are an identifiable quantitative, qualitative, or performance standard for the assessment of a particular environmental impact. Significance criteria are included for each environmental topic.

Impact Analysis

This section provides an analysis of the potential environmental impacts that could result from implementation of the proposed project. This Draft EIR addresses the direct, indirect, and cumulative impacts associated with implementation of the proposed project, including short-term and long-term impacts.

The level of significance for each environmental impact examined in this Draft EIR was determined by considering the predicted magnitude of the impact in relation to baseline environmental setting and the applicable regulatory requirements, measured against the significance criterion. Based on the significance criterion, the significance of each potential environmental impact is determined according to the following categories:

- **Significant and Unavoidable**: A significant and unavoidable impact is a substantial adverse effect on the environment that cannot be reduced to below a significance threshold given reasonably available and feasible mitigation measures. A project with significant and unavoidable impacts could still proceed, but IRWD would be required to prepare a Statement of Overriding Considerations, pursuant to CEQA Guidelines Section 15093, explaining why the District would proceed with the project in spite of the potential for a significant environmental impact.
- **Less-than-Significant Impact with Mitigation:** A potentially significant impact occurs if the proposed project could result in a potentially substantial adverse change in the physical conditions of the environmental topic being evaluated. If such a determination is made, reasonably available and feasible mitigation measures must be considered if they would avoid or substantially reduce the significant impact. An impact that can be reduced to below the

significance threshold with such mitigation measures is considered less than significant with mitigation. Such an impact requires findings to be made under Section 15091 of the CEQA Guidelines.

- **Less-than-Significant Impact:** A less-than-significant impact is an impact that may be adverse, but does not exceed the significance threshold and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact:** A no impact determination would occur if the project would not result in a substantive change to the environmental topic that is being evaluated.
- **Beneficial Impact**: An effect that would enhance existing environmental conditions or reduce existing environmental problems or hazards.

Mitigation Measures and Significance Determination

Mitigation measures are recommended for any identified potentially significant impacts as a result of the proposed project. The significance determination provides the level of significance after the implementation of recommended mitigation measures, if applicable, based on the categories described above.

References

References used for the analysis of each environmental topic addressed in this Draft EIR are included at the end of each subsection.

3.0.2 Effects Found Not to Be Significant

Agriculture and Forestry Resources

The proposed project would not convert Prime Farmland, Unique Farmland, for Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.

The California Department of Conservation (CDC) Farmland Map for Orange County identified the project site as “Other Land,” which includes low density rural developments, brush, timber, wetland, and riparian areas not suitable for livestock grazing, confined livestock, poultry or aquatic facilities, strip mines, borrow puts, and water bodies smaller than 40 acres. Further, there is no Prime Farmland, Unique Farmland, or Farmland of Statewide Importance located within the project vicinity (CDC 2020a). The project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use. There would be no impact.

The proposed project would not conflict with existing zoning for agricultural use, or a Williamson Act contract.

A Williamson Act contract requires private landowners to voluntarily restrict their land to agriculture and compatible open-space uses. The project site does not include land enrolled in a Williamson Act contract (CDC 2004). However, the project site is zoned as General Agriculture by the County of Orange (2015). According to the Orange County Zoning Code (Section 7-9-55.1), the General Agricultural District "is established to provide for agriculture, outdoor recreational uses, and those low-intensity uses which have a predominately open space character" such as the existing Syphon Reservoir. The proposed project would enlarge the Syphon Reservoir and maintain the use of the project site for water storage similar to existing conditions, and would not result in conflicts with the General Agricultural zoning designation. There would be no impact.

The proposed project would not conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104 (g)).

As stated above, the project site is currently zoned as General Agriculture. The proposed project does not include lands that are zoned as forest land or timberland. The proposed project does not involve any changes to current General Plan land use or zoning designations for forest land, or timberland. Therefore, the proposed project would not conflict with existing zoning of forest land or cause rezoning of forest land, timberland, or timberland zoned for Timberland Production. There would be no impact.

The proposed project would not result in the loss of forest land or conversion of forest land to non-forest use.

The project site and surrounding areas contain no forest land. Thus, implementation of the proposed project would result in no impacts related to the loss or conversion of forest land to non-forest use.

The proposed project would not involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use.

As stated above, the proposed project would not convert Farmland to non-agricultural use or forest land to non-forest use. No other adverse impacts to the existing environment would occur from implementation of the proposed project activities that could result in conversion of farmland to non-agricultural use or forest land to non-forest use.

Land Use and Planning

The proposed project would not physically divide an established community.

The physical division of an established community typically results from the construction of a feature, such as an interstate highway or railroad tracks, or removal of a means of access, such as a local road or bridge that would impact mobility within an existing community or between a community and outlying area. Given that the proposed project would not construct any physical structures that would impact mobility within the surrounding community or remove a means of access, the proposed project would result in no impact to the physical division of an established community.

The proposed project would not cause significant environmental impact due to conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

The proposed project is located in unincorporated Orange County and within the City of Irvine's sphere of influence, which means that City of Irvine General Plan zoning ordinances apply to the project site. The California Government Code (CGC) Section 53091 specifies that water supply facilities such as those associated with the proposed project, are exempt from building and zoning ordinances. Specifically, CGC Section 53091 states in part:

> *(d) Building ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water, wastewater, or electrical energy by a local agency.*
>
> *(e) Zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water.*

The proposed project is considered a water storage facility. Per CGC Section 53091, building ordinances and zoning ordinances of local cities or counties do not apply to the location or construction of facilities for the storage of water. Therefore, the building ordinances and zoning ordinances of the County of Orange and City of Irvine, including the Orange County General Plan and the City of Irvine General Plan and its policies, that have been adopted for purposes of mitigating an environmental effect do not apply to the proposed project.

Even so, the proposed project would not conflict with the Orange County General Plan, Orange County Zoning Code, the City of Irvine General Plan, or the City of Irvine Zoning Ordinance. The project site, where the existing Syphon Reservoir is located, is currently designated as Open Space Reserve in the Orange County General Plan and is zoned as General Agriculture (County of Orange 2015; County of Orange 2016). As stated above under Agriculture and Forestry Resources, the proposed project would not conflict with the Orange County Zoning Code. The project site's land use is designated as Water Bodies, Preservation, and NCCP Reserve, and zoned as 1.4 Preservation Area and 1.6 Water Bodies in the City of Irvine General Plan (City of Irvine 2015). The proposed project would not develop any permanent built facilities that would change the land use of the project site, which would continue to be used as a water storage facility similar to existing conditions. Additionally, the project would remain consistent with the City of Irvine Preservation Area land use, which identifies land that contains visually significant ridgelines and biotic communities, and the Water Bodies land use, which contain public or private reservoirs that provide the City with water resources, since these resources and uses would be preserved with expansion of the reservoir under the proposed project. The proposed project is a permitted use within the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP), and impacts related to conflicts of provisions with the NCCP are discussed in Section 3.3, Biological Resources of this Draft EIR. As such, the proposed project would not conflict with the Orange County General Plan or the City of Irvine General Plan or the respective zoning codes. There would be no impact.

Mineral Resources

The proposed project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

According to USGS' Mineral Resources Data System (USGS 2020), the project area is not identified as a known mineral resource area and does not have a history of mineral extraction uses. In addition, according to the State of California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, no oil wells exist on the project site (CDC 2020b). The proposed project would not result in the loss of availability of a known mineral resource. There would be no impact.

The proposed project would not result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

The County of Orange General Plan does not identify the project area as a mineral resource zone (County of Orange 2005). Therefore, the implementation of the proposed project would not result in the loss of a locally important mineral resource recovery site. There would be no impact.

Population and Housing

The proposed project would not induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

Implementation of the proposed project would not have a direct growth inducement effect, as it does not propose development of new housing that would attract additional population to the area. Further, implementation of the proposed project would not result in substantial permanent employment that could indirectly induce population growth. Although construction activities would create some short-term construction employment opportunities over the approximately 3-year duration of construction, the amount of opportunities created would not require persons outside of the Orange County workforce. Further, no new permanent employees would be required to operate the proposed dam and reservoir. The proposed project would not directly induce substantial unplanned population growth; there would be no impact.

Please refer to Chapter 5, Growth Inducement of this Draft EIR for a discussion of the potential for the proposed project to indirectly induce substantial unplanned population growth.

The proposed project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.

There are no existing residences within the project area, and no residences would be condemned or displaced by the proposed project. Therefore, the proposed project would not displace people or housing necessitating the construction of replacement housing elsewhere. There would be no impact.

Public Services

The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service rations, response times or other performance objectives for any of the following public services:

Fire Protection.

The proposed project would be implemented in the County of Orange. The Orange County Fire Authority (OCFA) provides fire protection and emergency services in the vicinity of the project site (Orange County Fire Authority 2020). The nearest station to the project site is Station 55 located approximately 1.3 miles northwest of the project site at 4955 Portola Parkway in Irvine. The proposed project would not change existing demand for fire protection services because construction activities would not result in a permanent increase of employees or population to the project area. The proposed project would not substantially increase the need for new fire department staff or new facilities.

Police Protection.

The Orange County Sheriff's Department (OCSD) provides police protection services to the project site (Orange County Sheriff's Department 2020). The Irvine Police Department (IPD) also provides services to the project area (City of Irvine 2020). The nearest OCSD station is located 4.7 miles east of the project area at 20202 Windrow Drive in Lake Forest. The nearest IPD police station is located 5.6 miles southwest of the project area at 1 Civic Center Plaza in Irvine. The proposed project does not include new homes or businesses that would require any additional services or extended response times for police protection services beyond those required with the existing on-site uses. Therefore, the OCSD and IPD would not be required to expand or construct new police stations to serve the proposed project.

Schools.

The project area lies within the Irvine Unified School District (IUSD) (IUSD 2020). The student generation rates or enrollment numbers within IUSD would not be affected or altered by the proposed project. As such, the proposed project would not require new or expanded school facilities.

Parks.

The proposed project would not result in the construction of new public parks, or require the alteration of existing public parks. The project area is located adjacent to the privately-owned Crean Lutheran High School Athletic Complex. IRWD would notify Crean Lutheran High School prior to implementation of construction activities. The project would not require new parks in order to maintain service ratios.

Other Public Facilities.

The proposed project would not require or impact other additional public facilities. No impacts would occur because new public facilities would not be needed.

Utilities and Service Systems

The proposed project would not require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.

The proposed project would result in an expanded water storage facility that includes treatment facilities and discharge facilities to the existing Portola Parkway storm drain; however, the impacts associated with constructing and operating the proposed project is evaluated throughout this Draft EIR. Similar to existing conditions, the proposed project would capture onsite stormwater runoff in the reservoir and would be designed to ensure the existing SR-133 storm drain that discharges to the project site remains functional. The proposed project also includes an inlet/outlet pipeline that would be used to drain the reservoir in the event of a dam safety emergency to the existing storm drain, located in Portola Parkway. The proposed project may require the use of potable water during construction and operation, but no new water treatment facilities, electric power, natural gas, or telecommunication facilities would be required to support proposed infrastructure. Additionally, implementation of the proposed project would not require the relocation of any of the existing aforementioned infrastructure. As a result, no impact would occur.

The proposed project would not have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.

The proposed project would increase storage of recycled water, which would be beneficially used within IRWD’s service area instead of potable water, reducing dependency on costly, imported water and maintaining operational efficiency at IRWD’s water recycling plants. No new water supplies or entitlements would be required to serve the project itself. No permanent water supply would be required to serve the project. Therefore, no impacts would occur related to water supplies.

The proposed project would not result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project’s projected demand in addition to the provider’s existing commitments.

The proposed project would result in the generation of wastewater associated with the temporary use of portable toilets during construction. During project implementation, IRWD or the contractor may have portable toilet facilities available onsite temporarily for use by construction workers. Once construction of the proposed project is complete, such portable facilities would be removed and the wastewater properly handled and disposed in accordance with all applicable laws and regulations. Therefore, the proposed project does not require a wastewater treatment provider to serve the project during construction.

Once operational, the proposed project includes increased conveyance and storage of recycled water at Syphon Reservoir. The proposed project would store recycled water that currently is being produced at the Michelson WRP but not being put to beneficial use. The implementation of the proposed project would not affect the capacity of IRWD’s existing Michelson WRP or require expansion of the facility. IRWD has adequate capacity to serve the project’s projected demand. There would be no impact.

The proposed project would not generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.

Implementation of the proposed project will result in construction debris from demolition of the existing dam and construction and contouring of the new reservoir bottom. While the majority of soils and other materials would be reused onsite to the extent practicable, construction-related debris would require disposal at regional landfills serving the project area. There are three permitted Class III landfills in Orange County available to accept waste. The Frank R. Bowerman landfill is located adjacent to the project site and has a remaining capacity through the year 2053 (County of Orange Waste and Recycling 2020). If the tonnage daily limit of 11,500 tons per day is reached at that landfill, waste would be diverted to either the Olinda Landfill or the Prima Deshecha Landfill, both located in Orange County. As a result, the proposed project would be served by landfills with sufficient permitted capacity to accommodate the project's solid waste disposal needs. There would be no impact.

The proposed project would comply with federal, state, and local management and reduction statutes and regulations related to solid waste.

Implementation of the proposed project would result in nominal solid waste as discussed above. Statewide policies regarding solid waste have become progressively more stringent, reflecting Assembly Bill 939, which requires local government to develop waste reduction and recycling policies and meet mandated solid waste reduction targets. For the solid waste anticipated to be produced by the proposed project, IRWD would be required to comply with all laws and regulations related to the disposal and recycling of waste and for disposal of any hazardous materials resulting from demolition of the dam and the strainer and disinfection facilities (see Section 3.8, Hazards and Hazardous Materials for more information). There would be no impact.

3.0.3 Cumulative Impact Methodology

As indicated above, in addition to direct and indirect impacts associated with implementation of the proposed project, this Draft EIR also includes an assessment of cumulative impacts for each environmental topic evaluated in Chapter 3. The cumulative effects of implementing the proposed project in combination with other past, present, and reasonably foreseeable future projects within and around the project site are considered. The analysis of cumulative impacts considers whether other projects could cause related environmental impacts similar to the environmental impacts anticipated to occur due to the proposed project.

CEQA Guidelines Section 15130 requires that an EIR shall discuss cumulative impacts of a project when the project's incremental effect is "cumulatively considerable." "Cumulative impacts" are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" [CEQA Guidelines, Section 15355; see also Public Resources Code, Section 21083(b)]. Stated another way, "a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts" [CEQA

Guidelines, Section 15130(a)(1)]. The definition of cumulatively considerable is provided in Section 15065(a)(3):

> *Cumulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.*

According to Section 15130(b) of the CEQA Guidelines:

> *[t]he discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.*

For the purposes of this Draft EIR, the proposed project would contribute to a cumulatively considerable and, therefore, significant cumulative impact if:

- The cumulative effects of other past, current, and probable future projects without the proposed project are not significant and the proposed project's incremental impact is substantial enough, when added to the cumulative effects, to result in a significant impact.
- The cumulative effects of other past, current, and probable future projects without the proposed project are already significant and the proposed project would result in a cumulatively considerable contribution to the already significant effect. The standards used to determine whether the contribution is cumulatively considerable include the existing baseline environmental conditions and whether the proposed project would cause a substantial increase in impacts or otherwise exceed an established threshold of significance.

Geographic Scope of Cumulative Impacts

The geographic area affected by the proposed project and the proposed project's potential to contribute to cumulative impacts varies based on the environmental topic being analyzed. Generally, the geographic area associated with the environmental effects of the proposed project, as described further in this Chapter 3, define the boundaries of the area used for compiling the list of past, present, and reasonably foreseeable future related projects considered in the cumulative impact analysis. Table 3-1 presents the geographic areas analyzed to determine if the proposed project's contribution to a particular impact would be cumulatively considerable and, therefore, significant.

Temporal Scope of Cumulative Impacts

The cumulative projects considered in this analysis include those that have recently been completed, are currently under construction, or are reasonably foreseeable (e.g., for which an application has been submitted). A project's schedule is relevant to the consideration of cumulative short-term construction-related impacts and long-term operational impacts. For future cumulative projects, implementation schedules are often broadly estimated and can be subject to change. However, for purposes of evaluating both short-term and long-term cumulative impacts of the proposed project, this analysis assumes future cumulative projects would be implemented concurrently with the proposed project.

Method of Analysis

CEQA Guidelines Section 15130 provides that the following approaches can be used to adequately address cumulative impacts:

- Regional Growth Projections Method — A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact. Any such planning document shall be referenced and made available to the public at a location specified by the lead agency.
- List Method — A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the lead agency.

For this Draft EIR, the list method is used primarily. Consistent with CEQA, a two-step approach was used to analyze cumulative impacts. The first step was to determine whether the combined effects from the proposed project and related projects would be cumulatively significant. This was done by adding the proposed project's incremental impact to the anticipated impacts of other probable future projects and/or reasonably foreseeable development. Where the combined effect of the projects and/or projected development was determined to result in a significant cumulative effect, the second step was to evaluate whether the proposed project's incremental contribution to the combined significant cumulative impact would be cumulatively considerable, as required by CEQA Guidelines Section 15130(a).

CEQA Guidelines Section 15064(h)(4) states that:

> *… [t]he mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable.*

Therefore, it is not necessarily true that, even where cumulative impacts are significant, any level of incremental contribution must be deemed cumulatively considerable by the lead agency. If the proposed project's individual impact is less than significant, however, its contribution to a significant cumulative impact could also be deemed cumulatively considerable, depending on the nature of the impact and the existing environmental setting. If, for example, a project is located in an air basin determined to be in extreme or severe nonattainment for a particular criteria pollutant, a project's relatively small contribution of the same pollutant could be found to be cumulatively considerable. Thus, depending on the circumstances, an impact that is less than significant when considered individually may still be cumulatively considerable in light of the impact caused by all projects considered in the analysis.

List of Related Projects

Cumulative effects could result when considering the effects of the proposed project in combination with the effects of other related projects in the area. For this Draft EIR analysis, other past, present, and reasonably foreseeable future related projects have been identified. **Table 3-1** lists projects in the proposed project vicinity that are included in the analysis of cumulative impacts. **Figure 3-1** graphically displays the location of the cumulative projects.

TABLE 3-1
RELATED PROJECTS FOR CUMULATIVE ANALYSIS

Project No.	Lead Agency	Name	Location	Project Type	Project Description	Status
1	The County of Orange	Peters Canyon Regional Park General Development Plan and Resource Management Plan	Tustin, CA and Orange, CA	Development and Management Plan	The purpose of the GDP/RMP is to provide a comprehensive, long-term development and management plan to provide safe, educational, and enjoyable public access and recreation while preserving the natural and cultural resource values of the park. The GDP is the master plan for the park and identifies proposed uses, trailheads, staging area locations, and other improvements as well as the general operations and management of the park facility.	GDP/RMP approved by County Board of Supervisors, September 2019
2	The County of Orange, Orange County Parks	2014 Irvine Ranch Open Space Donation Interim Recreation and Resource Management Plan	Orange, CA	Development and Management Plan	Recreational improvements and general park maintenance for East Orange I and II and Mountain Park. These are intended to improve and expand permitted recreational uses including hiking, mountain biking, and horseback riding.	Complete 2019
3	City of Irvine	Gateway Community Park / City of Irvine Master Parks Plan	Irvine, CA	Park Master Plan	Conceptual planning for development of a new community park in the land zoned for Open Space adjacent to the western boundary of the Syphon Reservoir site (City of Irvine 2017). The site is currently used for agricultural purposes. Conceptual planning and community outreach for the Gateway Community Park planning process has been ongoing since the year 2003 and the current goal is for completion in 2021 (City of Irvine 2019). Plans include the potential development of a 70-acre park beginning at the terminus of the Jeffrey Open Space Trail which may include a community center, gymnasium, hiking trails, an 18-hole disc golf course, a dog park, picnic areas, and other amenities. If hiking trails are included as part of the finals concept, the trails could connect to other Open Space trails located north of the project site.	Construction projected to be completed in 2021
4	City of Irvine	Eastwood Village	Irvine, CA	Residential	The project consists of 1,798 total single-family homes, 587 are under construction, and 1,211 have been completed	Under construction
5	City of Irvine	Northwood Town Center Gas Station Renovation	Irvine, CA	Commercial	The project would consist of the demolition and reconstruction of an existing gas station to add a convenience store, new gas pump canopy and car wash	Approved

Project No.	Lead Agency	Name	Location	Project Type	Project Description	Status
6	City of Irvine	Orchard Hills	Irvine, CA	Residential	The project consists of 4,088 units, of which, 396 are under review and 750 have yet to be approved.	Under construction
7	City of Irvine	Planning Area 6	Irvine, CA	Residential	The project consists of 4,602 units, 438 apartment units, and 622 condominiums are under construction, 86 single-family homes have been completed	Under construction
8	City of Irvine	Spectrum Montessori	Irvine, CA	Conditional Use Permit	The project consists of a Conditional Use Permit request to establish a child care center on a 1.41-acre site at 910 Tomato Springs Road. The center is proposed to serve up to 204 children, with 20 full-time teachers.	Under construction
9	City of Irvine, Public Works	Truck Route Roadway Rehabilitation (CIP 311902)	Irvine, CA	Capital Improvement Project	The project would rehabilitate and preserve the pavement on arterial streets impacted by trash truck traffic going to and from the Frank Bowerman Landfill (County Landfill). The project is funded by County funds paid to the City as part of the Frank Bowerman Landfill Extension Agreement between the City and the Landfill. The project would occur on sections of Sand Canyon and Portola Parkway as these arterial streets contain the most trash truck traffic to and from the County Landfill.	Project is in design; civil engineering consultant will prepare plans and specification for the rehabilitation work
10	City of Irvine, Public Works	18-19 Athletic Court Resurfacing (CIP 361909)	Irvine, CA	Capital Improvement Project	The project consists of athletic court hardscape resurfacing and top finishing and Northwood, Las Lomas, Bill Barber, Homestead, Cypress, Stonegate, and other locations deemed necessary. The project will extend the useful life of the playing surface and provide a more even surface for public use and enjoyment.	Construction began December 2019; projected to be completed December 2020
11	City of Irvine, Public Works	FY 19-20 Slurry Seal and Local Street Rehabilitation	Irvine, CA	Capital Improvement Project	This project consists of an annual slurry seal and local street rehabilitation. Fiscal Year 2019-2020 will be in the Spectrum Business Park area, UCI Area, and a portion of Portola Springs. Slurry seal will be applied to the majority of streets in these areas to preserve the pavement and slow deterioration. Street segments that are very deteriorated will be rehabilitated with a 2-inch asphalt grind and overlay.	Construction to begin March 2020; projected to be completed by November 2020

Project No.	Lead Agency	Name	Location	Project Type	Project Description	Status
12	City of Irvine Public Works	Ventura Spur/ SR-133 Bicycle-Pedestrian Bridge (CIP 321701)	Irvine, CA	Capital Improvement Project	The project consists of a separated Class 1 bicycle-pedestrian bridge that spans over State Route 133 between the communities of Woodbury East (at Emberglow/Sable) and Great Park Neighborhoods. This project is identified in the City's Bicycle Transportation Plan and is a Developer obligation for Irvine Company and Five Point Communities. Preliminary Design Plans, Categorical Exemptions, and PEER/EP are approved by Caltrans.	Final design in progress; construction projected to be completed June 2022
13	City of Irvine Public Works	Adaptive Traffic Signal Control System (CIP 331907)	Irvine, CA	Capital Improvement Project	The project consists of piloting an adaptive signal control system to address changing traffic patterns and volumes.	Construction in progress; projected completion in July 2020
14	City of Irvine Public Works	Great Park (Trabuco)/ SR-133 Interchange (CIP 316020)	Irvine, CA	Capital Improvement Project	The project consist of construction of a freeway interchange to access SR-133 at Great Park (Trabuco Road).	Final design projected to be complete December 2021 with construction projected to be complete 2025
15	City of Irvine Public Works	Trabuco Center Expansion Design (CIP 361719)	Irvine, CA	Capital Improvement Project	The project consists of consulting architectural and engineering services to evaluate options for potential expansion of the Trabuco Center.	Preliminary design to be completed April 2020; projected construction from August to December 2020
16	City of Irvine Public Works	Streetscape Rehabilitation (CIP 351701)	Irvine, CA	Capital Improvement Project	The project consists rehabilitation of landscaping and irrigation systems within citywide streetscapes. Improvements are proposed to irrigation systems with a focus on reducing inefficiencies and water run off by installing master valves, flow sensors, drip emitters, and new nozzle technology. The focus of this CIP is on rehabilitation of streetscape landscaping citywide for the conversion of domestic/ potable water meters to a recycled water meter system.	Public Works is currently coordinating with IRWD to define scope of work and identify project locations
17	IRWD	Zone A to Rattlesnake Pump Station	Irvine, CA	Water Supply Project	The project involves replacing the existing Rattlesnake Reservoir pump station with a new pump station and appurtenant facilities. The project includes demolition and replacement of the pump, installation of electric motor-driven pumps, and other facility improvements.	Construction in progress; construction projected to be completed 2023.

Project No.	Lead Agency	Name	Location	Project Type	Project Description	Status
18	IRWD	Eastwood Recycled Water Pump Stations	Irvine. CA	Water Supply Project	The Eastwood Recycled Water Pump Station is an existing multi-zone pump station that pumps recycled water from IRWD's Zone A to Zone B through one set of pumps, and Zone A to Zone C through a separate set of pumps. The pump station structure is currently under construction to accommodate the Syphon Reservoir Improvement Project with the exception of the additional pump equipment. Installation of the equipment would be coordinated as a separate "equipping project" in parallel to the construction of the proposed Syphon Reservoir improvements.	Under construction
19	IRWD	Zone 1 Reservoir	Irvine. CA	Water Supply Project	The project involves installing a second, smaller reservoir at Sand Canyon Avenue and Elysian to increase water storage capacity and create a necessary backup supply of drinking water that will ensure uninterrupted service to Irvine residents.	Completed 2020
20	Orange County Water District	Mid-Basin Injection Project	Orange County Groundwater Basin	Groundwater Project	The project involves the installation of five new groundwater wells, with a total recharge capacity of 8 million gallons per day (MGD). The project is provided water from OCWD's Groundwater Replenishment System (GWRS). The project wells have the capacity to inject water with a TDS concentration of 48 mg/L near IRWD's Dyer Road Well Field.	Wells installed in 2020
21	Orange County Water District	Groundwater Replenishment System (GWRS) Final Improvement Project	Orange County Groundwater Basin	Groundwater Project	Groundwater producers from the Orange County Aquifer are cost-effectively limited to pump not more than a specified Basin Pumping Percentage (BPP) of their demand that overlies the groundwater basin. The project will increase the amount of groundwater recharge from 100 MGD to 130 MGD. This increased recharge is expected to increase IRWD's BPP from about 70% to 75%. This will result in IRWD pumping more groundwater that will be offset with a corresponding reduction in imported water. Because the TDS of groundwater is significantly less than the TDS of imported water, the BPP increase is expected to reduce the TDS concentration of Michelson WRP's outflow.	Operation anticipated in 2023

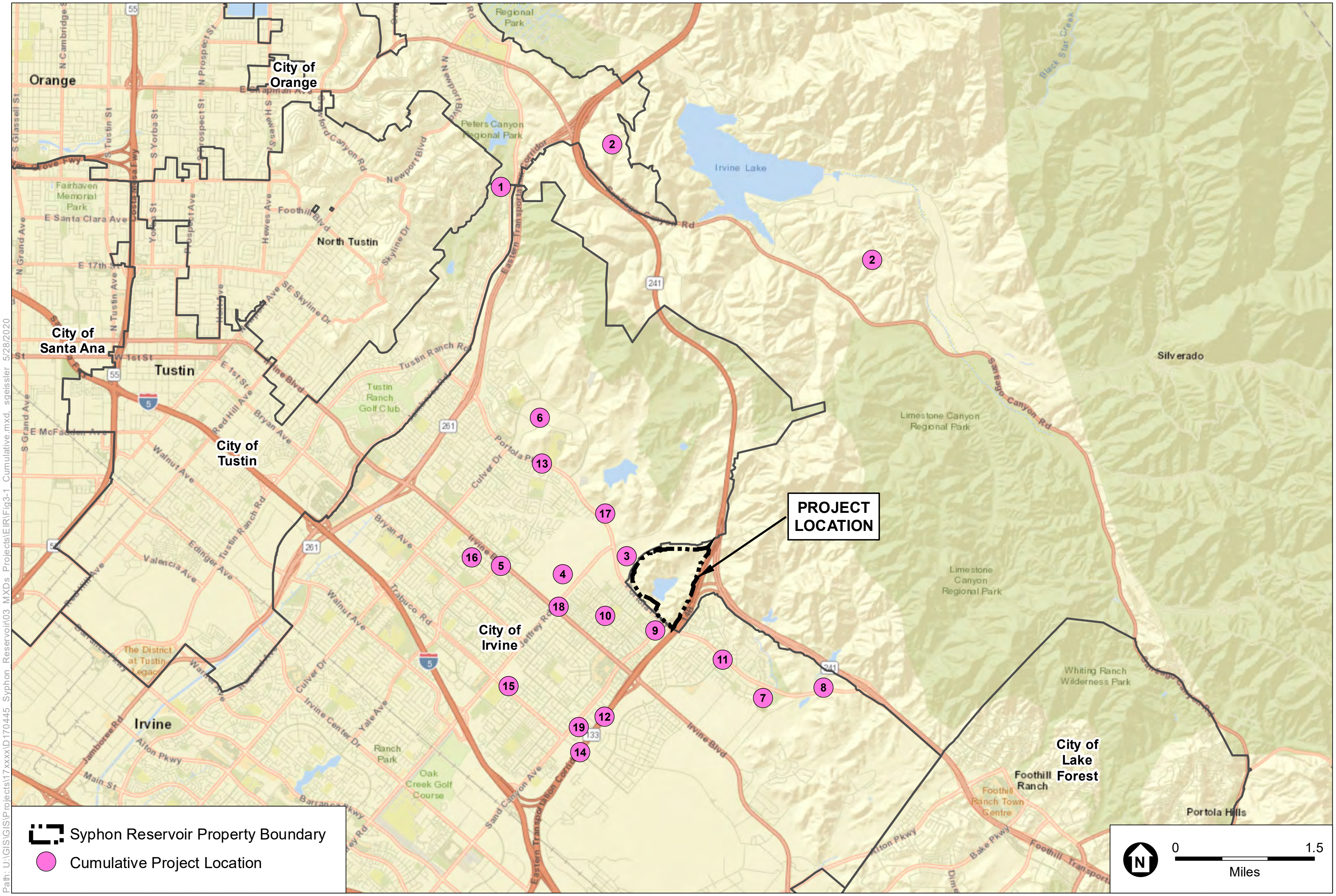
Project No.	Lead Agency	Name	Location	Project Type	Project Description	Status
22	IRWD	MWRP Biosolids Project	Irvine, CA	Recycled Water and Biosolids Project	IRWD's biosolids facility at the Michelson WRP will produce a centrate that is pre-treated and then discharged to the MWRP headworks. The facility is expected to provide about 1.24 MGD of centrate to the MWRP headworks and result in a 1.8% increase in TDS when operating at 28 MGD. The biosolids facility came on-line in 2020 for production testing and is expected to be fully operational before the Syphon Reservoir Improvement Project is operational.	Operation started in 2020

SOURCES:

1. https://www.ocparks.com/parks/peters/general_development_plan
2. https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/current-projects/3rd-district/archived-3
3. http://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=29900

4–8. http://cityofirvine.maps.arcgis.com/apps/MapTour/index.html?appid=0429065850ec4dcab5ba5856a497f42a

9. https://gis.cityofirvine.org/cip/pdf/CIPViewer/311902%20-%20Truck%20Route%20Rdwy%20Rehab.pdf
10. https://gis.cityofirvine.org/cip/pdf/CIPViewer/361909%20-%2018-19%20Athletic%20Court%20Resurfacing.pdf
11. https://gis.cityofirvine.org/cip/pdf/CIPViewer/312004%20-%20FY%2019-20%20Slurry%20Seal%20and%20Local%20Street%20Rehabilitation.pdf
12. https://gis.cityofirvine.org/cip/pdf/CIPViewer/321701%20-%20Venta%20Spur%20SR-133%20Bike%20Pedstrian%20Bridge.pdf
13. https://gis.cityofirvine.org/cip/pdf/CIPViewer/331907%20-%20Adaptive%20Traffic%20Signal%20Control%20System.pdf
14. https://gis.cityofirvine.org/cip/pdf/CIPViewer/316020%20-%20Great%20Park%20Trabuco%20SR133%20Interchange.pdf
15. https://gis.cityofirvine.org/cip/pdf/CIPViewer/361719%20-%20Trabuco%20Center%20Expansion%20Design.pdf
16. https://gis.cityofirvine.org/cip/pdf/CIPViewer/351701%20-%20Streetscape%20Rehab.pdf
17. https://www.irwd.com/images/pdf/doing-business/environmental-documents/env-documents-2020/NOD_Zn_A-Rattlesnake_MND_Filed.pdf
18. https://www.irwd.com/construction/eastwood-recycled-water-pump-station
19. https://www.irwd.com/construction/zone-1-reservoir-project
20. IRWD 2021.
21. IRWD 2021
22. IRWD 2021



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 3-1
Cumulative Project Locations

ESA

3.0.4 References

California Department of Conservation (CDC). 2004. Agricultural Preserves, Williamson Act Parcels, Orange County, California. 2004.

CDC. 2020a. California Important Farmland Finder. Available at https://maps.conservation.ca.gov/DLRP/CIFF/. Accessed March 2020.

CCDC. 2020b. Division of Oil, Gas, and Geothermal Resources Well Finder. Available at https://www.conservation.ca.gov/calgem/Pages/WellFinder.aspx. Accessed March 2020.

County of Orange. 2005. County of Orange General Plan. Resources Element. Available at https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=40235. Accessed March 2020.

County of Orange. 2015. Orange County General Plan. Land Use Element Amendment 14-02, August 23, 2015.

County of Orange. 2016. Zoning - Unincorporated County of Orange, California, March 1, 2016. https://ocds.ocpublicworks.com/sites/ocpwocds/files/2020-12/ZONING_2016blueborder_SM.pdf. Accessed February 4, 2021.

County of Orange Waste and Recycling. 2020. Available at http://www.oclandfills.com/landfill/active/bowerman. Accessed March 2020.

City of Irvine. 2015. Current General Plan, Land Use Element. Available at https://www.cityofirvine.org/community-development/current-general-plan. Accessed April 22, 2020.

City of Irvine. 2017. City of Irvine Parks Master Plan. Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=29900. Accessed May 11, 2020.

https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=29899. Accessed May 11, 2020.

City of Irvine. 2020. Public Safety. Available at http://www.cityofirvine.org/irvine-gives/public-safety. Accessed March 2020.

City of Irvine. 2021a. Fact Sheet, Truck Route Roadway Rehabilitation (CIP 311902), January. Available at https://gis.cityofirvine.org/cip/pdf/CIPViewer/311902%20-%20Truck%20Route%20Rdwy%20Rehab.pdf. Accessed February 4, 2021.

2021b. Fact Sheet, 18-19 Athletic Court Resurfacing (CIP 361909), January. Available at https://gis.cityofirvine.org/cip/pdf/CIPViewer/361909%20-%2018-19%20Athletic%20Court%20Resurfacing.pdf. Accessed February 4, 2021.

2021c. Fact Sheet, Slurry Seal and Local Street Rehabilitation (CIP 312004), January. Available at https://gis.cityofirvine.org/cip/pdf/CIPViewer/312004%20-%20FY%2019-20%20Slurry%20Seal%20and%20Local%20Street%20Rehabilitation.pdf. Accessed February 4, 2021.

2021d. Fact Sheet, Venta Spur/SR-133 Bicycle-Pedestrian Bridge (CIP 321701), January. Available at https://gis.cityofirvine.org/cip/pdf/CIPViewer/321701%20-%20Venta%20Spur%20SR-133%20Bike%20Pedstrian%20Bridge.pdf. Accessed February 4, 2021.

2021e. Fact Sheet, Adaptive Traffic Signal Control System (CIP 331907), January. Available at https://gis.cityofirvine.org/cip/pdf/CIPViewer/331907%20-%20Adaptive%20Traffic%20Signal%20Control%20System.pdf. Accessed February 4, 2021.

2021f. Fact Sheet, Great Park (Trabuco)/SR-133 Interchange (CIP 316020), January. Available at https://gis.cityofirvine.org/cip/pdf/CIPViewer/316020%20-%20Great%20Park%20Trabuco%20SR133%20Interchange.pdf. Accessed February 4, 2021.

2021g. Fact Sheet, Trabuco Center Expansion Design (CIP 361719), January. Available at https://gis.cityofirvine.org/cip/pdf/CIPViewer/361719%20-%20Trabuco%20Center%20Expansion%20Design.pdf. Accessed February 4, 2021.

2021h. Fact Sheet, Streetscape Rehabilitation (CIP 351701), January. Available at https://gis.cityofirvine.org/cip/pdf/CIPViewer/351701%20-%20Streetscape%20Rehab.pdf. Accessed February 4, 2021.

Irvine Ranch Water District (IRWD). 2020. Eastwood Recycled Water Pump Station. Available at https://www.irwd.com/construction/eastwood-recycled-water-pump-station. Accessed March 2020.

IRWD. 2020. Zone 1 Reservoir Project. Available at https://www.irwd.com/construction/zone-1-reservoir-project. Accessed March 2020.

IRWD. 2021. *Draft Syphon Reservoir Improvement Project – Recycled Water Quality Assessment*. Memorandum from Ray R. Bennett to Project File, March 11.

IUSD. 2020. Irvine Unified School District. Available at https://iusd.org/. Accessed March 2020.

Notice of Determination. Zone A to Rattlesnake Reservoir Pump Station Project Mitigated Negative Declaration (SCH #2020019012), March 13, 2020. Available at https://www.irwd.com/images/pdf/doing-business/environmental-documents/env-documents-2020/NOD_Zn_A-Rattlesnake_MND_Filed.pdf. Accessed February 4, 2021.

Orange County Fire Authority. 2020. Service Area. Available at https://www.ocfa.org/AboutUs/AboutOCFA.aspx#servicearea. Accessed March 2020.

Orange County Parks. 2014 Irvine Ranch Open Space Donation Interim Recreation and Resource Management Plan IS/MND. Available at https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/current-projects/3rd-district/archived-3. Accessed February 4, 2021.

Orange County Parks. Peters Canyon General Development Plan. Available at https://www.ocparks.com/parks/peters/general_development_plan. Accessed March 2020.

Orange County Sheriff's Department. 2020. Patrol Areas. Available at http://www.ocsd.org/patrol. Accessed March 2020.

United States Geologic Survey (USGS). 2020. Mineral Resources Data System. Available at https://mrdata.usgs.gov/mineral-resources/mrds-us.html. Accessed March 2020.

3.1 Aesthetics

This section addresses the aesthetic and visual impacts associated with construction and operation of the proposed project. This section includes: a description of existing visual resources and aesthetic conditions at the project site; a summary of applicable regulations related to aesthetics; and an evaluation of potential impacts on visual resources, including scenic vistas, and on the visual character and quality of the project site, including cumulative impacts.

3.1.1 Environmental Setting

Definitions Related to Visual Resources

Visual or aesthetic resources are generally defined as both the natural and built features of the landscape that contribute to the public viewer's experience and appreciation of the environment.[1] Depending on the extent to which a project's presence would alter the perceived visual character and quality of the environment, a visual or aesthetic impact may occur. Key terms that are used to describe aesthetic views include:

Visual character is a general description of the visual attributes of a particular land use setting as defined by local municipalities and other land use agencies. The purpose of defining the visual character of an area is to provide the context within which the visual quality of a particular site or locale is most likely to be perceived by the viewing public. For urban areas, visual character is typically described on the neighborhood level or in terms of areas with common land use, intensity of development, socioeconomic conditions, and/or landscaping and urban design features. For natural and open space settings, visual character is most commonly described in terms of areas with common landscape attributes (such as landform, vegetation, water features, etc.).

Visual quality is defined as the overall visual impression or attractiveness of a site or locale as determined by its aesthetic qualities (such as color, variety, vividness, coherence, uniqueness, harmony, and pattern). For the aesthetic analysis, the visual quality of a site or locale is defined according to three levels:

- **Low**. The location is lacking in natural or cultural visual resource amenities typical of the region. A site with low visual quality will have aesthetic elements that are perceptibly uncharacteristic of the surrounding area.
- **Moderate**. The location is typical or characteristic of the region's natural or cultural visual amenities. A site with moderate visual quality maintains the visual character of the surrounding area, with aesthetic elements that do not stand out as either contributing to or detracting from the visual character of an area.
- **High**. The location has visual resources that are unique or exemplary of the region's natural or cultural scenic amenities. A site with high visual quality is likely to stand out as particularly appealing and makes a notable positive contribution to the visual character of an area.

[1] CEQA Guidelines, Appendix G, Environmental Checklist Form defines public views as those that are experienced from a publicly accessible vantage point.

The identification of public viewer types describes the type of potentially affected viewers within the visual study area (defined below). Land uses that derive value from the quality of their settings are potentially sensitive to changes in visual conditions.

Viewer Exposure addresses the variables that affect the viewing conditions of a site. Viewer exposure considers some or all of the following factors: landscape visibility (the ability to see the landscape); viewing distance (i.e., the proximity of viewers to the project); viewing angle (whether the project would be viewed from a superior, inferior, or level line of sight); extent of visibility (whether the line of sight is open and panoramic to the project area or restricted by terrain, vegetation, and/or structures); and duration of view.

Visual Sensitivity is the overall measure of a site's susceptibility to adverse visual changes. Visual sensitivity is rated as high, moderate, or low and is determined based on the combined factors of visual quality, viewer types, how many viewers, and viewer exposure to the Project. Higher visual sensitivity is associated with sites with a higher visual quality and with a greater potential for changes to degrade or detract from the visual character of a public view.

Light originates from human activity from the following two primary sources): light emanating from building interiors that passes through windows, and light originating from exterior sources (e.g., street lighting, building illumination, security lighting, parking lot lighting, landscape lighting, and signage). These sources of light can be a nuisance to adjacent residential areas, diminish the view of the clear night sky, and if uncontrolled, can cause disturbances for motorists traveling in the area. Land uses such as residences and hotels are considered light sensitive, since occupants have expectations of privacy during evening hours and may be subject to disturbances by bright light sources. Light spill is typically defined as the presence of unwanted light on properties adjacent to the property being illuminated.

Glare is caused by the reflection of sunlight or artificial light by highly polished surfaces such as window glass or reflective materials and, to a lesser degree, from broad expanses of light-colored surfaces or vehicle headlights. Perceived glare is the unwanted and potentially objectionable sensation as observed by a person as they look directly into the light source of a luminaire. Daytime glare generation in urban areas is typically associated with buildings with exterior facades largely or entirely comprised of highly reflective glass. Glare can also be produced during evening and nighttime hours by the reflection of artificial light sources, such as automobile headlights. Glare generation is typically related to either moving vehicles or sun angles, although glare resulting from reflected sunlight can occur regularly at certain times of the year. Glare-sensitive uses include residences and transportation corridors.

Regional Setting

The proposed project site is located in the central-eastern portion of Orange County. Orange County encompasses approximately 798 square miles stretching from the Pacific Ocean to the Santa Ana Mountains. The natural setting of Orange County provides a diverse combination of mountains, hills, flatlands, and shoreline. Orange County consists of an alluvial plain surrounded by Santa Ana Mountains to the east that rise approximately 5,600 feet above mean sea level (amsl), the Puente and Chino Hills to the north, and the San Joaquin Hills to the south (Orange County 2020). The project site is situated in the Santiago Hills portion of the Santa Ana Mountains, within a shallow valley commonly referred to as Syphon Canyon.

The major roadway corridors in the Project vicinity include Portola Parkway, Sand Canyon Avenue, State Route (SR-) 133, and SR-241.

Visual Study Area

The proposed project site is located in unincorporated Orange County northeast of the City of Irvine. Site reconnaissance of the project area was performed in 2020 to identify the visual study area and take representative photographs of existing visual conditions of the project site and adjacent areas. The visual study area includes the existing Syphon Reservoir site, surrounding hillsides, and the residential neighborhood of Stonegate, located southwest of the existing Syphon Reservoir, in the City of Irvine. **Figure 3.1-1** identifies the four viewpoints chosen to document the visual study area in and around the proposed project. **Figure 3.1-2** and **Figure 3.1-3** include existing views from those viewpoints.

The project site includes the existing Syphon Reservoir Dam, Syphon Reservoir, and Syphon Reservoir Strainer and Disinfection Facilities. The topography surrounding the reservoir is hilly with ridgelines and terraced slopes. Ground surface elevations at the site range from about 675 feet amsl in the northeast corner of the project site to about 319 feet amsl at Portola Parkway immediately downstream of the existing reservoir. The Crean Lutheran High School Athletic Complex is located between Portola Parkway and the toe of the existing dam. The residential neighborhood of Stonegate is located on the southwest side of Portola Parkway.

Scenic Vistas and Aesthetic Resources

Scenic vistas and viewscapes provide expansive views of distant landforms and aesthetic features from public vantage points, including areas designated as official scenic vistas along roadway corridors or otherwise designated by local jurisdictions. The County of Orange identifies "viewscape corridors" in the Scenic Highway Plan which provide scenic views from the coastal and mountain roadways in the county (County of Orange 2005a). The closest viewscape corridor to the project site is Santiago Canyon Road, located approximately 3 miles northeast of the project site. The City of Irvine designates certain scenic highways for their characterization of urban or rural/nature as well as "major views" that provide outstanding views of the local area. The City of Irvine identifies the intersection of Sand Canyon Avenue looking northeast at Portola Parkway, which is located adjacent to the project site, as a "major view" (City of Irvine 2015a). Another "major view" is identified at the intersection of Jeffrey Road looking northeast at Irvine Boulevard, approximately 1 mile from the project site (City of Irvine 2015a).

Views of mountains, hills, flatlands, coastal areas, open space and conservation areas are considered important scenic resources within the County of Orange and the City of Irvine (County of Orange 2005b; City of Irvine 2015). The Santa Ana Mountains provide dominant ridgelines for surrounding areas within Orange County. The twin-peaked Saddleback Mountain within the Santa Ana Mountains is the "signature landmark of Orange County" (County of

Orange 2005b). This scenic resource offers a variety of visual opportunities to the area. Saddleback Mountain is located approximately 11 miles east of the proposed project site within the Cleveland National Forest. Closer to the project site in the hillsides west of the Cleveland National Forest are the "Lomas de Santiago" (commonly known as Loma Ridge) which is identified as a major ridgeline in Orange County (County of Orange 2005b). These scenic resources together provide the visual backdrop of the proposed project site looking east. Looking west from the proposed project site, the San Joaquin Hills are identified as a major ridgeline of importance in the Orange County General Plan (County of Orange 2005b).

Orange County is further defined by a series of linear open spaces that establish a "visual sense of community identity" within the county. According to the Orange County General Plan, open space corridors can include features such as "a series of ridgelines" (County of Orange 2005b) which are present in the Loma Ridge and Santa Ana Mountains in the background of the project site. The foothills abutting the Cleveland National Forest boundary "possess outstanding scenic qualities and significant watershed and wildlife habitat for mountain lion, deer, hawks, and eagles" (County of Orange 2005b). Other open space corridors "may include private recreation facilities such a golf courses or recreational lakes" (County of Orange 2005b).

Visual Character

The project site is within undeveloped open space located directly adjacent to urbanized land in the City of Irvine. The slopes of the mountains and hillsides surrounding the project site provide contrast to the generally flat topography of the developed City of Irvine located to the south and west, which is designated as Medium Density residential in the area southwest of Portola Parkway. Much of the residential area surrounding the project consists of low-rise residential units that preserve the scenic views of the hillsides to the east and northeast of the project site. Views east and north of the project site are towards the diverse topography and hillsides of the Sana Ana Mountains and larger Cleveland National Forest.

Public views of the project site are available to motorists traveling along roadways adjacent to the project including Portola Parkway, Bee Canyon Access Road, SR-133, SR-241, and Sand Canyon Avenue. Views of the project site could also be experienced by pedestrians and bicyclists traveling on public paths along Portola Parkway. The adjacent residential community of Stonegate in the City of Irvine offers brief views of the project area in the range of 600 to 4,000 feet from the project site. Portola Parkway has an average daily traffic load of approximately 19,000 vehicles in the project area between Sand Canyon Avenue and Jeffrey Road (OCTA 2019). Sand Canyon Avenue has an average daily traffic load of approximately 16,000 vehicles in the project area between Irvine Boulevard and Portola Parkway (OCTA 2019). SR-133 has a daily traffic load of 46,700 at the junction of SR-241 (Caltrans 2018).

SOURCE: ESA, 2020.

Syphon Reservoir Geotechnical Investigations Project

Figure 3.1-1
Viewpoint Map

ESA

This page intentionally left blank

Viewpoint A

Viewpoint B

D170445.00

SOURCE: ESA, 2020

Syphon Reservoir Improvement Project

Figure 3.1-2
Existing Views from Viewpoints A and B

ESA

Viewpoint C

Viewpoint D

D170445.00

SOURCE: ESA, 2020

Syphon Reservoir Improvement Project

Figure 3.1-3
Existing Views from Viewpoints C and D

ESA

Visual Quality and Sensitivity

The overall visual sensitivity of the project site from public views is described in terms of its visual quality, potentially affected viewers, and exposure conditions (i.e., landscape visibility, viewing angle, extent of visibility, and duration of view). **Table 3.1-1** summarizes the aforementioned attributes in regard to each analyzed viewpoint.

TABLE 3.1-1
SUMMARY OF VISUAL QUALITY AND SENSITIVITY FINDINGS

Viewing Location and Representative Photos	Visual Quality	Affected Viewers and Viewer Exposure Conditions	Visual Sensitivity
Viewpoint A (Figure 3.1-2)	Moderate	Moderate (19,000 daily motorists, as well as pedestrians/cyclists, for several minutes per trip)	Moderate
Viewpoint B (Figure 3.1-2)	Moderate	Moderate (approximately 1,000 daily users of the park/school, for 1-3 hours per day)	Moderate
Viewpoint C (Figure 3.1-3)	High	Low (46,700 daily motorists, for several seconds per trip)	Moderate
Viewpoint D (Figure 3.1-3)	Moderate	Moderate (19,000 daily motorists, as well as pedestrians/cyclists, for several minutes per trip)	Moderate

Viewpoint A

Viewpoint A (Figure 3.1-2) is looking northeast to the project site from public right-of-way Portola Parkway and the outer limits of the Stonegate residential community. This viewpoint is lower in elevation than the project site. The foreground view includes Portola Parkway and the middleground provides views of the Crean Lutheran High School Athletic Complex and the existing Syphon Reservoir. The background provides views of local hillsides leading up to the Santa Ana Mountains including Loma Ridge.

Visual Quality. The visual quality of the area is typical of a residential area that borders open space at the northeastern-most portion of the City of Irvine. While the hillsides leading up to the Santa Ana Mountains and views of Loma Ridge are seen in the background form this viewpoint, the extent of the visibility is somewhat hindered by the existing Syphon Reservoir. Nevertheless, the existing limit of the Syphon Reservoir is below the natural ridgelines. Further, the existing vegetated dam face blends in with the surrounding hillsides. Because the viewpoint is characteristic of typical residential areas within the northeastern portions of the City of Irvine and surrounding area, the existing visual quality is considered moderate (i.e., it is not lacking visual amenities but is not unique compared with the intended visual character of the area).

Affected Viewers and Exposure Conditions. Public views of the project site are provided to approximately 19,000 motorists and pedestrians/cyclists traveling northwest and southeast along Portola Parkway. Views of the Project site would be largely experienced from residents traveling to and from their homes and recreationalists using the bike/walking pathway on the western side of the roadway. It is important to note that motorists traveling northwest/southwest on Portola Parkway would not view the site from the angle depicted in the viewpoint; the angle from Viewpoint A looking northwest would mainly be experienced by pedestrians/cyclists, with motorists experiencing a lesser degree of the project site due to the angle of the roadway. There are relatively few trees or other features that obstruct views of the project site. Direct unobstructed views of the project site would be available for brief periods of time (i.e., seconds to several minutes) when motorists or pedestrians/cyclists are passing the site. Given that the view of the site is relatively clear and unobstructed and would be observed briefly by 19,000 daily users of Portola Parkway, the viewer exposure is considered moderate.

Visual Sensitivity Conclusion. Because the view of the site from this area has moderate visual quality and moderate exposure to public views, it is considered to have moderate visual sensitivity.

Viewpoint B

Viewpoint B (Figure 3.1-2) is looking east to the project site from Stonegate Park, which is a public park in the City of Irvine. Stonegate Elementary School is located adjacent to the park. This viewpoint is below the elevation of the project site. The foreground view includes a field within Stonegate Elementary School and the middleground includes a blacktop, trees, and some single-story buildings associated with the school. The background includes views of the ridgelines of the Santa Ana Mountains. The existing Syphon Reservoir is not visible from this vantage point.

Visual Quality. The visual quality of the area is typical of a residential area and associated recreational and educational facilities within the City of Irvine. While the hillsides leading up to the Santa Ana Mountains are seen in the background from this viewpoint, the extent of the visibility is somewhat hindered by the dense vegetation associated with the Stonegate neighborhood and elementary school. Nevertheless, the natural ridgelines of the local mountains are visible in the distance. Because viewpoint is characteristic of typical residential areas within the City of Irvine, especially those at the northeastern portion of the city, the existing visual quality is considered moderate (i.e., it is not lacking visual amenities but is not unique compared with the intended visual character of the area).

Affected Viewers and Exposure Conditions. Views of the project site from this location would be experienced by users of the public park, as well as children recreating in the fields of Stonegate Elementary School. The Stonegate neighborhood consists of over 1,000 single family homes and townhomes, with 7 parks available within the community, one of which is Stonegate. While the park is open to the public, it is more widely utilized by the residents of the Stonegate neighborhood. The Stonegate Elementary School had 1,066 annual students as of 2019 (IUSD 2020). Use of the school and park would involve longer durations than residents traveling along public rights-of-ways, since residents/students recreating at the location would spend longer than a couple minutes passing through (and up to 1-3 hours). Given that the view of the site is low and would be observed by over 1,000 daily but prolonged users of Stonegate park and elementary school, the viewer exposure is considered moderate.

Visual Sensitivity Conclusion. Because the view of the site from this area has moderate visual quality and moderate exposure, it is considered to have moderate visual sensitivity.

Viewpoint C

Viewpoint C (Figure 3.1-3) is looking southwest to the project site from public right-of-way SR-133, which passes through the project area in a southwestern direction. The viewpoint is elevated above the project site. The foreground view includes SR-133, the middle ground includes views of the project site and the vegetation surrounding the project site, while the background includes views of the City of Irvine and distant views of the San Joaquin Hills.

Visual Quality. The visual quality of the middleground area is typical of the low-lying hillsides that border the City of Irvine to the northeast. The visual quality experienced in the background is unique in that it is elevated above the valley floor and provides expansive views of Orange County, including the San Joaquin Hills, which are identified as resources of importance in the City of Irvine General Plan, and a major ridgeline in the Orange County General Plan. There are only a few right-of-ways similar to SR-133 that afford these expansive views within Orange County. Given that the visual resources experienced from Viewpoint C are unique or exemplary of the region's natural scenic amenities, the visual quality is considered high (i.e., it is considered unique when compared to the typical residential nature of Orange County).

Affected Viewers and Exposure Conditions. Public views of the project site are provided to approximately 46,700 motorists traveling southwest along SR-133. Direct views of the project site would be available for merely a number of seconds as motorists are traveling at high speeds along the transportation corridor. Given that the view of the project site, while clear, could only be viewed by motorists for several seconds, the viewer exposure is considered low.

Visual Sensitivity Conclusion. Because the view of the site from this area has high visual quality and low exposure, it is considered to have moderate visual sensitivity.

Viewpoint D

Viewpoint D (Figure 3.1-3) is looking northeast to the hills from the intersection of public right-of-way Portola Parkway and Sand Canyon Avenue. The foreground view includes the intersection of Portola Parkway and Sand Canyon Avenue. The middleground provides views of the low-lying hills immediately adjacent and to the east of Portola Parkway, which are identified by the City of Irvine as a "major view." The background provides views of local hillsides leading up to the Santa Ana Mountains.

Visual Quality. The visual quality of the area is typical of a residential area that borders open space at the northeastern-most portion of the City of Irvine. While the foreground views are exclusively roadways and associated stoplights, the hillsides in the middleground and background are unadulterated and contribute to the "major view" as defined by the City of Irvine. Because the viewpoint is characteristic of typical residential areas within the northeastern portions of the City of Irvine and surrounding area, the existing visual quality is considered moderate (i.e., it is not lacking visual amenities but is not unique compared with the intended visual character of the area).

Affected Viewers and Exposure Conditions. Public views of the project site are provided to approximately 19,000 motorists and pedestrians/cyclists traveling along Portola Parkway and along Sand Canyon Avenue. Motorists and pedestrians/cyclists traveling northeast on Sand

Canyon Avenue from regional connector freeways increasingly experience this view as they travel east. There are relatively few trees or other features that obstruct views from this location. Direct unobstructed views of the proposed access road would be available for brief periods of time (i.e., seconds to several minutes) when motorists and pedestrians/cyclists are passing through the intersection or queuing at the stop light on Sand Canyon Avenue waiting to turn left or right along Portola Parkway. Given that the view of the site is relatively clear and unobstructed and would be observed briefly by 19,000 daily users of Portola Parkway, the viewer exposure is considered moderate.

Visual Sensitivity Conclusion. Because the view of the site from this area has moderate visual quality and moderate exposure to public views, it is considered to have moderate visual sensitivity.

Light and Glare

The existing site consists largely of the existing Syphon Reservoir Dam. The existing facilities do not contain any major light sources. However, when filled during the winter months with recycled water, the reservoir can act as a source of glare for traffic southbound on SR-133. Existing light and glare in the immediate area is produced from motor vehicles travelling along Portola Parkway and SR-133. Residential receptors (single family homes) and the Crean Lutheran High School Sports Complex are located immediately south and west of the project site and emit small amounts of human-generated lighting emanating from building interiors and small amounts of outside lighting. There are no other uses located near or adjacent to the project site that generate glare such as solar panels or other large bodies of water.

3.1.2 Regulatory Framework

Federal

National Scenic Byway Program

The National Scenic Byways program is part of the U.S. Department of Transportation, Federal Highway Administration. The program was established under the Intermodal Surface Transportation Efficiency Act of 1991 and was reauthorized in 1998 under the Transportation Equity Act for the 21st Century. Under the program, the U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways or All-American Roads based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. The only National Scenic Byway located within Southern California is the Arroyo Seco Historic Parkway–Route 110 in Los Angeles County (Federal Highway Administration 2020). This National Scenic Byway is located 35 miles from the proposed project site.

State

California State Scenic Highway Program

The State Scenic Highway Program, created by the California Legislature in 1963, was established to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to the highways. A highway is designated under this program when a local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation (Caltrans) for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a scenic highway. When a city or county nominates an eligible scenic highway for official designation, it defines the scenic corridor, which is land generally adjacent and visible to a motorist on the highway (Caltrans 2020). The nearest officially designated state scenic highway is a segment of SR-91, which is approximately 10.5 miles northwest of the project area. (Caltrans 2019).

Local

County of Orange

General Plan, Resources Element

The County of Orange General Plan, Resources Element, contains a comprehensive strategy for the development, management, preservation and conservation of resources that are necessary to meet Orange County's existing and future demands. This strategy entails a framework of resources goals, policies, and programs. The General Plan identifies Landforms as a natural resource and discusses the aesthetic value of the diverse combination of mountains, hills, flatlands, and shoreline within the County of Orange. Additionally, the General Plan discusses policies in use to maintain scenic views such as sign restriction zoning and the Scenic Highway Component of the Transportation Element.

The Resources Element also discusses the value of Open Space within the County of Orange and how that relates to the aesthetic quality of the County. The value of open space to Orange County includes shaping the overall urban form, providing outdoor recreation opportunities, enhancing and protecting scenic vistas, ensuring public health and safety, preserving valuable natural resources, and providing areas for the managed production of resources.

The following are relevant policies, goals and objectives related to aesthetic resources identified in the General Plan, Resources Element:

> **Natural Resources Component, Policy 5:** To protect the unique variety of significant landforms in Orange County through environmental review procedures and community and corridor planning activities.
>
> **Open Space, Goal 1:** Retain the character and natural beauty of the environment through the preservation, conservation, and maintenance of open space.
>
> **Open Space, Objective 1.1:** To designate open space areas that preserve, conserve, maintain, and enhance the significant natural resources and physical features of unincorporated Orange County.

Open Space, Policy 1.1: To guide and regulate development of the unincorporated areas of the County to ensure that the character and natural beauty of Orange County is retained.

General Plan, Transportation Element

The County of Orange General Plan, Transportation Element, contains a Scenic Highway Plan, which designates "landscape corridors" and "viewscape corridors" within the county. As discussed in Section 3.1.1 above, the closest viewscape corridor to the project site is Santiago Canyon Road, approximately three miles northeast of the project site. The Transportation Element defines the goals, objectives, and policies pertaining to the implementation of the Scenic Highways Plan. The following are relevant policies, goals and objectives related to aesthetic resources identified in the General Plan, Transportation Element:

Scenic Highway Plan, Goal 1: Preserve and enhance unique or special aesthetic and visual resources through sensitive highway design and the regulation of development within the scenic corridor.

Scenic Highway Plan, Objective 1.1: Protect and enhance the County's beauty, amenities and quality of life within the unincorporated areas.

City of Irvine

General Plan, Conservation and Open Space Element

The City Irvine General Plan, Conservation Open Space Element, includes goals and policies to achieve the overarching goal of maintaining and preserving the environmental systems as a major feature in the City. Open space includes wildlife habitats, natural resource preserves, as well as parklands and areas of scenic value. As discussed above in Section 3.1.1, the General Plan identifies natural resources of importance to the City of Irvine namely the Santiago Hills, Northern Flatlands, Central Flatlands, and San Joaquin Hills. The following goals and policies from the Open Space Element are relevant to the proposed project and are as follows:

Policy L-5(b): Include standards or criteria for the identification and preservation of visually significant natural features (i.e., skylines, major ridgelines, prominent rock outcroppings, ridges, and oak woodlands) in future development proposals.

Policy L-5(c): Ensure development in the hillside areas retains the character and aesthetic value of the natural landform through use of the Hillside Development Ordinance.

General Plan, Land Use Element

The City Irvine General Plan, Land Use Element, includes goals and policies to achieve the overarching goal of promoting land use patterns which maintain safe residential neighborhoods, bolster economic prosperity, preserve open space, and enhance the overall quality of life in Irvine. The following goals and policies from the Land Use Element are relevant to the proposed project and are as follows:

Policy A-1(a): Develop identifiable City edges, pathways, entry points, and landmarks, and conserve visual resources along the scenic corridors which characterize Irvine.

Policy A-3(b): Ensure development in the hillside areas retains the character and aesthetic value of the natural landform through use of the Hillside Development Ordinance.

3.1.3 Impact Analysis and Mitigation Measures

Significance Criteria

This Draft EIR assumes implementation of the Proposed Project would have a significant impact related to aesthetics based on the *CEQA Guidelines* Appendix G and adapted to the Project by IRWD as lead agency if it would do the following:

1. Have a substantial adverse effect on a scenic vista or other scenic viewscapes.
2. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.
3. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?
4. Create a new source of substantial light or glare which would adversely affect sensitive day or nighttime views in the area.
5. Result in cumulatively considerable impacts to aesthetics.

Methodology

Visual Quality

Impacts to visual quality are generally assessed by estimating the amount of visual change introduced by project components, the degree to which visual changes may be visible to surrounding viewer groups, and the general sensitivity of viewer groups to landscape alterations. Visual changes are usually measured by three factors: (1) the amount of visual contrast that project components create (changes to form, line, color, texture, and scale in the landscape); (2) the amount of view obstruction that occurs (loss of view, duration/timing); and (3) the degradation of specific natural resources (e.g., removal of scenic trees):

(1) Visual contrast could be significant if project activities involve regraded landforms, alteration or elimination of ridgelines, and changes introduced by the project that result in landscape colors, textures, and scale of visual components that are inconsistent with a Project site's surroundings.

(2) View obstruction could be considered significant if the project would obstruct foreground (0 to 0.25 mile) or middleground (0.25 to 3 miles) views of the viewed area seen from sensitive public viewpoints.[2] View obstruction is contextualized in the temporal framework, for instance how long the view of the project feature would be visible by motorists, pedestrians and bicyclists traveling on the surrounding public roadways.

(3) The project's impacts could be considered significant if the project severely alters or displaces specific natural resources composed of striking landform features, aesthetic water bodies, mature stands of native/cultural trees (e.g., historic hedgerows), or historic structures.

2 Public views are those that are experienced from publicly accessible vantage points.

Visual impacts would be considered significant overall if any one of the three measures of significance is identified. These criteria were used to assist in estimating the extent and scale of landscape alterations due to Project implementation.

Visual Assessment

This visual assessment is based on field observations of the project site and surroundings in addition to a review of topographic maps, aerial, and ground-level photographs of the project area. Additionally, visual simulations were prepared by Fuscoe Engineering, Inc., and ESA, to document the "before and after" visual conditions that could be experienced by implementation of the proposed project (see **Figures 3.1-4 through 3.1-7**). To create the visual simulations, photographs were taken from each proposed viewpoint location described in Section 3.1.1 above. Data from each photograph was recorded, such as focal length, date and time of day, lens information, as well as geographic location. A 3D model was created of the proposed enlarged dam, reservoir, and access road using 3D Studio Max software, which was overlaid on each viewpoint photograph in order to demonstrate the visual change that would result from implementation of the proposed project, when viewed from the four public Viewpoints A, B, C, and D. The visual assessment included in this section is based in part on these simulations.

Impact Analysis

Scenic Vistas

Impact 3.1-1: The proposed project could have a substantial adverse effect on a scenic vista or other scenic viewscapes.

As explained in Section 3.1.1 Environmental Setting, there are several locally designated scenic vistas/viewscapes that encompass the project site:

- The Loma Ridge and Santa Ana Mountains, which provide an eastern backdrop to the proposed project as shown in Viewpoints A and B, are identified as "dominant ridgelines" in the County of Orange; the Santa Ana Mountains is identified as the "signature landmark of Orange County."
- The San Joaquin Hills, which can be seen in the distant background of the proposed project site and vicinity as shown in Viewpoint C, are identified as a "major ridgeline of importance" in the County of Orange.
- The intersection of Sand Canyon Avenue and Portola Parkway looking northeast as shown in Viewpoint D is designated as a "major view" within the City of Irvine.

The intersection of Jeffrey Road looking northeast at Irvine Boulevard is designated as a "major view" within the City of Irvine. Views from this location towards the project site are largely obstructed by trees and residences in the middleground, and this viewscape is not discussed further.

Santiago Canyon Road, located approximately 3 miles northeast of the project site, is identified by the County of Orange as a viewscape corridor. Views west from Santiago Canyon Road are blocked by low-lying hills, and therefore views of the project site are not available from this vantage point. As such, this viewscape is not discussed further.

Existing

Proposed

D170445.00

SOURCE: FUSCOE, 2020

Syphon Reservoir Improvement Project

Figure 3.1-4
Existing View and Visual Simulation
of Crean Athletic Field Entrance from Viewpoint A

ESA


Existing


Proposed

D170445.00

SOURCE: FUSCOE, 2020

Syphon Reservoir Improvement Project

Figure 3.1-5
Existing View and Visual Simulation
of Stonegate Elementary/Park from Viewpoint B

ESA

Existing

Proposed

D170445.00

SOURCE: FUSCOE, 2020

Syphon Reservoir Improvement Project

Figure 3.1-6
Existing View and Visual Simulation
of Toll Road from Viewpoint C

ESA

Existing

Proposed

D170445.00

SOURCE: ESA, 2020

Syphon Reservoir Improvement Project

Figure 3.1-7
Existing View and Visual Simulation
of Intersection of Portola Parkway and Sand Canyon Avenue from Viewpoint D

ESA

Construction

Construction of the proposed project would require temporary construction activities within the project site. Construction equipment would include backhoes, excavators, scrapers, dozers, water wagons and trucks, rollers, graders, loaders, dozers, and trucks for the construction workers and equipment hauling. Construction would initiate with intersection improvements and construction of an on-site access road at the intersection of Sand Canyon Avenue and Portola Parkway (Viewpoint D), which is identified as a "major view" in the City of Irvine. During construction, the access road would consist of native dirt or potentially road base and would not provide unusual contrast with the native hillsides which provide the backdrop for the "major view." Construction at this location would be temporary, approximately 5 months, and would not affect the scale or quality of the view of the local hillsides from this location. Impacts to the "major view" at the intersection of Sand Canyon Avenue and Portola Parkway would be less than significant.

The construction sequence would continue at the easternmost portion of the project site and move west as work progresses. While work occurs within the eastern and middle portions of the reservoir, and before excavation of the existing dam face begins, construction activities and large equipment would generally be shielded from view along Portola Parkway (Viewpoint A) by the walls of the existing dam. Views of construction equipment may be visible from SR-133 (Viewpoint C) during this time, which provide background views of the Santiago Hills, identified as a "major ridgeline of importance." However, the construction equipment would be temporary and would not shield the background viewscape of the Santiago Hills. As a result, impacts would be less than significant.

When the existing dam is excavated, and as construction of the treatment facilities, new dam, spillway and other appurtenant facilities occur on the western portion of the project site, construction equipment and partially built features may be visible from public vantage points along Portola Parkway (Viewpoint A) that provide views of the "dominant ridgelines" of Loma Ridge and the larger Santa Ana Mountains in the background. However, the equipment would not have the scale or massing to significantly obstruct or provide contrast to the ridgelines in the background. As a result, impacts would be less than significant.

Operation

Once constructed, the existing 59-foot dam would be elevated to 136 feet in order to achieve water storage capacity of approximately 5,000 AF. The crest of the dam would be elevated from 388 feet amsl to 477 amsl. Other aboveground structures would include a spillway on the left abutment of the dam and an approximately 6,400 square foot treatment facility at the toe of the dam. Visual simulations of the proposed dam are included in Figure 3.1-4 (from Viewpoint A) and Figure 3.1-5 (Viewpoint B). Figure 3.1-6 (Viewpoint C) includes a visual simulation of the proposed maximum water surface elevation in the expanded reservoir. Other permanent contrasting features include pavement installed for the on-site access road and installation of a retaining wall behind the access road, as shown in the visual simulation in Figure 3.1-7 (Viewpoint D).

As shown in Figure 3.1-7, the access road north of the intersection of Sand Canyon Avenue and Portola Parkway would be paved after completion of construction, and a retaining wall would be installed, which would introduce permanent features into a native landscape that is identified by the City of Irvine as a "major view." While views of the paved access road would not be pronounced like other aboveground structures, the retaining wall would be a new permanent feature that could contribute to a degradation of the "major view" from this location. As a result, the impact would be considered a potentially significant impact to scenic viewscapes identified in the City of Irvine General Plan. **Mitigation Measure AES-1** would require design of the aboveground project structures, including retaining walls, to have color palettes that blend in with the surrounding character of the project site. As shown in Figure 3.1-7 which demonstrates implementation of the mitigation measure, the retaining wall would blend in with the surrounding vegetation. With implementation of the mitigation measure, the impact to the "major view" at the intersection of Sand Canyon Avenue and Portola Parkway would be reduced to a less than significant level.

The proposed dam face would extend approximately 77 feet above the existing dam height. The enlarged dam would be the main project component that could obstruct the "dominant ridgelines" of the Loma Ridge or Santa Ana Mountains from public vantage points within the City of Irvine; all other facilities would be below the dam crest. As shown in Figure 3.1-5, the enlarged dam would barely be visible from Stonegate Park and Stonegate Elementary School (Viewpoint B) due to the intervening vegetation and residences, and would not compromise existing views of the Loma Ridge or Santa Ana Mountains. However, as shown in Figure 3.1-4, the enlarged dam would extend higher than the natural ridgelines seen in the existing condition from the entrance to the Crean Lutheran High School Athletic Complex (Viewpoint A). The permanent impact to the viewscape of prominent ridgelines of Loma Ridge and the Santa Ana Mountains within the City of Irvine would be a potentially significant impact. The proposed project includes revegetation of the dam face as a project design feature, which would allow the enlarged dam to blend into the surrounding hillsides, as shown in Figure 3.1-4. The types of vegetation used and associated maintenance would conform with DSOD requirements. Additionally, motorists, bicyclists and pedestrians would only experience temporary view obstruction for brief moments of time while passing the project site on Portola Parkway. And as shown in Figure 3.1-5, the view obstruction is minimized as distance away from the project site is achieved. With implementation of project design features, impacts would be reduced to a less than significant level.

The proposed expanded reservoir would provide an increase in approximately 4,500 AF of water storage at the project site. As shown from Figure 3.1-6, the water surface elevation would be significantly higher than under existing conditions. Nevertheless, background views of the Santiago Hills, identified as a "major ridgeline of importance," would be maintained. Furthermore, the increase in water within the reservoir provides an aesthetic benefit to the overall viewscape. As a result, impacts would be less than significant.

Mitigation Measures

> **AES-1**: Aboveground buildings/structures/retaining walls shall be designed to have earth-tone color palettes that blend in with the surrounding landscape and vegetation.

Significance Determination

Less than Significant Impact with Mitigation

Scenic Highway

Impact 3.1-2: The proposed project would not substantially damage scenic resources including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.

The proposed project facilities are not located in the vicinity of a state designated or eligible scenic highway. The nearest officially designated state scenic highway is a segment of SR-91, which is approximately 10.5 miles northwest of the project area (Caltrans 2019). Neither project construction nor operation activities would be visible from motorists traveling along this portion of SR-91 due to the distance and intervening topography. Therefore, the proposed project would not impact scenic resources, which include rock outcroppings, trees, or historic buildings within a designated state scenic highway corridor. No impact would occur.

Mitigation Measures

None required

Significance Determination

No Impact

Visual Character and Quality

Impact 3.1-3: The proposed project could substantially degrade the existing visual character or quality of public views of the site and its surroundings. (Public views are those that are experienced from publicly accessible vantage point).

As described above in Section 3.1.1 Environmental Setting and in Table 3.1-1, the project site and surrounding area has moderate to high visual quality, but is not considered highly visually sensitive when affected viewers and viewer exposure conditions are taken into account. An assessment of impacts to the visual character and quality of the site due to construction and operation of the proposed project is summarized using the three screening criteria discussed above in the Methodology.

Construction

The public vantage points from which views of construction activities could occur are from Portola Parkway and Sand Canyon Avenue, the closest public rights-of-way to the west, and SR-133, the closest public right-of-way to the southeast. The visual sensitivity from Portola Parkway and Sand

Canyon Avenue is considered moderate due to moderate visual quality and moderate viewer exposure. The visual sensitivity from SR-133 is considered moderate due to high visual quality and low viewer exposure. Due to the hillsides surrounding the existing reservoir where construction would occur, public views are otherwise limited.

Construction activities associated with the proposed project would result in temporary, short-term, impacts to the visual character and quality of the project area. Construction activities would require the use of construction equipment and materials such as scrapers, dozers, water wagons, rollers, graders, loaders, dozers, and trucks for the construction workers. All work within the existing reservoir footprint would generally be shielded from view along Portola Parkway by the walls of the existing dam. Construction activities associated with the proposed intersection improvements and construction of an on-site access road would be visible for a short duration (from a few seconds to several minutes) from the intersection of Portola Parkway and Sand Canyon Avenue for the 5-month construction period; as work progresses northeast along the access route and into the project site, views would be shielded by existing topography from public rights-of-way. Views from SR-133 to the construction activities within the existing reservoir would be short in duration (a few seconds) and would not be perceivable to motorists passing by. Construction of the treatment facilities, new dam, spillway and other appurtenant facilities may be visible from public vantage points along Portola Parkway. However, the majority of these features would be partially obstructed by the Crean Lutheran High School Athletic Complex. Additionally, the equipment would not have the scale or massing to significantly obstruct or provide contrast to the ridgelines in the background. The low contrasting visual elements of construction would be temporary and would not permanently affect the existing visual character and quality of the surrounding area. All impacts from construction-related activities would be less than significant.

Operation

Once constructed, the dam would be raised from its existing height of 59 feet to 136 feet in order to achieve water storage capacity of 5,000 AF. The crest of the dam would be elevated from 388 feet amsl to 477 amsl. Other aboveground structures would include a spillway on the left abutment and a 6,400 square foot treatment facility near the toe of the dam. Visual simulations of the proposed dam are included in Figure 3.1-4 (from Viewpoint A) and Figure 3.1-5 (Viewpoint B). Figure 3.1-6 (Viewpoint C) includes a visual simulation of the proposed maximum water surface elevation in the expanded reservoir. Visual simulations of the proposed on-site access road and retaining wall are included in Figure 3.1-7 (Viewpoint D). These figures compare existing views with simulated views after project implementation. The visual simulations show that the proposed new dam, expanded reservoir, and features such as the access road and retaining wall would be fully visible once operational from surrounding public viewpoints. A description of the simulated views in relation to visual character and quality is provided below per the screening criteria of visual obstruction, contrast, and alteration of natural resources.

For Viewpoint A (Figure 3.1-4), the existing visual sensitivity is considered moderate due to moderate visual quality and moderate viewer exposure. With the addition of the proposed dam as shown in the simulation, the ridgelines of the Santa Ana Mountains and Loma Ridge would be eliminated from this vantage point. These ridgelines are considered to have natural land form and open space value and contribute to the area's visual character and quality. No natural landforms would be regraded, altered, or otherwise destroyed as a result of project implementation because the existing dam is an artificial feature. The dam face would be revegetated as a project design feature, which would maintain consistency with the existing natural hillsides. The types of vegetation used and associated maintenance would conform with DSOD requirements. The proposed dam would not provide significant contrast nor alter color of the surrounding landscape. The proposed treatment facilities would be the only facilities installed aboveground other than the dam and associated spillway. To ensure that all aboveground project structures would not impact the visual character or quality of the project site or surrounding area, Mitigation Measure AES-1 would require design of the aboveground project structures to have color palettes that blend in with the surrounding character of the project site. As a result, the proposed project would not modify the visual quality of the surrounding area. Direct unobstructed views of the proposed dam would be available for brief periods of time (i.e., seconds to several minutes) when approximately 19,000 daily motorist users, as well as pedestrians/cyclists, are passing the site. It is important to note that motorists traveling northwest/southwest on Portola Parkway would not view the site from the angle depicted in the viewpoint; the angle from Viewpoint A looking northwest would mainly be experienced by pedestrians/cyclists, with motorists experiencing a lesser degree of the project site due to the angle of the roadway. Given the lack of temporal frequency of public viewers and the revegetation of the dam face that would be consistent with the surrounding natural hillsides, the existing visual sensitivity of the view from this location would not be compromised. As a result, impacts to the established visual character and quality from this view as a result of project implementation would be less than significant with mitigation.

For Viewpoint B (Figure 3.1-5), the existing visual sensitivity is considered moderate due to moderate visual quality and moderate viewer exposure. As shown in the simulation, the proposed dam would barely be visible from Stonegate Park and Stonegate Elementary School due to the intervening vegetation and residences in the middleground. The proposed dam would not provide significant contrast nor alter color of the surrounding landscape from this location. No ridgelines or natural landforms would be regraded, altered, or otherwise destroyed from this vantage point, and distant views of the Santa Ana Mountains and Loma Ridge would be preserved. While approximately 1,000 students and recreationalists would be using the Stonegate Elementary School and Stonegate Park for durations of up approximately 1 to 3 hours, view obstruction would not be perceived by these users. As a result, the existing visual sensitivity would not be compromised, and impacts to established visual character and quality from this view as a result of project implementation would be less than significant.

For Viewpoint C (Figure 3.1-6), the existing visual sensitivity is considered moderate due to high visual quality and low viewer exposure. With addition of the proposed reservoir as shown in the simulation, the increase in water surface would provide an expanded man-made water feature. While native vegetation would be removed to achieve the larger reservoir, the area would be surrounded by a wetland/riparian area that would enhance the view from this location. Neither the existing background view of the Santiago Hills nor any other ridgelines or landforms would be obstructed from this vantage point. The expanded reservoir would be consistent with the site and its surroundings, and would not result in a visual contract as in terms of altered landscape colors or textures. While the view of the project site would be unobstructed, views would be available for merely a number of seconds as motorists are traveling at high speeds along the transportation corridor. As a result, the existing visual sensitivity would not be compromised, and the impacts to the established visual character and quality from this view a result of project implementation would be less than significant.

For Viewpoint D (Figure 3.1-7), the existing visual sensitivity is considered moderate due to moderate visual quality and moderate viewer exposure. The proposed access road would extend along the alignment of an existing access road and would be widened and paved. Additionally, a retaining wall would be added to stabilize the hillside behind the access road. As shown in the simulation in Figure 3.1-7, the hillsides that have open space value and that contribute to the area's visual character and quality would be slightly altered by installation of a paved access road and a retaining wall. As a result, the impact would be considered a potentially significant impact to the existing visual character or quality of the project site and its surroundings. To ensure that all aboveground non-natural project features such as the retaining wall would not impact the visual character or quality of the project site or surrounding area, Mitigation Measure AES-1 would require design of the retaining wall to have color palettes that blend in with the surrounding character of the project site. As a result, the proposed project would not significantly modify the visual quality of the surrounding area. Direct unobstructed views of the proposed access road would be available for brief periods of time (i.e., seconds to several minutes) when approximately 19,000 daily motorist users are passing the site. Given the lack of temporal frequency of public viewers and the fact that the retaining wall that would be designed to blend in with the surrounding natural hillsides, the existing visual sensitivity of the view from this location would not be significantly compromised. As a result, impacts to the established visual character and quality from this view as a result of project implementation would be less than significant with mitigation.

Mitigation Measures

Implement Mitigation Measure AES-1

Significance Determination

Less than Significant Impact with Mitigation

Light and Glare

Impact 3.1-4: The proposed project could create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

Existing light sources in the vicinity of the project area include existing uses of the adjacent Crean Lutheran High School Athletic Complex and residential uses to the south across Portola Parkway. There are no existing light sources on the project site. Project construction would take place from 7:00 A.M. to 4:00 P.M. As such, proposed project construction would not create a new source of light or glare and impacts would be less than significant.

Once operational, aboveground project components that could require lighting in the project area include the proposed treatment facilities and new access road. The proposed treatment facilities and access road would require lighting that could affect nighttime views. **Mitigation Measure AES-2** would require all new permanent exterior lighting to be shielded or directed downward to minimize light cast on neighborhood residences directly adjacent to the project site. As a result, impacts to light during operation would be less than significant with mitigation.

When reservoir levels are at their peak in the winter and spring months, the reservoir could create new sources of glare from an increased water surface area. However, this potential increase would be marginal, not in effect in the summer months when daytime hours are at their highest, and only noticeable to motorists travelling on SR-133 for brief periods of time (several seconds). As a result, impacts to daytime glare would be less than significant.

Mitigation Measures

> **AES-2**: All new permanent exterior lighting associated with the proposed project shall be shielded and directed downward to avoid light spill onto neighboring parcels and visibility from surrounding public vantage points.

Significance Determination

Less than Significant Impact with Mitigation

Cumulative Impacts

Impact 3.1-5: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative short-term and long-term impacts to aesthetics.

The geographical extent of cumulative impacts related to aesthetic includes viewsheds in which the project is visible as outlined in Table 3-1 of Chapter 3 of this Draft EIR. There are three community improvement projects, Project 3 (Gateway Community Park), Project 9 (Truck Route Roadway Rehabilitation Project), and Project 10 (18-19 Athletic Court Resurfacing) that are located in close proximity to the proposed project and could contribute to cumulatively considerable aesthetic impacts.

Construction and Operation

Significant cumulative impacts related to aesthetics could occur if the project, in conjunction with Cumulative Projects 3, 9 and 10, could block significant scenic vistas, create cumulative light and glare, or substantially degrade the visual quality of an area. Projects 3, 9, and 10 are projects that either involve resurfacing of roadways or recreational facilitates, or creation of recreational facilities. While these projects would involve construction equipment similar to the proposed project, the machinery would not be visible above the existing vegetation lines within the City of Irvine and would therefore not combine together with the project to create a significant impact to nearby scenic vistas. Once constructed, these projects would not involve aboveground facilities and therefore would not contribute to cumulative visual impacts. There are no other projects within the cumulative scenario in close proximity to the project site that would block scenic vistas, resources, or negatively impact visual character or quality. As discussed above, the proposed project would result in the introduction of project features that could contrast with designated scenic resources in the City of Irvine and the County of Orange. The project would be required to implement Mitigation Measures AES-1 and AES-2, which would require permanent facilities to blend in with the surrounding color palette. During construction, less than sufficient impacts due to equipment would occur. Implementation of mitigation measures would reduce the project's incremental contribution to cumulative impacts in the area, and impacts would be less than significant with mitigation. Therefore, the project would not combine together with the projects in the cumulative scenario to be cumulatively considerable, and impacts would be less than significant with mitigation.

Mitigation Measures

Implement Mitigation Measures AES-1 and AES-2

Significance Determination

Less than Significant Impact with Mitigation

3.1.4 References

California Department of Transportation (Caltrans). 2018. Caltrans Traffic Census Program. *Traffic Volumes: Annual Average Daily Traffic (AADT)* Data Spreadsheet. Available at https://dot.ca.gov/programs/traffic-operations/census. Accessed May 12, 2020.

Caltrans. 2019. List of eligible and officially designated State Scenic Highways, updated August 2019. Available at https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways. Accessed May 27, 2020.

Caltrans. 2020. California Scenic Highways. Available at https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways. Accessed May 27, 2020.

City of Irvine. 2015. General Plan, Open Space and Conservation Element. Available at https://www.cityofirvine.org/community-development/current-general-plan. Accessed March 16, 2020.

County of Orange. 2005a. County of Orange, General Plan Chapter IV, Scenic Highway Plan. Available at http://www.ocpublicworks.com/civicax/filebank/blobdload.aspx?blobid=8588. Accessed May 13, 2020.

County of Orange. 2005b, General Plan Chapter VI: Resources Element. Available at https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=40235. Accessed May 13, 2020.

Federal Highway Administration. 2020. America's Byways: California. Available at https://www.fhwa.dot.gov/byways/states/CA. Accessed on February 7, 2020.

3.2 Air Quality

This section evaluates the potential for impacts related to air emissions generated by construction and operation of the proposed project. This section includes: a description of the existing air quality conditions regionally and in and around the proposed project site; a summary of applicable regulations related to air quality; and an evaluation of the potential impacts of the proposed project related to air quality in and around the project site, including cumulative impacts. Details regarding the air quality assumptions and calculations are provided in the Air Quality and Greenhouse Gas Technical Report prepared by ESA for this project and included as **Appendix B** of this Draft EIR.

3.2.1 Environmental Setting

Air Quality Fundamentals

Criteria Pollutants

Elevated concentrations of certain air pollutants in the atmosphere have been recognized to cause notable health problems and consequential damage to the environment either directly or in reaction with other pollutants. In the United States, such pollutants have been identified and are regulated as part of the overall endeavor to prevent further deterioration and facilitate improvement in air quality. The following pollutants are regulated by the United States Environmental Protection Agency (USEPA) and are subject to emissions control requirements adopted by federal, State and local regulatory agencies. These pollutants are referred to as "criteria air pollutants" as a result of the specific standards, or criteria, which have been adopted pertaining to them. The USEPA established the National Ambient Air Quality Standards (NAAQS) to "provide public health protection, including protecting the health of 'sensitive' populations such as asthmatics, children, and the elderly," (USEPA 2016a) allowing "an adequate margin of safety" (42 USC Section 7409; CAA Section 109). California Ambient Air Quality Standards (CAAQS) were "established to protect the health of the most sensitive groups in our communities" and "defines the maximum amount of a pollutant averaged over a specified period of time that can be present in outdoor air without any harmful effects on people or the environment" (CARB 2020a). NAAQS and CAAQS for each of the monitored pollutants and their effects on health are discussed below.

Ozone: Ozone is a secondary pollutant formed by the chemical reaction of volatile organic compounds (VOCs) and nitrogen oxides (NO_X) in the presence of sunlight under certain meteorological conditions, such as high temperature and stagnation episodes. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable.

According to the USEPA, ozone can cause the muscles in the airways to constrict potentially leading to wheezing and shortness of breath (USEPA 2019a). Ozone can make it more difficult to breathe deeply and vigorously; cause shortness of breath and pain when taking a deep breath; cause coughing and sore or scratchy throat; inflame and damage the airways; aggravate lung diseases such as asthma, emphysema and chronic bronchitis; increase the frequency of asthma attacks; make the lungs more susceptible to infection; continue to damage the lungs even when the symptoms have disappeared; and cause chronic obstructive pulmonary disease (USEPA 2019a).

Long-term exposure to ozone is linked to aggravation of asthma and is likely to be one of many causes of asthma development. Long-term exposures to higher concentrations of ozone may also be linked to permanent lung damage, such as abnormal lung development in children (USEPA 2019a). According to the California Air Resources Board (CARB), inhalation of ozone causes inflammation and irritation of the tissues lining human airways, causing and worsening a variety of symptoms, and exposure to ozone can reduce the volume of air that the lungs breathe in and cause shortness of breath (CARB 2020b).

The USEPA states that people most at risk from breathing air containing ozone include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers (USEPA 2019a). Children are at greatest risk from exposure to ozone because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, which increases their exposure (USEPA 2019a). According to CARB, studies show that children are no more or less likely to suffer harmful effects than adults; however, children and teens may be more susceptible to ozone and other pollutants because they spend nearly twice as much time outdoors and engaged in vigorous activities compared to adults (CARB 2020b). Children breathe more rapidly than adults and inhale more pollution per pound of their body weight than adults and are less likely than adults to notice their own symptoms and avoid harmful exposures (CARB 2020b). Further research may be able to better distinguish between health effects in children and adults (CARB 2020b).

Volatile Organic Compounds: VOCs are organic chemical compounds of carbon and are not "criteria" air pollutants themselves; however, in combination with NO_X they form ozone, and are regulated to prevent the formation of ozone (USEPA 2017a). According to CARB, some VOCs are highly reactive and play a critical role in the formation of ozone. Potential health effects of ozone exposure are discussed above. Other VOCs can result in adverse health effects from direct exposure and are classified by the State of California as toxic air contaminants or Hazardous Air Pollutants (HAPs) by the USEPA (CARB 2020c; USEPA 2018a). The health effects of VOCs, as Toxic Air Contaminants/Hazardous Air Pollutants (TACs/HAPs), are discussed more thoroughly below.

VOCs are typically formed from combustion of fuels and/or released through evaporation of organic liquids. Fuel combustion can occur in internal combustion sources, such as motor vehicle usage, landscape and other portable equipment, and stationary generators, or external combustion, such as for water and space heating. Evaporation sources include fueling operations, consumer products (e.g., cleaning solutions), and architectural coatings (USEPA 2017b).

Nitrogen Dioxide (NO_2) and Nitrogen Oxide: NO_X is a term that refers to a group of compounds containing nitrogen and oxygen. As mentioned above, NO_X combines with VOCs to form ozone. The health effects associated with the formation of ozone were discussed above under Ozone. The primary compounds of air quality concern include NO_2 and nitric oxide (NO). Ambient air quality standards have been promulgated for NO_2, which is a reddish-brown, reactive gas (CARB 2020d).

The principal form of NO_X produced by combustion is NO, but NO reacts quickly in the atmosphere to form NO_2, creating the mixture of NO and NO_2 referred to as NO_X. Major sources of NO_X include emissions from cars, trucks and buses, power plants, and off-road equipment. The terms NO_X and NO_2 are sometimes used interchangeably. However, the term NO_X is typically used when discussing emissions, usually from combustion-related activities, and the term NO_2 is typically used when discussing ambient air quality standards. Where NO_X emissions are discussed in the context of the thresholds of significance or impact analyses, the discussions are based on the conservative assumption that all NO_X emissions would oxidize in the atmosphere to form NO_2.

According to the USEPA, short-term exposures to NO_2 can potentially aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to emergency rooms while longer exposures to elevated concentrations of NO_2 may contribute to the development of asthma and potentially increase susceptibility to respiratory infections (USEPA 2016b). According to CARB, controlled human exposure studies that show that NO_2 exposure can intensify responses to allergens in allergic asthmatics (CARB 2020d).

In addition, a number of epidemiological studies have demonstrated associations between NO_2 exposure and premature death, cardiopulmonary effects, decreased lung function growth in children, respiratory symptoms, emergency room visits for asthma, and intensified allergic responses (CARB 2020d). Infants and children are particularly at risk from exposure to NO_2 because they have disproportionately higher exposure to NO_2 than adults due to their greater breathing rate for their body weight and their typically greater outdoor exposure duration while in adults, the greatest risk is to people who have chronic respiratory diseases, such as asthma and chronic obstructive pulmonary disease (CARB 2020d).

CARB states that much of the information on distribution in air, human exposure and dose, and health effects is specifically for NO_2 and there is only limited information for NO and NO_X, as well as large uncertainty in relating health effects to NO or NO_X exposure (CARB 2020d).

Carbon Monoxide (CO): CO is primarily emitted from combustion processes and motor vehicles due to the incomplete combustion of fuel, such as natural gas, gasoline, or wood, with the majority of outdoor CO emissions from mobile sources (CARB 2020e).

According to the USEPA, breathing air with a high concentration of CO reduces the amount of oxygen that can be transported in the blood stream to critical organs like the heart and brain and at very high levels, which are possible indoors or in other enclosed environments, CO can cause dizziness, confusion, unconsciousness and death (USEPA 2016c). Very high levels of CO are not likely to occur outdoors; however, when CO levels are elevated outdoors, they can be of particular concern for people with some types of heart disease since these people already have a reduced ability for getting oxygenated blood to their hearts and are especially vulnerable to the effects of CO when exercising or under increased stress (USEPA 2016c). In these situations, short-term exposure to elevated CO may result in reduced oxygen to the heart accompanied by chest pain also known as angina (USEPA 2016c).

According to CARB, the most common effects of CO exposure are fatigue, headaches, confusion, and dizziness due to inadequate oxygen delivery to the brain (CARB 2020e). For people with cardiovascular disease, short-term CO exposure can further reduce their body's already compromised ability to respond to the increased oxygen demands of exercise, exertion, or stress; inadequate oxygen delivery to the heart muscle leads to chest pain and decreased exercise tolerance (CARB 2020e). Unborn babies, infants, elderly people, and people with anemia or with a history of heart or respiratory disease are most likely to experience health effects with exposure to elevated levels of CO (CARB 2020e).

Sulfur Dioxide (SO_2): According to the USEPA, the largest source of SO_2 emissions in the atmosphere is the burning of fossil fuels by power plants and other industrial facilities while smaller sources of SO_2 emission include industrial processes such as extracting metal from ore; natural sources such as volcanoes; and locomotives, ships and other vehicle and heavy equipment that burn fuel with a high sulfur content (USEPA 2019b). In 2006, California phased-in the ultra-low-sulfur diesel regulation limiting vehicle diesel fuel to a sulfur content not exceeding 15 parts per million, down from the previous requirement of 500 parts per million, substantially reducing emissions of sulfur from diesel combustion (CARB 2004).

According to the USEPA, short-term exposures to SO_2 can harm the human respiratory system and make breathing difficult (USEPA 2019b). According to CARB, health effects at levels near the State one-hour standard are those of asthma exacerbation, including bronchoconstriction accompanied by symptoms of respiratory irritation such as wheezing, shortness of breath and chest tightness, especially during exercise or physical activity and exposure at elevated levels of SO_2 (above 1 parts per million [ppm]) results in increased incidence of pulmonary symptoms and disease, decreased pulmonary function, and increased risk of mortality (CARB 2020f). Children, the elderly, and those with asthma, cardiovascular disease, or chronic lung disease (such as bronchitis or emphysema) are most likely to experience the adverse effects of SO_2 (CARB 2020f; USEPA 2019b).

Particulate Matter (PM10 and PM2.5): Particulate matter air pollution is a mixture of solid particles and liquid droplets found in the air (USEPA 2018b). Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye while other particles are so small they can only be detected using an electron microscope (USEPA 2018b). Particles are defined by their diameter for air quality regulatory purposes: inhalable particles with diameters that are generally 10 micrometers and smaller (PM10); inhalable particles with diameters that are 2.5 micrometers or less (PM2.5) (USEPA 2018b). Thus, PM2.5 comprises a portion or a subset of PM10.

Sources of PM10 emissions include dust from construction sites, landfills and agriculture, wildfires and brush/waste burning, industrial sources, and wind-blown dust from open lands (CARB 2020g). Sources of PM2.5 emissions include combustion of gasoline, oil, diesel fuel, or wood (CARB 2020g). PM10 and PM2.5 may be either directly emitted from sources (primary particles) or formed in the atmosphere through chemical reactions of gases (secondary particles) such as SO_2, NO_X, and certain organic compounds (CARB 2020g).

According to CARB, both PM10 and PM2.5 can be inhaled, with some depositing throughout the airways; PM10 is more likely to deposit on the surfaces of the larger airways of the upper region of the lung, while PM2.5 is more likely to travel into and deposit on the surface of the deeper parts of the lung, which can induce tissue damage, and lung inflammation (CARB 2020g). Short-term (up to 24-hours duration) exposure to PM10 has been associated primarily with worsening of respiratory diseases, including asthma and chronic obstructive pulmonary disease, leading to hospitalization and emergency department visits (CARB 2020g). The effects of long-term (months or years) exposure to PM10 are less clear, although studies suggest a link between long-term PM10 exposure and respiratory mortality. The International Agency for Research on Cancer published a review in 2015 that concluded that particulate matter in outdoor air pollution causes lung cancer (CARB 2020g).

Short-term exposure to PM2.5 has been associated with premature mortality, increased hospital admissions for heart or lung causes, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and restricted activity days. Long-term exposure to PM2.5 has been linked to premature death, particularly in people who have chronic heart or lung diseases, and reduced lung function growth in children (CARB 2020g). According to CARB, populations most likely to experience adverse health effects with exposure to PM10 and PM2.5 include older adults with chronic heart or lung disease, children, and asthmatics. Children and infants are more susceptible to harm from inhaling pollutants such as PM10 and PM2.5 compared to healthy adults because they inhale more air per pound of body weight than do adults, spend more time outdoors, and have developing immune systems (CARB 2020g).

Lead (Pb): Major sources of lead emissions include ore and metals processing, piston-engine aircraft operating on leaded aviation fuel, waste incinerators, utilities, and lead-acid battery manufacturers (USEPA 2017c). In the past, leaded gasoline was a major source of lead emissions; however, the removal of lead from gasoline has resulted in a decrease of lead in the air by 98 percent between 1980 and 2014 (USEPA 2017c).

Lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system, and affects the oxygen carrying capacity of blood (USEPA 2017c). The lead effects most commonly encountered in current populations are neurological effects in children, such as behavioral problems and reduced intelligence, anemia, and liver or kidney damage (CARB 2020h). Excessive lead exposure in adults can cause reproductive problems in men and women, high blood pressure, kidney disease, digestive problems, nerve disorders, memory and concentration problems, and muscle and joint pain (CARB 2020h).[1]

California Only Criteria Pollutants

The California Ambient Air Quality Standards regulate the same criteria pollutants as the NAAQS but in addition, regulate State-identified criteria pollutants, including sulfates, hydrogen

1 While the SCAQMD CEQA Air Quality Handbook contains a thresholds of significance of significance for lead, project construction and operation would not include sources of lead emissions and would not exceed the thresholds of significance for lead. Unleaded fuel and unleaded paints have virtually eliminated lead emissions from commercial land use projects such as the Project. As a result, lead emissions are not further evaluated.

sulfide, visibility-reducing particles, and vinyl chloride (CARB 202a). With respect to the State-identified criteria pollutants (i.e., sulfates, hydrogen sulfide, visibility reducing particles, and vinyl chloride), the Project would either not emit them (i.e., hydrogen sulfide and vinyl chloride), or they would be accounted for as part of the pollutants estimated in this analysis (i.e., sulfates and visibility reducing particles). For example, visibility reducing particles are associated with particulate matter emissions and sulfates are associated with SO_2 emissions. Both particulate matter and SO_2 are included in the emissions estimates for the project. A description of the health effects of the State-identified criteria air pollutants is provided below.

Sulfates (SO_4^{2-}): Sulfates in the environment occur as a result of SO_2 (sulfur dioxide) being converted to SO_4^{2-} compounds in the atmosphere where sulfur is first oxidized to SO_2 during the combustion process of sulfur containing, petroleum-derived fuels (e.g., gasoline and diesel fuel) (CARB 2020i). Exposure to SO_4^{2-}, which are part of PM2.5, results in health effects similar to those from exposure to PM2.5 including reduced lung function, aggravated asthmatic symptoms, and increased risk of emergency department visits, hospitalizations, and death in people who have chronic heart or lung diseases (CARB 2020i). Population groups with higher risks of experiencing adverse health effects with exposure to SO_4^{2-} include children, asthmatics, and older adults who have chronic heart or lung diseases (CARB 2020i).

Hydrogen Sulfide (H_2S): H_2S is a colorless gas with a strong odor of rotten eggs. The most common sources of H_2S emissions are oil and natural gas extraction and processing, and natural emissions from geothermal fields. Industrial sources of H_2S include petrochemical plants and Kraft paper mills. H_2S is also formed during bacterial decomposition of human and animal wastes, and is present in emissions from sewage treatment facilities and landfills (CARB 2020j). Exposure to H_2S can induce tearing of the eyes and symptoms related to overstimulation of the sense of smell, including headache, nausea, or vomiting; additional health effects of eye irritation have only been reported with exposures greater than 50 ppm, which is considerably higher than the odor threshold (CARB 2020j). H_2S is regulated as a nuisance based on its odor detection level; if the standard were based on adverse health effects, it would be set at a much higher level (CARB 2020j). According to CARB, there are insufficient data available to determine whether or not some groups are at greater risk than others (CARB 2020j).

Visibility-Reducing Particles: Visibility-reducing particles are any particles in the atmosphere that obstruct the range of visibility by creating haze (CARB 2020k). These particles vary in shape, size and chemical composition, and come from a variety of natural and manmade sources including windblown metals, soil, dust, salt, and soot. Other haze-causing particles are formed in the air from gaseous pollutant (e.g., sulfates, nitrates, organic carbon particles) which are the major constituents of fine PM, such as PM2.5 and PM10, and are caused from the combustion of fuel. CARB’s standard for visibility reducing particles is not based on health effects, but rather on welfare effects, such as reduced visibility and damage to materials, plants, forests, and ecosystems. The health impacts associated with PM2.5 and PM10 are discussed above under Particulate Matter.

Vinyl Chloride: Vinyl chloride is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products and are generally emitted from industrial processes and other major sources of vinyl chloride have been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents (CARB 2020l). Short-term health of effects of exposure to high levels of vinyl chloride in the air include central nervous system effects, such as dizziness, drowsiness, and headaches while long-term exposure to vinyl chloride through inhalation and oral exposure causes liver damage and has been shown to increase the risk of angiosarcoma, a rare form of liver cancer in humans (CARB 2020l). Most health data on vinyl chloride relate to carcinogenicity; thus, the people most at risk are those who have long-term exposure to elevated levels, which is more likely to occur in occupational or industrial settings; however, control methodologies applied to industrial facilities generally prevent emissions to the ambient air (CARB 2020l).

Air Toxics

Toxic Air Contaminants (TACs): TACs, or hazardous air pollutants (HAPs) as defined by the USEPA, are defined as those contaminants that are known or suspected to cause serious health problems, but do not have a corresponding ambient air quality standard (USEPA 2017d). For consistency within this document they will be referred to as TACs. TACs are also defined as an air pollutant that may increase a person's risk of developing cancer and/or other serious health effects. TACs are emitted by a variety of industrial processes such as petroleum refining, electric utility and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. TACs may exist as PM10 and PM2.5 or as vapors (gases). TACs include metals, other particles, gases absorbed by particles, and certain vapors from fuels and other sources. The emission of a TAC does not automatically create a health hazard. Other factors, such as the amount of the TAC, its toxicity, how it is released into the air, the weather, and the terrain, all influence whether the emission could be hazardous to human health. Emissions of TACs into the air can be damaging to human health and to the environment. Human exposure to TACs at sufficient concentrations and durations can result in cancer, poisoning, and rapid onset of sickness, such as nausea or difficulty in breathing. Other less measurable effects include immunological, neurological, reproductive, developmental, and respiratory problems. TACs deposited onto soil or into lakes and streams affect ecological systems and eventually human health through consumption of contaminated food. The carcinogenic potential of TACs is a particular public health concern because many scientists currently believe that there is no "safe" level of exposure to carcinogens. Any exposure to a carcinogen poses some risk of contracting cancer (CARB 2020m).

The public's exposure to TACs is a significant public health issue in California. The Air Toxics "Hotspots" Information and Assessment Act is a State law requiring facilities to report emissions of TACs to air districts (CARB 2020m). The program is designated to quantify the amounts of potentially HAPs released, the location of the release, the concentrations to which the public is exposed, and the resulting health risks. The State Air Toxics Program (AB 2588) identified over 200 TACs, including the 188 TACs identified in the Clean Air Act (CAA) (CARB 2020m).

The USEPA has assessed this expansive list and identified 21 TACs as Mobile Source Air Toxics (MSATs) (USEPA 2004). MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. USEPA also extracted a subset of these 21 MSAT compounds that it now labels as the nine priority MSATs: 1,3-butaidene, acetaldehyde, acrolein, benzene, diesel particulate matter (DPM)/diesel exhaust organic gases, ethylbenzene, naphthalene, and polycyclic organic matter (POM). While these nine MSATs are considered the priority transportation toxics, USEPA stresses that the lists are subject to change and may be adjusted in future rules (USDOT 2016).

Diesel Exhaust: According to the California Almanac of Emissions and Air Quality, the majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most important being particulate matter from the exhaust of diesel-fueled engines, i.e., DPM (CARB 2020n). DPM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances.

Diesel exhaust is composed of two phases, gas and particle, and both phases contribute to the health risk. The gas phase is composed of many of the urban HAPs, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde and polycyclic aromatic hydrocarbons. The particle phase is also composed of many different types of particles by size or composition. Fine and ultra-fine diesel particulates are of the greatest health concern and may be composed of elemental carbon with adsorbed compounds such as organic compounds, sulfate, nitrate, metals and other trace elements. Diesel exhaust is emitted from a broad range of diesel engines; the on-road diesel engines of trucks, buses and cars and the off-road diesel engines that include locomotives, marine vessels and heavy-duty equipment. Although DPM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present.

The most common exposure to DPM is breathing air that contains diesel exhaust. The fine and ultra-fine particles are respirable (similar to PM2.5), which means that they can avoid many of the human respiratory system defense mechanisms and enter deeply into the lung. Exposure to DPM comes from both on-road and off-road engine exhaust that is either directly emitted from the engines or lingering in the atmosphere.

Diesel exhaust causes health effects from long-term chronic exposures. The type and severity of health effects depends upon several factors including the amount of chemical exposure and the duration of exposure. Individuals also react differently to different levels of exposure. There is limited information on exposure to only DPM, but there is enough evidence to indicate that inhalation exposure to diesel exhaust causes chronic health effects as well as having cancer-causing potential.

Because it is part of PM2.5, DPM also contributes to the same non-cancer health effects as PM2.5 exposures. These effects include premature death, hospitalizations and emergency department visits for exacerbated chronic heart and lung disease, including asthma, increased respiratory symptoms, and decreased lung function in children. Several studies suggest that exposure to DPM may also facilitate development of new allergies. Those most vulnerable to non-cancer health effects are children whose lungs are still developing and the elderly who often have chronic health problems (CARB 2020n).

Regional Air Quality

The Air Basin's meteorological conditions, in combination with regional topography, are conducive to the formation and retention of ozone. Pollutant concentrations in the Air Basin vary with location, season, and time of day. Concentrations of ozone, for example, tend to be lower along the coast, higher in the near inland valleys, and lower in the far inland areas of the Air Basin and adjacent desert (SCAQMD 2017). The worst air pollution conditions throughout the Air Basin typically occur from June through September.

California Health and Safety Code section 39607(e) requires CARB to establish and periodically review area designation criteria. As shown in **Table 3.2-1**, the Air Basin is designated under federal or State ambient air quality standards as nonattainment for ozone, PM10, and fine particulate matter PM2.5. It is noteworthy to mention that air quality in the Air Basin has improved substantially over the years, primarily due to the impacts of air quality control programs at the federal, State and local levels. The ozone and PM levels have fallen significantly compared to the worst years and are expected to continue to trend downward in the future despite increases in the economy and population in the Air Basin.

TABLE 3.2-1
SOUTH COAST AIR BASIN ATTAINMENT STATUS (ORANGE COUNTY)

Pollutant	National Standards (NAAQS)	California Standards (CAAQS)
Ozone (1-hour standard)	N/A[a]	Non-attainment – Extreme
Ozone (8-hour standard)	Non-attainment – Extreme	Non-attainment
CO	Attainment – Maintenance	Attainment
NO_2	Attainment – Maintenance	Attainment
SO_2	Attainment	Attainment
PM10	Attainment – Maintenance	Non-attainment
PM2.5	Non-attainment – Serious	Non-attainment
Lead (Pb)	Attainment (Partial)[b]	Attainment
Visibility Reducing Particles	N/A	Unclassified
Sulfates	N/A	Attainment
Hydrogen Sulfide	N/A	Unclassified
Vinyl Chloride[c]	N/A	N/A

NOTES:
N/A = not applicable
[a] The NAAQS for 1-hour ozone was revoked on June 15, 2005, for all areas except Early Action Compact areas.
[b] Partial Non-attainment designation – Los Angeles County portion of the Air Basin only for near-source monitors. Orange County is designated as attainment.
[c] In 1990, the California Air Resources Board identified vinyl chloride as a toxic air contaminant and determined that it does not have an identifiable threshold. Therefore, the California Air Resources Board does not monitor or make status designations for this pollutant.
SOURCE: USEPA 2020; CARB 2020p.

With respect to the State-identified criteria air pollutants (sulfates, hydrogen sulfide, visibility reducing particles, and vinyl chloride) present in Table 3.2.1, the proposed project would either not use these pollutants in the day to day operations or during construction and therefore would not have emissions of those pollutants (hydrogen sulfide, vinyl chloride, and lead), or such emissions would be accounted for as part of the pollutants estimated in this analysis (visibility reducing particles are associated with particulate matter emissions, and sulfates are associated with SO_2). Vinyl chloride is used in the process of making PVC plastic and vinyl products and is primarily emitted from industrial processes (CARB 2020l). Vinyl chloride would not be emitted directly during operations or during construction; therefore, there would be no project emissions of vinyl chloride. In addition, CARB determined there is not sufficient scientific evidence available to support the identification of a threshold exposure level for vinyl chloride, therefore, CARB does not monitor or make status designations for this pollutant (CARB 2020o).

As detailed in the AQMP, the major sources of air pollution in the Air Basin are divided into four major source classifications: point and area stationary sources, and on-road and off-road mobile sources. Point and area sources are the two major subcategories of stationary sources (SCAQMD 2017). Point sources are permitted facilities that contain one or more emission sources at an identified location (e.g., power plants, refineries, emergency generator exhaust stacks). Area sources consist of many small emission sources (e.g., residential water heaters, architectural coatings, consumer products, restaurant charbroilers and permitted sources such as large boilers), which are distributed across the region. Mobile sources consist of two main subcategories: On-road sources (such as cars and trucks) and off-road sources (such as heavy construction equipment). The main source associated with the proposed project is mobile source use during construction activities.

Local Air Quality

Existing Ambient Air Quality

SCAQMD maintains monitoring stations within district boundaries that monitor air quality and compliance with associated ambient standards. The project area is located in the Inland County of Orange general forecast area and specifically within the Saddleback Valley source receptor area. Currently, the nearest monitoring station to the project area is the Mission Viejo Station (26081 Via Pera Mission Viejo, CA 92691 – SCAQMD Station Number 3812). This station monitors ambient concentrations of CO, ozone, PM10 and PM2.5. The nearest monitoring station that monitors for NO_2 is the Anaheim station (SRA 17, Central County of Orange Station Number 3176). There are no stations within the Inland County of Orange general forecast area that monitor for SO_2. Historical data of ambient ozone, NO_2, CO, PM10 and PM2.5 concentrations from these monitoring stations for the most recent three years of available data (2017–2019) are shown in **Table 3.2-2**.

TABLE 3.2-2
AMBIENT AIR QUALITY IN THE PROJECT VICINITY

Pollutant/Standard	2017	2018	2019
Ozone, (1-hour) – Mission Viejo			
Maximum Concentration (ppm)	0.103	0.121	0.106
Days > CAAQS (0.09 ppm)	3	2	3
Ozone, (8-hour) – Mission Viejo			
Maximum Concentration (ppm)	0.083	0.088	0.087
4th High 8-hour Concentration (ppm)	0.082	0.074	0.082
Days > CAAQS (0.070 ppm)	25	9	11
Days > NAAQS (0.070 ppm)	25	9	11
Nitrogen Dioxide, NO_2 (1-hour) - Anaheim			
Maximum Concentration (ppm)	0.081	0.066	0.059
Days > CAAQS (0.18 ppm)	0	0	0
98th Percentile Concentration (ppm)	0.064	0.055	0.049
Days > NAAQS (0.100 ppm)	0	0	0
Nitrogen Dioxide, NO_2 (Annual)			
Annual Arithmetic Mean (0.030 ppm)	0.014	0.014	0.013
Carbon Monoxide, CO (1-hour) – Mission Viejo			
Maximum Concentration (ppm)	1.4	1.2	1.0
Days > CAAQS (20 ppm)	0	0	0
Days > NAAQS (35 ppm)	0	0	0
Carbon Monoxide, CO (8-hour)			
Maximum Concentration (ppm)	0.9	0.09	0.8
Days > CAAQS (9.0 ppm)	0	0	0
Days > NAAQS (9 ppm)	0	0	0
Respirable Particulate Matter, PM10 (24-hour) – Mission Viejo			
Maximum Concentration ($\mu g/m^3$)	58	55	45
Samples > CAAQS (50 $\mu g/m^3$)	1	1	0
Samples > NAAQS (150 $\mu g/m^3$)	0	0	0
Respirable Particulate Matter, PM10 (Annual)			
Annual Arithmetic Mean (20 $\mu g/m^3$)	18.4	19.0	16.6
Fine Particulate Matter, PM2.5 (24-hour) – Mission Viejo			
Maximum Concentration ($\mu g/m^3$)	19.5	20.80	20.80
98th Percentile Concentration ($\mu g/m^3$)	15.0	18.50	14.70
Samples > NAAQS (35 $\mu g/m^3$)	0	0	0
Fine Particulate Matter, PM2.5 (Annual)			
Annual Arithmetic Mean (12 $\mu g/m^3$)	8.11	8.31	7.11

NOTE:
[a] ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter
SOURCE: SCAQMD 2020b.

Existing Area Health Risk

Between July 2012 and June 2013, the SCAQMD conducted the Multiple Air Toxics Exposure Study IV (MATES IV), which focuses on the carcinogenic risk from exposure to air toxics. The MATES IV Final Report was issued in May 2015. The study, based on actual monitored data throughout the Air Basin, consisted of several elements, which included a monitoring program, an updated emissions inventory of TACs, and a modeling effort to characterize carcinogenic risk across the Air Basin from exposure to TACs. As part of the MATES IV study, the SCAQMD has prepared a series of maps that show regional trends in estimated outdoor inhalation cancer risk from toxic emissions, as part of an ongoing effort to provide insight into relative risks. The maps represent the estimated number of potential cancers per million people associated with a lifetime of breathing air toxics (24 hours per day outdoors for 70 years). The background potential cancer risk per million people in the proposed project area using the updated Office of Environmental Health Hazard Assessment (OEHHA) methodology is estimated at 587 in one million (compared to an overall Air Basin-wide risk of 1,023 in one million for the average of 10 fixed monitoring sites) (SCAQMD 2015b). Generally, the risk from air toxics is lower near the coastline and increases inland, with higher risks concentrated near large diesel sources (e.g., freeways, airports, and ports).

Existing Site Emissions

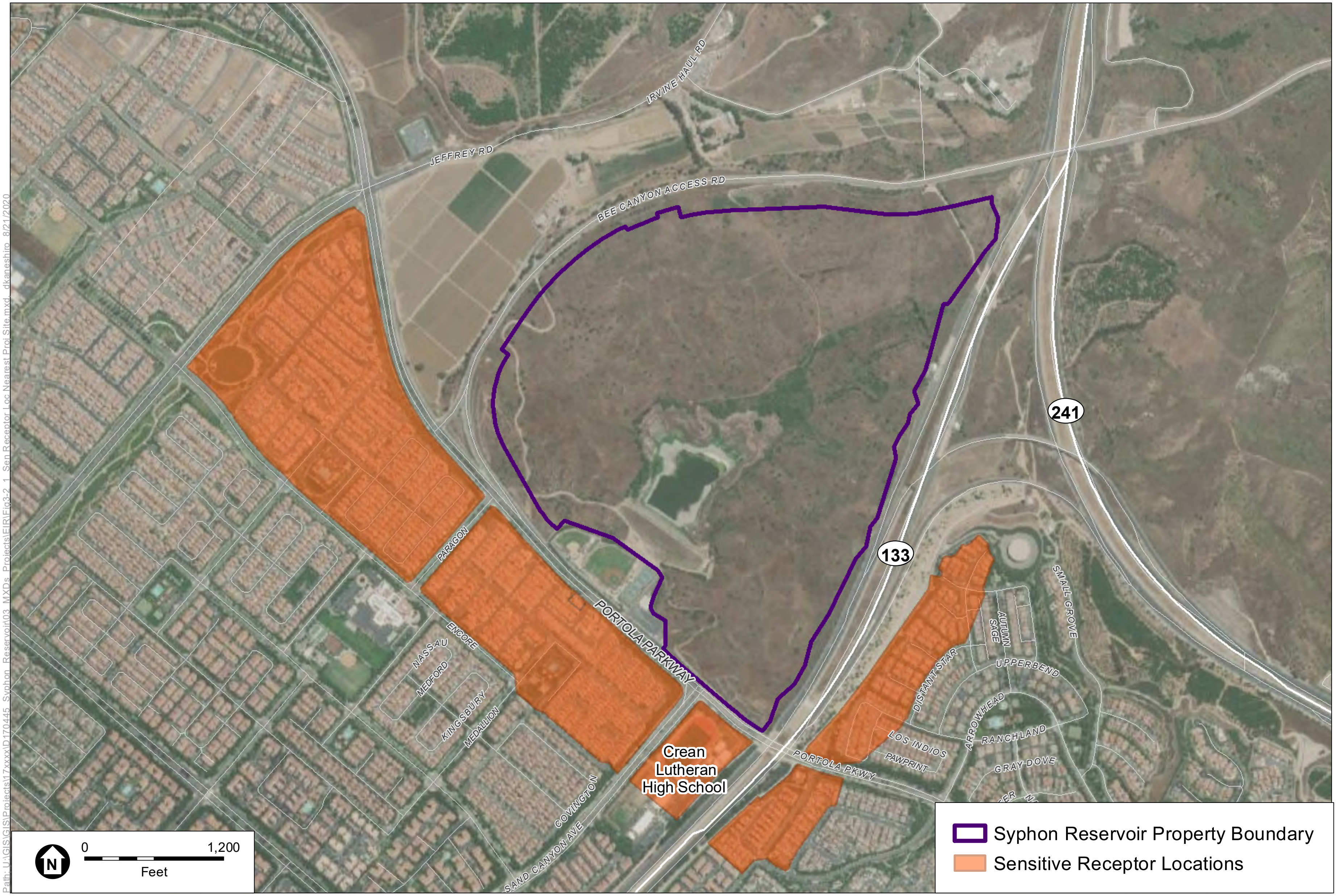
The existing Syphon Reservoir activities result in negligible mobile source emissions from maintenance trips and current recreational activities. The number of maintenance and recreational trips are nominal and are not anticipated to change with the improvements to the reservoir. Therefore, existing emissions were not modeled, and the proposed project's air quality emissions would all be considered new emissions.

Sensitive Receptors and Locations

Certain population groups, such as children, elderly, and acutely and chronically ill persons (especially those with cardio-respiratory diseases), are considered more sensitive to the potential effects of air pollution than others. As a result, certain land uses that are occupied by these population groups, such as residences, hospitals and schools, are considered to be air quality-sensitive land uses. The proposed project site is bordered to the north and west by predominantly open space, agricultural (including a residence), and commercial/industrial uses. The proposed project site is bordered to the south by Portola Parkway with residential and school land uses directly south. The proposed project is bordered to the east by SR-133 followed by residential land uses. The nearest land uses are the residential neighborhoods approximately 180 feet southwest of the intersection of Portola Parkway and Sand Canyon Ave, which is the proposed project site entrance. The Crean Lutheran High School is located approximately 140 feet southeast of the project site at the intersection of Portola Parkway and Sand Canyon Road.[2] Residences to the east of SR-133 are approximately 1,000 feet from onsite construction activities. Sensitive receptor locations are shown **Figure 3.2-1**.

---

[2] While the Crean Lutheran High School Athletic Complex is located adjacent to the project site area, the athletic complex itself is not considered a sensitive receptor as it would only be occupied for a limited amount of time, similar to that of a local gym, park, or other commercial establishment. The majority of student time would be spent at the main school site and therefore that would be the closest school associated sensitive receptor.



SOURCE: ESA, 2019; ESRI, 2019.

Syphon Reservoir Improvement Project

Figure 3.2-1
Sensitive Receptor Locations Nearest to the Project Site

ESA

All other air quality-sensitive uses are located at greater distances from the proposed project site and would experience lower air pollutant impacts from potential sources of pollutants from the proposed project site due to atmospheric dispersion effects.

3.2.2 Regulatory Framework

Federal

This section provides a summary of pertinent federal, State, and local statutes, regulations, plans, and policies that have been adopted that address air quality.

Clean Air Act

The 1963 CAA was the first federal legislation regarding air pollution control and has been amended numerous times in subsequent years, with the most recent amendments occurring in 1990. At the federal level, USEPA is responsible for implementation of certain portions of the CAA including mobile source requirements.

The CAA establishes federal air quality standards and specifies future dates for achieving compliance. The CAA also mandates that the State submit and implement a State Implementation Plan (SIP) for areas not meeting these standards. SIPs must include pollution control measures that demonstrate how the NAAQS will be met. The 1990 amendments to the CAA identify specific emission reduction goals for areas not meeting the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA that are most applicable to the proposed project include Title I (Nonattainment Provisions).

Title I requirements are implemented for the purpose of attaining NAAQS for the following criteria air pollutants: ozone; NO_2; CO; SO_2; PM10; and lead. The NAAQS were amended in July 1997 to include an 8-hour standard for ozone and to adopt a NAAQS for PM2.5. The NAAQS were also amended in September 2006 to include an established methodology for calculating PM2.5 as well as revoking the annual PM10 threshold. **Table 3.2-3** shows the NAAQS currently in effect for each criteria air pollutant.

TABLE 3.2-3
AMBIENT AIR QUALITY STANDARDS

Pollutant	Average Time	California Standards[a]		National Standards[b]		
		Concentration[c]	Method[d]	Primary[c,e]	Secondary[c,f]	Method[g]
Ozone[h]	1 Hour	0.09 ppm (180 μg/m³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 μg/m³)		0.070 ppm (137 μg/m³)		
NO_2[i]	1 Hour	0.18 ppm (339 μg/m³)	Gas Phase Chemi-luminescence	100 ppb (188 μg/m³)	None	Gas Phase Chemi-luminescence
	Annual Arithmetic Mean	0.030 ppm (57 μg/m³)		53 ppb (100 μg/m³)	Same as Primary Standard	
CO	1 Hour	20 ppm (23 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10mg/m³)		9 ppm (10 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	
SO_2[j]	1 Hour	0.25 ppm (655 μg/m³)	Ultraviolet Fluorescence	75 ppb (196 μg/m³)	—	Ultraviolet Fluorescence; Spectro-photometry (Pararosaniline Method)[9]
	3 Hour	—		—	0.5 ppm (1300 μg/m³)	
	24 Hour	0.04 ppm (105 μg/m³)		0.14 ppm (for certain areas)[j]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[j]	—	
PM10[k]	24 Hour	50 μg/m³	Gravimetric or Beta Attenuation	150 μg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m³		—		
PM2.5[k]	24 Hour	No Separate State Standard		35 μg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m³	Gravimetric or Beta Attenuation	12.0 μg/m³[k]	15 μg/m³	

Pollutant	Average Time	California Standards[a] Concentration[c]	California Standards[a] Method[d]	National Standards[b] Primary[c,e]	National Standards[b] Secondary[c,f]	National Standards[b] Method[g]
Lead[l,m]	30 Day Average	1.5 μg/m³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 μg/m³ (for certain areas)[m]	Same as Primary Standard	
	Rolling 3-Month Average[m]	--		0.15 μg/m³		
Visibility-Reducing Particles[n]	8 Hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more due to particles when relative humidity is less than 70 percent.		**No Federal Standards**		
Sulfates (SO_4)	24 Hour	25 μg/m³	Ion Chromatography	**No Federal Standards**		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m³)	Ultraviolet Fluorescence	**No Federal Standards**		
Vinyl Chloride[l]	24 Hour	0.01 ppm (26 μg/m³)	Gas Chromatography	**No Federal Standards**		

NOTES:

[a] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 micrograms/per cubic meter (μg/m³) is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

[c] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] Any equivalent procedure which can be shown to the satisfaction of the California Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.

[e] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[f] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[g] Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.

[h] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[i] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb.

[j] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated non-attainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

[k] On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 μg/m³ to 12.0 μg/m³.

[l] CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[m] The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 μg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated non-attainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[n] In 1989, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

SOURCE: CARB 2016; CARB 2020a–l

State

California Clean Air Act

The California Clean Air Act, signed into law in 1988, requires all areas of the State to achieve and maintain the CAAQS by the earliest practical date. The CAAQS are established to protect the health of the most sensitive groups and apply to the same criteria air pollutants as the federal CAA and also includes State-identified criteria air pollutants, which are sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride (CARB 2020a). Table 3.2-3, provided above, shows the CAAQS currently in effect for each of the federally identified criteria air pollutants as well as state recognized pollutants, such as sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride.

On-Road and Off-Road Vehicle and Equipment Rules

Heavy-Duty Vehicles and Equipment

In 2004, CARB adopted an Airborne Toxic Control Measure to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel PM and other TACs. The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than 5 minutes at any given time.

In 2008 CARB approved the Truck and Bus Regulation to reduce NO_X, PM10, and PM2.5 emissions from existing diesel vehicles operating in California. The requirements were amended in December 2010 and apply to nearly all diesel fueled trucks and busses with a gross vehicle weight rating greater than 14,000 pounds. For the largest trucks in the fleet (i.e., those with a gross vehicle weight rating greater than 26,000 pounds), there are two methods to comply with the requirements. The first method is for the fleet owner to retrofit or replace engines, starting with the oldest engine model year, to meet 2010 engine standards, or better. This is phased over eight years, starting in 2015 and would be fully implemented by 2023, meaning that all trucks operating in the State subject to this option would need to meet or exceed the 2010 engine emission standards for NO_X and PM by 2023. The second option, if chosen, requires fleet owners, starting in 2012, to retrofit a portion of their fleet with diesel particulate filters achieving at least 85 percent removal efficiency, so that by January 1, 2016, their entire fleet is equipped with diesel particulate filters. However, diesel particulate filters do not typically lower NO_X emissions. Thus, fleet owners choosing the second method must still comply with the 2010 engine emission standards for their trucks and busses by 2020. Beginning January 1, 2020, this requirement is enforced by the California Department of Motor Vehicles (DMV). Senate Bill 1 (SB 1), the Road Repair and Accountability Act of 2017, was signed into law on April 28, 2017. SB 1 authorizes the DMV to check that vehicles are compliant with or exempt from CARB’s Truck and Bus Regulation. Effective January 1, 2020, if a vehicle is not compliant with the rule, DMV will no longer register that vehicle.

In addition to limiting exhaust from idling trucks, CARB promulgated emission standards for off-road diesel construction equipment of greater than 25 horsepower such as bulldozers, loaders, backhoes and forklifts, as well as many other self-propelled off-road diesel vehicles. The regulation adopted by CARB on July 26, 2007, aims to reduce emissions by installation of diesel soot filters and encouraging the retirement, replacement, or repower of older, dirtier engines with newer emission-controlled models. Implementation is staggered based on fleet size (which is the total of all off-road horsepower under common ownership or control), with the largest fleets to begin compliance by January 1, 2014. Each fleet must demonstrate compliance through one of two methods. The first option is to calculate and maintain fleet average emissions targets, which encourages the retirement or repowering of older equipment and rewards the introduction of newer cleaner units into the fleet. The second option is to meet the Best Available Control Technology (BACT) requirements by turning over or installing Verified Diesel Emission Control Strategies (e.g., engine retrofits) on a certain percentage of its total fleet horsepower. The compliance schedule requires that BACT turn overs or retrofits be fully implemented by 2023 in all equipment in large and medium fleets and across 100 percent of small fleets by 2028.

Low Carbon Fuel Standard

In January 2007, Governor Schwarzenegger enacted Executive Order S-01-07, which mandates that the state: (1) establish a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and (2) adopt a Low Carbon Fuel Standard (LCFS) for transportation fuels in California. The overall goal of the LCFS is to lower the carbon intensity of California transportation fuel. The 2017 Scoping Plan Update calls for the LCFS to reduce fuel carbon intensity by at least 18 percent by 2030. In September 2018, CARB extended the LCFS program to 2030, making significant changes to the design and implementation of the Program including a doubling of the carbon intensity reduction to 20 percent by 2030.

Regional

South Coast Air Quality Management District

SCAQMD has jurisdiction over air quality planning for all of County of Orange, Los Angeles County except for the Antelope Valley, the non-desert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The Air Basin is a subregion within SCAQMD jurisdiction. While air quality in the Air Basin has improved, the Air Basin requires continued diligence to meet the air quality standards.

Air Quality Management Plan

SCAQMD has adopted a series of AQMPs to meet the CAAQS and NAAQS, the 2012 and the 2016 AQMPs. While the 2016 AQMP is the most recent and was adopted by SCAQMD and CARB, it has not received full USEPA approval for inclusion in the SIP. Therefore, until such time as the 2016 AQMP is completely approved by the USEPA, the 2012 AQMP remains the applicable AQMP; however, this analysis considers both the 2012 and 2016 AQMPs as appropriate.

The 2012 AQMP includes a comprehensive strategy aimed at controlling pollution from all sources, including stationary sources, and on-road and off-road mobile sources. It highlights the significant amount of emission reductions needed and the urgent need to identify additional strategies, especially in the area of mobile sources, to meet all federal criteria air pollutant standards within the timeframes allowed under the CAA (SCAQMD 2013).

The key undertaking of the 2012 AQMP is to bring the Air Basin into attainment with the NAAQS for the 24-hour PM2.5 standard. It also intensifies the scope and pace of continued air quality improvement efforts toward meeting the 2024 8-hour ozone standard deadline with new measures designed to reduce reliance on the CAA section 182(e)(5) long-term measures for NO_X and VOC reductions. SCAQMD expects exposure reductions to be achieved through implementation of new and advanced control technologies as well as improvement of existing technologies.

The SCAQMD Governing Board adopted the 2016 AQMP on March 3, 2017 (SCAQMD 2017). CARB approved the 2016 AQMP on March 23, 2017. Key elements of the 2016 AQMP include implementing fair-share emissions reductions strategies at the federal, state, and local levels; establishing partnerships, funding, and incentives to accelerate deployment of ZE and near-zero-emissions (NZE) technologies; and taking credit from co-benefits from greenhouse gas, energy, transportation and other planning efforts (SCAQMD 2017). The strategies included in the 2016 AQMP are intended to demonstrate attainment of the NAAQS for the national non-attainment pollutants ozone and PM2.5 (SCAQMD 2018). The strategies that are particularly relevant to the project include the following:

MOB-08 – Accelerated Retirement of Older On-Road Heavy-Duty Vehicles: This measure seeks to replace up to 2,000 heavy-duty vehicles per year with newer or new vehicles that at a minimum, meet the 2010 on-road heavy-duty NO_X exhaust emissions standard of 0.2 grams per brake horsepower-hour (g/bhp-hr).

MOB-10 – Extension of the SOON Provision for Construction/Industrial Equipment: This measure continues the Surplus Off-Road Option for NO_X (SOON) provision of the Statewide In-Use Off-Road Fleet Vehicle Regulation through the 2031 timeframe.

Air Quality Guidance Documents

SCAQMD's CEQA Guidelines are voluntary initiatives recommended for consideration by local planning agencies. The *CEQA Air Quality Handbook* (Handbook) published by SCAQMD provides local governments with guidance for analyzing and mitigating project-specific air quality impacts (SCAQMD 1993). SCAQMD is currently updating some of the information and methods in the Handbook, such as the screening tables for determining the air quality significance of a project and the on-road mobile source emission factors. While this process is underway, SCAQMD recommends using other approved models to calculate emissions from land use projects, such as CalEEMod (SCAQMD 2020a).

The SCAQMD *Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning* considers impacts to air quality sensitive receptors from TAC-emitting facilities (SCAQMD 2005). SCAQMD's siting distance recommendations are the same as those provided by CARB (e.g., a 500-foot siting distance for air quality sensitive receptors proposed in proximity to freeways and high-traffic roads, and the same siting criteria for distribution centers and drycleaning facilities).

The SCAQMD *Final Localized Significance Threshold Methodology and Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM2.5 Significance Thresholds* provides guidance when evaluating the localized effects of emissions in the CEQA evaluation (SCAQMD 2008a; SCAQMD 2006). These guidance documents were promulgated by the SCAQMD Governing Board as a tool to assist lead agencies to analyzed localized impacts associated with project-specific level proposed projects. The guidance documents establish mass emission rate "look up tables" as significance thresholds for projects that are five acres or less. For projects that are larger than five acres, such as the proposed project, it is recommended that project-specific air quality dispersion modeling is completed to determine localized air quality.

Toxic Air Contaminants

At the local level, air pollution control or management districts may adopt and enforce CARB control measures. Under SCAQMD Regulation XIV (Toxics and Other Non-Criteria Pollutants), and in particular Rule 1401 (New Source Review), all sources that possess the potential to emit TACs are required to obtain permits from SCAQMD. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new source review standards and air toxics control measures. SCAQMD limits emissions and public exposure to TACs through a number of programs. SCAQMD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

In 2000, The Air Toxics Control Plan (revised in 2004) examined the overall direction of SCAQMD's air toxics control program. It includes development and implementation of strategic initiatives to monitor and control air toxics emissions. Control strategies that are deemed viable and are within SCAQMD's jurisdiction will each be brought to the SCAQMD Board for further consideration through the normal public review process. Strategies that are to be implemented by other agencies will be developed in a cooperative effort, and the progress will be reported back to the Board periodically.

In 2015, SCAQMD completed the Multiple Air Toxics Exposure Study IV (MATES IV) (SCAQMD 2015a), which is a monitoring and evaluation study conducted in the Air Basin. MATES IV is a follow up to the 2008 MATES III study and consists of several elements including a monitoring program, an updated emissions inventory of toxic air contaminants, and a modeling effort to characterize risk across the Air Basin (SCAQMD 2008b). MATES IV focuses on the carcinogenic risk from exposure to air toxics. However, it does not estimate mortality or other health effects from particulate exposures. SCAQMD is currently in the process of updating the MATES studies series with MATES V; however, the analysis has not yet been completed.

Rules and Regulations

The SCAQMD has adopted many rules and regulations to regulate sources of air pollution in the Air Basin and to help achieve air quality standards. The proposed project may be subject to the following SCAQMD rules and regulations:

Regulation IV – Prohibitions: This regulation sets forth the restrictions for visible emissions, odor nuisance, fugitive dust, various air emissions, fuel contaminants, start-up/shutdown exemptions and breakdown events. The following is a list of rules which apply to the project:

Rule 401 – Visible Emissions: This rule states that a person shall not discharge into the atmosphere from any single source of emission whatsoever any air contaminant for a period or periods aggregating more than three minutes in any one hour which is as dark or darker in shade as that designated No. 1 on the Ringelmann Chart or of such opacity as to obscure an observer's view.

Rule 402 – Nuisance: This rule states that a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

Rule 403 – Fugitive Dust: This rule requires projects to prevent, reduce or mitigate fugitive dust emissions from a site. Rule 403 restricts visible fugitive dust to the project property line, restricts the net PM10 emissions to less than 50 micrograms per cubic meter ($\mu g/m^3$) and restricts the tracking out of bulk materials onto public roads. Additionally, projects must utilize one or more of the best available control measures (identified in the tables within the rule). Control measures may include adding freeboard to haul vehicles, covering loose material on haul vehicles, watering, using chemical stabilizers and/or ceasing all activities. Finally, a contingency plan may be required if so determined by USEPA. As a large site, the proposed project would also be required to comply with subsection (e) of Rule 403 which includes additional requirements for large operations.

Regulation XI – Source Specific Standards: Regulation XI sets emissions standards for specific sources. The following is a list of rules which may apply to the proposed project:

Rule 1113 – Architectural Coatings: This rule requires manufacturers, distributors, and end users of architectural and industrial maintenance coatings to reduce VOC emissions from the use of these coatings, primarily by placing limits on the VOC content of various coating categories.

Rule 1186 – PM10 Emissions from Paved and Unpaved Roads, and Livestock Operations: This rule applies to owners and operators of paved and unpaved roads and livestock operations. The rule is intended to reduce PM10 emissions by requiring the cleanup of material deposited onto paved roads, use of certified street sweeping equipment, and treatment of high-use unpaved roads (see also Rule 403).

Regulation XIV – Toxics and Other Non-Criteria Pollutants: Regulation XIV sets requirements for new permit units, relocations, or modifications to existing permit units which emit toxic air contaminants or other non-criteria pollutants. The following is a list of rules which may apply to the proposed project:

Rule 1403 – Asbestos Emissions from Demolition/Renovation Activities: This rule requires owners and operators of any demolition or renovation activity and the associated disturbance of asbestos-containing materials, any asbestos storage facility, or any active waste disposal site to implement work practice requirements to limit asbestos emissions from building demolition and renovation activities, including the removal and associated disturbance of asbestos-containing materials.

Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines: This rule applies to stationary compression ignition engine greater than 50 brake horsepower and sets limits on emissions and operating hours. In general, new stationary emergency standby diesel-fueled engines greater than 50 brake horsepower are not permitted to operate more than 50 hours per year for maintenance and testing.

Southern California Association of Governments

The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization for the region in which the County of Orange and City of Irvine are located. In April 2016, SCAG adopted the *2016 Regional Transportation Plan/Sustainable Communities Strategy: A Plan for Mobility, Accessibility, Sustainability and a High Quality of Life* (RTP/SCS), which is an update to the previous 2012 RTP/SCS (SCAG 2016).

The 2016 RTP/SCS considers the role of transportation in the broader context of economic, environmental, and quality-of-life goals for the future, identifying regional transportation strategies to address mobility needs. The 2016 RTP/SCS describes how the region can attain the GHG emission-reduction targets set by CARB by achieving an 8 percent reduction in passenger vehicle GHG emissions on a per capita basis by 2020, 18 percent reduction by 2035, and 21 percent reduction by 2040 compared to the 2005 level. Although the focus of the 2016 RTP/SCS is on GHG emission-reduction, compliance with and implementation of 2016 RTP/SCS policies and strategies would also have co-benefits of reducing per capita criteria air pollutant and TAC emissions associated with reduced per capita vehicle miles traveled (VMT). Improved air quality with implementation of the 2016 RTP/SCS policies would decrease reactive organic gases (ROG) by 8 percent, CO by 9 percent, NO_X by 9 percent, and PM2.5 by 5 percent (SCAG 2016).

The 2016 RTP/SCS includes goals and strategies to promote active transportation and improve transportation demand management. The 2016 RTP/SCS strategies support local planning and projects that serve short trips, increase access to transit, expand understanding and consideration of public health in the development of local plans and projects, and support improvements in sidewalk quality, local bike networks, and neighborhood mobility areas. The 2016 RTP/SCS proposes to better align active transportation investments with land use and transportation strategies, increase competitiveness of local agencies for federal and state funding, and to expand the potential for all people to use active transportation.

Local

Local jurisdictions, such as the County of Orange (County) and the City of Irvine (City), have the authority and responsibility to reduce air pollution through their land use decision-making authority.

Orange County General Plan

The County is responsible for the assessment and mitigation of pollutant emissions resulting from its land use decisions. The County's General Plan Resource Element sets forth the goals, objectives, and policies which guide the County in its implementation of its air quality improvement programs and strategies. A number of these goals, objectives, and policies are relevant to the proposed project, and relate to minimizing particulate emissions from construction activities, managing traffic congestion during peak hours, and increasing energy efficiency in private developments.

The Resource Element establishes the following air quality goal pertaining to the proposed project: Promote optimum sustainable environmental quality standards for air resources.

The Resource Element establishes the following goal pertaining to the proposed project's energy use: Goal 3: Maximize the conservation of energy resources in all future land use and transportation planning decisions.

City of Irvine General Plan

The City is responsible for the assessment and mitigation of pollutant emissions resulting from its land use decisions. The City's General Plan does not have any objectives or policies that are directly related to air quality emissions with respect to the proposed project.

3.2.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from CEQA Guidelines Appendix G are used as thresholds of significance to determine the impacts of the proposed project as related to air quality. The proposed project would have a significant impact if it would:

1. Conflict with or obstruct implementation of the applicable air quality plan.
2. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard.
3. Expose sensitive receptors to substantial pollutant concentrations.
4. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.
5. Result in cumulatively considerable impacts to air quality.

In addition to the Appendix G significant impacts listed above, cumulative impacts with respect to air quality are also addressed as part of the analysis.

Pursuant to the CEQA Guidelines (Section 15064.7), a lead agency may consider using, when available, significance thresholds established by the applicable air quality management district or air pollution control district when making determinations of significance. For purposes of this analysis, the potential air quality impacts of the proposed project are assessed in accordance with the most recent thresholds adopted by the SCAQMD in connection with its CEQA Air Quality Handbook, Air Quality Analysis Guidance Handbook, and subsequent SCAQMD guidance, as discussed below.[3]

Regional Criteria Air Pollutant Emissions Thresholds

SCAQMD has established numerical significance thresholds for regional emissions during construction and operation. The numerical significance thresholds are based on the recognition that the Air Basin is a distinct geographic area with a critical air pollution problem for which ambient air quality standards have been promulgated to protect public health (SCAQMD 1993).

Given that construction impacts are temporary, SCAQMD has established significance thresholds specific to construction activity. Based on the thresholds of significance in the SCAQMD CEQA Air Quality Analysis Handbook, the proposed project would potentially cause or contribute to an exceedance of an ambient air quality standard if the following would occur (SCAQMD 2020c).

Regional construction emissions from both direct and indirect sources would exceed any of the following SCAQMD prescribed daily emissions thresholds (SCAQMD 2020c):

- 75 pounds a day for VOC,
- 100 pounds per day for NO_X,
- 550 pounds per day for CO,
- 150 pounds per day for SO_X,
- 150 pounds per day for PM10, and
- 55 pounds per day for PM2.5

SCAQMD has also established numeric significance thresholds for operations. SCAQMD has established significance thresholds in part based on CAA section 182(e), which identifies 10 tons per year of VOC and NO_X as a significance level for stationary source emissions in extreme non-attainment areas for ozone. The numeric significance thresholds for other pollutants are also based on federal major source thresholds, which vary depending on regional attainment status. For example, the Air Basin is in attainment for carbon monoxide, which yields a corresponding major source threshold of 100 tons per year, or 550 pounds per day (USEPA 2017e). These "major source" significance thresholds were developed under the Federal Title V Operating Permit Program (SCAQMD 2020d). SCAQMD converted these significance levels to pounds per day. The attainment status designation is based on the healthfulness of air quality and the corresponding significance thresholds are intended to be health protective (CARB 2020p).

A similar approach is applied to PM2.5, where the daily limit of 55 pounds per day is based on the USEPA proposed rule to implement a PM2.5 NAAQS, with a significant emission rate of 10 tons per year (SCAQMD 2006).

[3] While the SCAQMD CEQA Air Quality Handbook contains significance thresholds for lead, project construction and operation would not include sources of lead emissions and would not exceed the significance thresholds for lead. Unleaded fuel and unleaded paints have virtually eliminated lead emissions from projects. As a result, lead emissions are not further evaluated.

The proposed project would potentially cause or contribute to an exceedance of an ambient air quality standard if regional operational emissions exceed any of the following SCAQMD prescribed daily emissions thresholds (SCAQMD 2019):

- 55 pounds a day for VOC,
- 55 pounds per day for $NO_{X,}$
- 550 pounds per day for CO,
- 150 pounds per day for $SO_{X,}$
- 150 pounds per day for PM10, and
- 55 pounds per day for PM2.5.

SCAQMD has set its CEQA significance threshold for NO_X and VOC at 10 tons per year (expressed as 55 pounds per day). because the federal CAA defines a major stationary source for extreme ozone nonattainment areas such as SCAQMD as one emitting 10 tons/year (42 U.S.C. §§ 75lla(e), 7511a(f); CAA §§ 182(e), 182(f)). Under the federal CAA, such sources are subject to enhanced control requirements (42 U.S.C. §§ 7502(c)(5), 7503; CAA §§ 172(c)(5), 173), so SCAQMD determined that 55 lb/day was an appropriate threshold for making a CEQA significance finding and requiring feasible mitigation. As, SCAQMD has stated:

> *… a project source that emits 10 tons/year of NO_X or VOC is small enough that its regional impact on ambient ozone levels may not be detected in the regional air quality models that are currently used to determine ozone levels. Thus, in this case it would not be feasible to directly correlate project emissions of VOC or NO_X with specific health impacts from ozone. (SCAQMD 2015c.)*

Therefore, lead agencies that use SCAQMD thresholds of significance may determine that projects have a significant air quality impact and correspondingly are required to implement all feasible mitigation measures, yet are not able to correlate the project impact to quantifiable health effects.

Localized Significance Thresholds

SCAQMD published its Final Localized Significance Threshold Methodology in June 2003, (revised July 2008) and Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM2.5 Significance Thresholds in October 2006, recommending that all air quality analyses include a localized assessment of both construction and operational impacts on the air quality of nearby air quality sensitive receptors (SCAQMD 2008a). LSTs represent the maximum emissions from a project site that are not expected to result in an exceedance of a NAAQS or CAAQS. LSTs are based on the ambient concentrations of that pollutant within the Source Receptor Area (SRA) where a project is located and the distance to the nearest air quality sensitive receptor. LSTs are only applicable to the following criteria air pollutants: NO_X, CO, PM10, and PM2.5. The proposed project site is located in the central portion of SRA 19 (Saddleback Valley) (SCAQMD 2020e).

The Basin is in attainment for NO_2 and CO, meaning their ambient concentrations are below their respective air quality standards. When evaluating localized impacts for NO_2 and CO, the local ambient concentrations and the proposed project related concentrations are summed and then compared to the NAAQS and CAAQS. If the sum of the ambient concentrations and proposed project concentrations are greater than the air quality standard, this would result in a significant impact.

The Basin is in nonattainment for PM10 and PM2.5, meaning their ambient concentrations are above their respective air quality standards. If ambient levels already exceed a NAAQS or CAAQS, then project impacts may be considered significant if they increase ambient concentrations in excess of the allowable increase established by SCAQMD. This would apply to PM10 and PM2.5, both of which are nonattainment pollutants in the Basin. For these latter two pollutants, the significance criteria are the pollutant concentration thresholds presented in SCAQMD Rules 403 and 1301. The Rule 403 threshold of 10.4 $\mu g/m^3$ applies to construction emissions (and may apply to operational emissions at aggregate handling facilities). The Rule 1301 threshold of 2.5 $\mu g/m^3$ applies to non-aggregate handling operational activities.

SCAQMD recommends that sites larger than 5 acres perform air dispersion modeling to determine localized air quality (SCAQMD 2008a). While the proposed project site is greater than 5 acres, the individual phases of construction are localized to smaller portions of the site on any given day (i.e., construction at the toe of the dam would not be occurring at the same time as the access road near the intersection of Sand Canyon Avenue and Portola Parkway). Based on the daily areas of disturbance, the onsite areas are analyzed as either one-acre sites or five-acre sites and screening level LSTs are used to determine significance. Operational emissions would be centralized around the proposed Treatment Facility, which is conservatively assumed to be 328 feet (100 meters) from the nearest sensitive receptor. **Table 3.2-4** shows the threshold levels used for a one-acre site located within 164 feet (50 meters) of the nearest sensitive receptor and for a five-acre site located within 164 feet of the proposed project.

TABLE 3.2-4
LOCALIZED SCREENING LEVELS

Source	NO_X	CO	PM10	PM2.5
Construction - 1-acre site at 164 feet (50 meters)	52	883	11	4
Construction - 5-acre site at 328 feet (100 meters)	112	2,763	49	16
Operational – 1-acre site at 328 feet (100 meters)	60	1,234	6	2

SOURCE: SCAQMD 2008a.

Toxic Air Contaminants

Based on the criteria set forth by SCAQMD, the proposed project would expose air quality sensitive receptors to substantial concentrations of TACs if the proposed project emits carcinogenic materials or TACs that exceed the maximum incremental cancer risk of 10 in one million or a non-cancer hazard index of 1.0. Similarly, the proposed project would result in a potentially significant impact if cancer burden corresponds to an increase in more than 0.5 excess cancer cases in areas where the proposed project-related increase in individual cancer risk exceeds 1 in one million (SCAQMD 2019).

Health Impacts

Currently, the health impact of a particular criteria air pollutant is analyzed by air districts on a regional scale based on how close the area is to attaining the NAAQS. Such an analysis has generally not been performed at the project level. The SCAQMD states that an exceedance of the significance thresholds does not necessarily cause localized human health effects as, even with relatively high levels of emissions. However, the Air Basin is a distinct geographic area that has critical air pollution problems for which AAQS have been established to protect human health and welfare. Therefore, analyzing a project against these thresholds conservatively assesses whether these emissions directly contribute to regional or local exceedances of AAQS and assesses their potential to be harmful to human health. Thus, in order to determine the potential for adverse health effects, project emissions are compared to the SCAQMD's regional emissions thresholds of significance. Additional discussion of significance thresholds used in this analysis for health impacts is discussed in the Air Quality Technical Report attached as Appendix B of this Draft EIR.

General Conformity Determination

A conformity determination is required for each criteria pollutant or precursor where the total of direct emissions of the criteria pollutant or precursor in a federal non-attainment or maintenance area would equal or exceed specified annual emission rates, referred to as "de minimis" thresholds." These de minimis thresholds are provided in 40 CFR 93.153(b)(1) and (2). For ozone precursor emissions, the de minimis thresholds depend on the severity of the non-attainment classification. In an extreme ozone non-attainment area, the de minimis thresholds are 10 tons per year for both NO_X and VOC. In a federal serious non-attainment area, the de minimis threshold is 70 tons per year for PM2.5. In a federal attainment-maintenance area, the de minimis threshold is 100 tons per year for CO, and PM10. Effective June 13, 2012, the USEPA designated the South Coast Air Basin as extreme non-attainment for the 1997 ozone standard. In 2012, the USEPA designated the Air Basin as extreme non-attainment for the 2008 ozone standard. The Air Basin is also attainment-maintenance for the federal CO and PM10 standards. and serious non-attainment for the federal PM2.5 standards. Thus, based on the present attainment status of the Air Basin, a federal action would conform to the SIP if its annual emissions remain below 10 tons of VOC or NO_X, 100 tons of CO or PM10, and 70 tons of PM2.5.

Methodology

Construction Impacts

Regional Construction Emissions

Project construction activities that would have the potential to create regional air quality impacts including vehicle trips generated by construction workers, vendor trucks, and haul trucks traveling to and from the proposed project site and building activities such as the application of paint and other surface coatings. The proposed project's daily regional criteria pollutant emissions during construction have been estimated by assuming a conservative scenario for construction activities (i.e., assuming all construction occurs at the earliest feasible date) and applying the mobile source and fugitive dust emissions factors.

The emissions have been estimated using the CalEEMod software, an emissions inventory software program recommended by the SCAQMD for off-road construction equipment emissions.[4] On-road mobile source emissions were estimated using the 2017 CARB on-road vehicle emissions factor model (EMFAC) and incorporating the adjustment factors for the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part I: One National Program (SAFE Rule Part I).

Project construction is estimated to start in 2022 and continue for approximately 41 months, ending in 2026. Construction phasing would include vegetation clearing, mobilization and creation of access road/intersection improvements, excavation of sediments and the existing dam, construction of the dam, spillway and reservoir, construction of the treatment facilities, creation of wetlands/riparian habitat, installation of recreational components (hiking trail), and demobilization. The proposed project would import approximately 100,000 cubic yards of soil with a maximum of 66 haul trucks accessing the site per day. The remaining soil needed for the new dam construction would come from soils excavated onsite. No soil removal is estimated. An estimated 420,000 cubic yards of vegetation would be removed from the project site with a maximum of 78 haul trucks per day. One daily fuel delivery per day is estimated during construction activities. Worker and vendor deliveries vary by phase with a maximum of 114 worker vehicles and 29 vendor trucks accessing the site daily.[5]

The input values used in this analysis were adjusted to be proposed project-specific based on provided equipment types and the construction schedule. Haul truck trips and concrete truck trips estimates were based on information obtained from IRWD. Haul and concrete truck trip VMT were based on a 28-mile one-way trip. Worker trip and vendor truck trip estimates were based on default calculation methodologies in CalEEMod (worker trips equal 14.7 miles and vendor trips equal 6.9 miles).

Per Chapter 2, *Project Description*, additional geotechnical work may or may not occur, and the intensity of any geotechnical work is unknown at this time. There are three potential geotechnical tests that could occur: borings, test pits, or trenches. Because the intensity of any work that will occur is unknown, the analysis determines the maximum intensity of geotechnical work that can occur concurrently and independent from the reservoir work. The *Irvine Ranch Water District Syphon Reservoir Geotechnical Investigations Project Initial Study/Mitigated Negative Declaration* was used to determine the equipment and workers that would be used to conduct the additional geotechnical investigations.

Emissions from proposed project construction activities were estimated based on the construction phase in which the activity would be occurring. The maximum daily emissions estimate the worst-case day and do not represent the emissions that would occur for every day of proposed project construction. The maximum daily emissions are compared to SCAQMD daily regional

---

4 CalEEMod was developed in collaboration with the air districts of California and is recommended by SCAQMD for evaluating emissions for projects under CEQA. Regional data (e.g., emission factors, trip lengths, meteorology, source inventory, etc.) were provided by the various California air districts to account for local requirements and conditions.

5 It is unknown how many additional geotechnical tests would be required for completion of the project. The 114 maximum workers are based on the maximum geotechnical work that can occur with non-geotechnical work. Geotechnical activities would require between 9 to 12 workers per activity.

thresholds of significance. A detailed discussion of the proposed project's construction phasing and equipment list as well as emissions calculations and modeling output are included in Appendix B of this Draft EIR.

Localized Construction Emissions

Proposed project construction activities that would have the potential to create local air quality impacts including fugitive dust from grading, demolition, and building activities such as the application of paint and other surface coatings. The localized effects from the on-site portion of the proposed project's construction emissions were evaluated at the nearby sensitive receptor locations that would be potentially impacted by proposed project construction in accordance with the SCAQMD's *Final Localized Significance Threshold Methodology* (June 2003, revised July 2008). The localized significance thresholds only address NO_X, CO, PM10, and PM2.5 emissions. The SCAQMD has established screening criteria that can be used to determine the maximum allowable daily emissions that would satisfy the localized significance thresholds and therefore not cause or contribute to an exceedance of the applicable ambient air quality standards without the need for proposed project-specific dispersion modeling. The localized analysis for the proposed project is based on this SCAQMD screening criteria. The maximum daily onsite emissions from construction of the proposed project were compared to these screening criteria. Emissions calculations and modeling output are included in Appendix B of this Draft EIR.

Health Impacts

Health impacts associated with the proposed project are assessed based on the estimated project's regional emissions, as discussed above for regional construction and operational emissions, in comparison to the SCAQMD regional emissions thresholds of significance.

Toxic Air Contaminants

The proposed project would emit TACs during construction, exposure to which may result in an increase in carcinogenic and non-carcinogenic health risks on the residents and other air quality sensitive receptors in the vicinity. A Health Risk Assessment (HRA) was prepared to evaluate the risk of potential negative health outcomes (cancer, or other acute or chronic conditions) related to TACs exposure from airborne emissions during proposed project construction activities. Incremental increase in lifetime cancer risk is assessed over longer exposure time periods (i.e., 30-year for residential receptors).

The HRA followed the procedure and methods provided in the *Guidance Manual for Preparation of Health Risk Assessments* issued by OEHHA in 2015. as well as the methods the SCAQMD's *Risk Assessment Procedures for Rule 1401, 1401.1, and 212, version 8.1*, used in conjunction with the associated *SCAQMD Permit Application Package "N (OEHHA 2015; SCAQMD 2017b; SCAQMD 2017c)."* The procedure involved emission quantification, modeling of environmental transport, evaluation of environmental fate, identification of exposure routes, identification of exposed populations, and estimation of short-term (e.g., 1-hour maximum), 8-hour average, and long-term (annual) exposure levels. The revised 2015 OEHHA Guidance takes into account the sensitivity of children to TAC emissions, breathing rates, and time spent at home since children have higher breathing rate compared to adults and would likely spend more time at home resulting in longer exposure durations. A full detailed methodology of health risk assessment is included in the Air Quality Technical Report attached as Appendix B of this Draft EIR.

Operational Impacts

Regional Operational Emissions

The proposed project's operational activities would have minimal changes from the existing scenario. There are no new permanent maintenance or recreational trips associated with the reservoir improvements, and no natural gas emissions, water use or solid waste generation anticipated. Maintenance of the wetland/riparian area would be required for approximately 5 years after construction is complete to ensure success of the vegetated areas, and would result in infrequent trips to the project site. Operational vehicle trips during the first five years of maintenance would equal 12 to 24 round trips for 30 to 40 days per year. However, these trips would not result in substantial daily or annual emissions.

The main operational emissions associated with air quality impacts would occur from consumer product use associated with onsite maintenance activities. While electrical consumption will increase, electrical consumption does not result in direct air quality impacts and therefore are not addressed in the regional or localized air quality emissions analysis. Assumptions, calculations and modeling output are included in Appendix B of this Draft EIR.

Localized Operational Emissions

The localized effects from the on-site portion of the maximum daily emissions from proposed project operation were evaluated at the nearby sensitive receptor locations that would be potentially impacted by operation of the proposed project according to the SCAQMD's Final Localized Significance Threshold Methodology (June 2003, revised July 2008).[6] The localized impacts from operation of the proposed project were assessed similar to the construction emissions, as discussed previously. For further explanation, please see the Air Quality Technical Report attached as Appendix B of this Draft EIR.

Carbon Monoxide Hotspots

The greatest quantities of CO are produced from motor vehicle combustion and are usually concentrated at or near ground level because they do not readily disperse into the atmosphere, particularly under cool, stable (i.e., low or no wind) atmospheric conditions. Localized areas where ambient concentrations exceed State and/or federal standards are termed "CO hotspots." As the operation of the proposed project would not result in any new mobile source emissions, the project would not result in CO hotspots. Therefore, CO hotspots are not discussed further in this analysis.

Toxic Air Contaminants

Operation of the proposed project, i.e., periodic maintenance and remotely operated electrical equipment), would not include the operation of non-permitted stationary sources of TACs. Permitted sources would be regulated by the SCAQMD and therefore would be mandated to be

---

6 SCAQMD, Final Localized Significance Threshold Methodology.

within regulatory thresholds. Therefore, the proposed project would not result in significant TAC emissions and operational TACs are not addressed further in this analysis.

General Conformity

Under section 176(c)(1) of the federal CAA, federal agencies that "engage in, support in any way or provide financial assistance for, license or permit, or approve any activity" must demonstrate that such actions do not interfere with state and local plans to bring an area into attainment with the NAAQS (42 USC 7506(c)). Orange County is designated extreme non-attainment for the federal 8-hour ozone NAAQS; serious non-attainment for PM2.5; and attainment for the federal CO, NO_2, SO_2, and PM10 standards. The program by which a federal agency determines that its action would not obstruct or conflict with air quality attainment plans is called "General Conformity." The implementing regulations for General Conformity are found in 40 CFR 93(B) (75 FR 17254 (April 5, 2010, amended July 6, 2010). Under the General Conformity regulations, both the direct and indirect emissions associated with a federal action must be evaluated.

Each year of construction (2022 through 2026) are analyzed against the *de minimis* thresholds. Annual emissions for the construction activities are quantified for both the unmitigated and mitigated scenarios. Operational emissions are discussed qualitatively as there is a minimal operational component.

Impact Analysis

Conflict with or Obstruct Air Quality Plans

Impact 3.2-1: The proposed project could conflict with or obstruct implementation of the applicable air quality plan.

Construction

The proposed project is located within the Air Basin, which is under the jurisdiction of the SCAQMD. As such, SCAQMD's 2016 AQMP is the applicable air quality plan for the proposed project. Projects that are consistent with the regional population, housing, and employment forecasts identified by SCAG are considered to be consistent with the AQMP growth projections, since the forecast assumptions by SCAG forms the basis of the land use and transportation control portions of the AQMP. Additionally, because SCAG's regional growth forecasts are based upon, among other things, land uses designated in general plans, a project that is consistent with the land use designated in a general plan would also be consistent with the SCAG's regional forecast projections, and thus also with the AQMP growth projections.

The proposed project would result in an increase in short-term employment compared to existing conditions. Also, construction employees are typically employees of the construction firm and are not hired specifically for any one construction job. Being relatively small in number and temporary in nature, construction jobs under the project would not conflict with the long-term employment projections upon which the AQMP is based. Control strategies in the AQMP with applicability to short-term emissions from construction activities include strategies denoted in the 2016 AQMP as MOB-08 and MOB-10 and are intended to reduce emissions from on-road and off-road heavy-duty vehicles and equipment by accelerating replacement of older, emissions-prone engines with newer engines meeting more stringent emission standards. Construction contractors would be required to comply with the CARB Air Toxic Control Measure that limits heavy duty diesel motor vehicle idling to no more than five minutes at any given location with certain limited exceptions defined in the regulation for equipment in which idling is integral to the function of the equipment or activity (such as concrete trucks and concrete pouring). In addition, contractors would be required to comply with required and applicable BACT and the CARB In-Use Off-Road Diesel Vehicle Regulation to use lower emitting equipment in accordance with the phased-in compliance schedule for equipment fleet operators. The proposed project would not conflict with implementation of these strategies. The proposed project is also required to comply with SCAQMD regulations for controlling fugitive dust pursuant to SCAQMD Rule 403. Compliance with these requirements is consistent with and meets or exceeds the AQMP requirements for control strategies intended to reduce emissions from construction equipment and activities.

Nonetheless, as discussed further below in the analysis for Impact 3.2-2, even though the proposed project would be consistent with applicable strategies in the AQMP, local and state regulations, and other voluntary measures designed to reduce non-attainment pollutants, regional emissions during construction of the proposed project would exceed the significance threshold for NO_X. Therefore, impacts related to consistency with air quality plans during construction of the proposed project would be potentially significant.

As detailed in Impact 3.2-2 below, construction-related daily emissions would be reduced to below the SCAQMD threshold of significance of significance for NO_X with the implementation of Mitigation Measure AIR-1. Implementation of mitigation would increase the emissions of CO, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. For all other criteria pollutants, emission levels would remain below the applicable thresholds of significance. As the proposed project's maximum regional emissions from construction would not exceed the regional thresholds of significance with implementation of mitigation measures, the proposed project would be consistent with the AQMP, and impacts would be reduced to a less-than-significant level.

Operation

The proposed project is the expansion of the capacity of the Syphon Reservoir. There are no new permanent maintenance or recreational trips associated with the reservoir improvements, and no natural gas emissions, water use or solid waste generation anticipated. Maintenance of the wetland/riparian area would be required for approximately 5 years after construction is complete to ensure success of the vegetated areas, and would result in infrequent trips to the project site. The project does not result in a change in land use, nor does it result in residential or employment growth for the region. Additionally, as detailed under Impact 3.2-2 below, the operational emissions will not exceed regulatory thresholds. Therefore, operation of the proposed project would be consistent with the AQMP, and impacts would be reduced to a less-than-significant level.

Mitigation Measures

> **AIR-1:** IRWD shall require the construction contractor to implement construction equipment features for equipment operating at the project site during certain construction phases. Construction features will include the following: The proposed project shall utilize off-road diesel-powered construction equipment that meet or exceed CARB and

USEPA Tier 4 off-road emissions standards for standard construction equipment rated at 50 horsepower (hp) or greater during project construction. Such equipment will be outfitted with BACT devices including a CARB certified Level 3 Diesel Particulate Filter or equivalent. At a minimum, this measure shall apply during implementation of the following construction sub-phases: upstream excavation and foundation treatment, dam excavation and foundation treatment, installation of embankment to the bottom of the blanket drain, and installation of the chimney/remaining embankment.

Significance Determination

Less than Significant Impact with Mitigation

Criteria Pollutants

Impact 3.2-2: The proposed project could result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard.

The proposed project would contribute to local and regional air pollutant emissions during construction (short-term or temporary) and operation (long-term).

Construction

Regional Emissions Analysis

Construction of the proposed project has the potential to generate temporary regional criteria pollutant emissions through the use of heavy-duty construction equipment, such as excavators and forklifts, through vehicle trips generated by workers and haul trucks traveling to and from the proposed project site, and through building activities such as the application of paint and other surface coatings. In addition, fugitive dust emissions would result from demolition and various soil-handling activities. Mobile source emissions, primarily NO_X, would result from the use of construction equipment such as dozers and loaders. Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of construction activity, and prevailing weather conditions.

The maximum daily construction emissions for the proposed project were estimated for each construction phase. Some individual construction phases could potentially overlap; therefore, the estimated maximum daily emissions include these potential overlaps by combining the relevant construction phase emissions. The maximum daily emissions are predicted values for a representative worst-case day, and do not represent the actual emissions that would occur for every day of construction, which would likely be lower on many days. As stated above, in order to provide a conservative emissions analysis, for modeling purposes, construction emissions were modeled beginning in 2022. Detailed emissions calculations are provided in Appendix B of this Draft EIR.

The results of the criteria pollutant calculations are presented in **Table 3.2-5** and include dust control measures required to be implemented by SCAQMD Rule 403 (Control of Fugitive Dust), including subsection (e) – Additional Requirements for Large Operations, and fugitive VOC control measures required to be implemented by architectural coating emission factors based on

SCAQMD Rule 1113 (Architectural Coatings). As shown in Table 3.2-5, construction-related daily emissions would exceed the SCAQMD threshold of significance for NO_X. For all other criteria pollutants, emission levels would be below the applicable thresholds of significance. As the proposed project's maximum regional emissions from construction would exceed the regional threshold of significance for NO_X, regional construction emissions impacts would be potentially significant.

TABLE 3.2-5
ESTIMATED MAXIMUM UNMITIGATED REGIONAL CONSTRUCTION EMISSIONS (POUNDS PER DAY)

Construction Sub-Phase	VOC	NO_X	CO	SO_2	PM10[a]	PM2.5[a]
Preconstruction Activities	7	91	42	<1	14	8
Access Routes/Intersection Improvements	4	47	36	<1	5	2
Excavation of Sediment/Existing Dam	13	133	94	<1	16	10
Construction of Dam/Spillway/Reservoir	13	165	95	<1	19	11
Construction of Treatment Facility	5	26	21	<1	3	1
Wetlands/Riparian Installation	2	16	14	<1	2	1
Installation of Recreational Facilities	4	43	34	<1	3	2
Demobilization	3	22	20	<1	1	1
Maximum Geotechnical Work	20	177	198	<1	50	18
Overlapping Sub-Phases						
Set-up & Geotechnical[c]	12	137	94	<1	27	13
Excavation & Geotechnical	19	180	145	<1	29	15
Construction & Geotechnical	18	211	147	<1	32	16
Maximum Reservoir Phase Overlap & Geotechnical	21	236	173	<1	35	17
Dam Excavation & Construction of Dam (Install Inlet/Outlet)	16	182	122	<1	21	12
Construction of Dam (Install Chimney) & Construction of Dam (Spillway)	15	189	121	<1	21	12
Construction of Dam (Spillway) & Construction of Treatment Facilities & Wetlands Installation	9	66	61	<1	7	3
Construction of Treatment Facilities & Wetlands Installation & Recreation Facilities Installation	11	84	70	<1	8	4
Maximum Daily Emissions	**21**	**236**	**198**	**1**	**50**	**18**
SCAQMD Thresholds of Significance	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Thresholds?	No	**Yes**	No	No	No	No

NOTES:
Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided in Appendix B of this Draft EIR.
[a] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403, including subsection (e) – Additional Requirements for Large Operations.
SOURCE: ESA 2021.

The results of the mitigated criteria pollutant calculations are presented in **Table 3.2-6** and include dust control measures required to be implemented by SCAQMD Rule 403 (Control of Fugitive Dust), including subsection (e) – Additional Requirements for Large Operations and fugitive VOC control measures required to be implemented by architectural coating emission factors based on

SCAQMD Rule 1113 (Architectural Coatings). As shown in Table 3.2-6, construction-related daily emissions would be reduced to below the SCAQMD threshold of significance for NOx with the implementation of Mitigation Measure AIR-1. Implementation of Mitigation Measure AIR-1 would slightly increase the emissions of CO due to the emissions control technology used, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. For all other criteria pollutants, emission levels would remain below the applicable thresholds of significance. As the proposed project's maximum regional emissions from construction would not exceed the regional thresholds of significance with implementation of mitigation measures, the proposed project's regional construction emissions impacts would be less than significant.

TABLE 3.2-6
ESTIMATED MAXIMUM MITIGATED REGIONAL CONSTRUCTION EMISSIONS (POUNDS PER DAY)

Construction Sub-Phase	VOC	NO_X	CO	SO_2	PM10[b]	PM2.5[b]
Preconstruction Activities	3	45	51	<1	12	6
Access Routes/Intersection Improvements	1	9	47	<1	4	1
Excavation of Sediment/Existing Dam	5	33	112	<1	11	6
Construction of Dam/Spillway/Reservoir	4	51	106	<1	14	6
Construction of Treatment Facility	4	18	22	<1	2	1
Wetlands/Riparian Installation	2	14	16	<1	2	1
Installation of Recreational Facilities	1	5	45	<1	1	<1
Demobilization	2	13	25	<1	1	1
Maximum Geotechnical	10	97	139	<1	48	16
Overlapping Sub-Phases						
Set-up & Geotechnical[c]	5	70	115	<1	25	10
Excavation & Geotechnical	8	59	176	<1	24	10
Construction & Geotechnical	8	76	170	<1	27	11
Maximum Reservoir Phase Overlap & Geotechnical	9	98	208	1	29	12
Dam Excavation & Construction of Dam (Install Inlet/Outlet)	7	72	144	0	17	8
Construction of Dam (Install Chimney) & Construction of Dam (Spillway)	5	62	134	0	16	7
Construction of Dam (Spillway) & Construction of Treatment Facilities & Wetlands Installation	7	43	66	0	6	2
Construction of Treatment Facilities & Wetlands Installation & Recreation Facilities Installation	7	38	83	0	6	2
Maximum Daily Emissions	**10**	**98**	**208**	**1**	**48**	**16**
SCAQMD Thresholds of Significance	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Thresholds?	No	No	No	No	No	No

NOTES:

Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided Appendix B of this Draft EIR.

[a] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403, including subsection (e) – Additional Requirements for Large Operations.

SOURCE: ESA 2021.

Conformity Analysis

Annual emissions for unmitigated and mitigated emissions were compared to the General Conformity *de minimis* levels for NAAQS non-attainment areas (see **Table 3.2-7**). In the unmitigated scenario, annual construction emissions of NO_X, would exceed the 10 tons per year General Conformity threshold. With implementation of Mitigation Measure AIR-1, annual construction emissions of VOC, CO, NO_X, PM10, and PM2.5 would be below applicable General Conformity *de minimis* levels and thus would not conflict with implementation of the SIP. Additionally, short-term direct construction emissions associated with the project would not conflict with or obstruct implementation of applicable long-term air quality management plans. Therefore, no further conformity analysis is required for any of the pollutants because their emissions would be less than the conformity *de minimis* levels, and no significant adverse effect from the project would occur.

TABLE 3.2-7
GENERAL CONFORMITY

Year	VOC	NO_X	CO	PM10[a]	PM2.5[a]
Unmitigated Emissions (tons/year)					
2022	<1	4	3	1	<1
2023	1	15	10	2	1
2024	1	19	11	2	1
2025	1	9	6	1	<1
2026	<1	1	1	<1	<1
Annual Emissions	1	19	11	2	1
***De minimis* Levels**	10	**10**	100	100	70
Exceeds *de minimis*?	No	**Yes**	No	No	No
Mitigated Emissions (tons/year)[b]					
2022	<1	1	3	<1	<1
2023	1	5	13	1	1
2024	<1	7	12	2	1
2025	<1	3	7	1	<1
2026	<1	1	1	<1	<1
Annual Emissions	1	7	13	2	1
***De Minimis* Levels**	10	10	100	100	70
Exceeds *de minimis*?	No	No	No	No	No

NOTES:

Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided in Appendix B of this Draft EIR.

[a] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403, including subsection (e) – Additional Requirements for Large Operations.

[b] Incorporates Mitigation Measure AIR-1.

SOURCE: ESA 2021.

Operation

Regional Emissions Analysis

As discussed previously, operational activities would result in area source emissions and an increase in electrical consumption. No new permanent vehicle trips would occur as maintenance and recreational activities are anticipated to remain the same as the existing conditions. Operational vehicle trips during the first 5 years of maintenance would equal 12 to 24 round trips for 30 to 40 days per year. However, these trips would not result in substantial daily or annual emissions. Operational regional criteria pollutant emissions were calculated for the proposed project's buildout year of 2026 and emissions were assumed not to exceed 1 pound per day for all criteria pollutants during operational activities. Detailed emissions calculations are provided in Appendix B of this Draft EIR. The proposed project's operational-related daily emissions would not exceed the SCAQMD thresholds of significance for any criteria pollutants. As the proposed project's maximum regional emissions from operational activities would be below the regional thresholds of significance, regional operation-related emissions impacts would be less than significant.

General Conformity Analysis

Daily operational emissions are less than one pound per day for all criteria pollutants. Therefore, annual emissions would be less than 0.2 tons per year, well below any of the de minimis thresholds, thus in conformance with the SIPs. Additionally, operational emissions associated with the proposed project would not conflict with or obstruct implementation of applicable long-term air quality management plans. Therefore, no further conformity analysis is required for any of the pollutants because their emissions would be less than the conformity thresholds and no significant adverse effect from the project would occur.

Health Impact Assessment

NO_X and VOC emissions from projects are directly related to the increase in ozone in the local area/region which aggravate respiratory diseases, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to emergency rooms and may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. As shown in Table 3.2-5, unmitigated project-related construction emissions would potentially exceed regional thresholds for NO_X. Accordingly, elevated levels of criteria air pollutants as a result of a project's emissions could cause adverse health effects associated with this pollutant. All other criteria pollutants would be below the thresholds of significance. Implementation of Mitigation Measure AIR-1 would reduce both localized (discussed in detail in Impact 3 below) and regional project generated construction emissions (with the exception of CO, which increases slightly with Mitigation Measure AIR-1 but still remains below the threshold of significance), and therefore would reduce the potential to result in regional health effects associated with ozone precursors (VOC and NO_X). As shown in Table 3.2-6, mitigated project construction emissions would not exceed the thresholds of significance. As a result, construction of the proposed project would not have the potential to result in additional quantifiable health impacts, and impacts would be reduced to a less-than-significant level with implementation of Mitigation Measure AIR-1.

As discussed under operational emissions above, unmitigated project-related operational emissions would not exceed regional thresholds for any criteria pollutant. Accordingly, levels of criteria air pollutants as a result of a project's emissions are not anticipated to cause adverse health effects. Impacts would be less than significant.

Mitigation Measures

Implement Mitigation Measure AIR-1

Significance Determination

Less than Significant Impact with Mitigation

Sensitive Receptors

Impact 3.2-3: The proposed project could expose sensitive receptors to substantial pollutant concentrations.

Construction

Local Criteria Pollutant Emissions

The maximum daily localized emissions for each of the construction phases and the localized significance thresholds are presented in **Table 3.2-8**. The same phasing, equipment assumptions, and compliance with SCAQMD Rule 403 and Rule 1113 were used as for the regional emissions calculations discussed above. As shown in Table 3.2-8, maximum localized construction emissions for sensitive receptors would exceed the localized threshold of significance for NO_X, therefore, with respect to localized construction emissions, impacts to sensitive receptors would be potentially significant. All other criteria pollutants of local concern (CO, PM10, and PM2.5) would not exceed the localized thresholds of significance. Detailed emissions calculations are provided in Appendix B of this Draft EIR.

TABLE 3.2-8
ESTIMATED MAXIMUM UNMITIGATED LOCALIZED CONSTRUCTION EMISSIONS (POUNDS PER DAY)

Construction Phase	NO_X	CO	PM10[a]	PM2.5[a]
1 acre area – 164 feet (50 meters) from sensitive receptors				
Mobilization, site prep/Staging Areas	44	41	2	2
Access Routes/Intersection Improvements	42	33	5	2
Construction of Facility	9	11	0	0
Installation of Recreational Facilities	42	33	3	2
Demobilization	21	19	1	1
Spillway & Facilities & Wetlands	41	44	3	2
Facilities & Wetlands & Recreational	65	57	5	3
Maximum Localized (On-Site) Emissions	65	57	5	3
SCAQMD Thresholds of Significance	52	883	11	4
Exceed Thresholds?	**Yes**	No	No	No
5 acre area – 328 feet (100 meters) from sensitive receptors				
Preconstruction Activities	55	26	11	7
Excavation of Sediment/Existing Dam	**132**	91	15	10
Construction of Dam/Spillway/Reservoir	**128**	78	15	10
Wetlands/Riparian Installation	14	13	1	1
Dam Excavation & Inlet/Outlet	**144**	102	16	10
Chimney & Spillway Construction	**145**	98	15	10
Maximum Geotechnical	176	186	37	11
Maximum Localized (On-Site) Emissions	**176**	**186**	37	11
SCAQMD Thresholds of Significance	112	2,763	49	16
Exceed Thresholds?	**Yes**	No	No	No

NOTES:
Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided Appendix B of this Draft EIR.
[a] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403.
SOURCE: ESA 2021.

The results of the mitigated localized emissions calculations are presented in **Table 3.2-9**. And include dust control measures required to be implemented by SCAQMD Rule 403 (Control of Fugitive Dust), including subsection (e) – Additional Requirements for Large Operations and fugitive VOC control measures required to be implemented by architectural coating emission factors based on SCAQMD Rule 1113 (Architectural Coatings). As shown in Table 2.3-9, construction-related daily emissions would be reduced to below the SCAQMD threshold of significance of significance for NO_X with the implementation of Mitigation Measure AIR-1. Implementation of Mitigation Measure AIR-1 would slightly increase CO emissions due to the emissions control technology used, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. For all other criteria pollutants, emissions levels would remain below the applicable thresholds of significance. As the proposed project's maximum localized emissions from construction would not exceed the localized thresholds of significance, localized construction emissions impacts would be less than significant with the incorporation of Mitigation Measure AIR-1.

TABLE 3.2-9
ESTIMATED MAXIMUM MITIGATED LOCALIZED CONSTRUCTION EMISSIONS (POUNDS PER DAY)

Construction Phase	NO_X	CO	PM10[a]	PM2.5[a]
1 acre area – 164 feet (50 meters) from sensitive receptors				
Mobilization, site prep/Staging Areas	20	50	1	1
Access Routes/Intersection Improvements	4	44	3	<1
Construction of Facility	2	12	<1	<1
Installation of Recreational Facilities	4	44	1	<1
Demobilization	13	24	<1	<1
Spillway & Facilities & Wetlands	18	50	2	1
Facilities & Wetlands & Recreational	19	70	3	1
Maximum Localized (On-Site) Emissions	20	70	3	1
SCAQMD Thresholds of Significance	52	883	11	4
Exceed Thresholds?	**No**	**No**	1	1
5 acre area – 328 feet (100 meters) from sensitive receptors				
Preconstruction Activities	8	35	9	5
Excavation of Sediment/Existing Dam	32	109	11	6
Construction of Dam/Spillway/Reservoir	14	88	10	5
Wetlands/Riparian Installation	13	14	1	<1
Dam Excavation & Inlet/Outlet	34	124	12	6
Chimney & Spillway Construction	17	111	10	5
Maximum Geotechnical	96	234	37	11
Maximum Localized (On-Site) Emissions	96	234	37	11
SCAQMD Thresholds of Significance	112	2,763	49	16
Exceed Thresholds?	**No**	**No**	**No**	**No**

NOTES:
Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided in Appendix B of this Draft EIR.
[a] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403.
SOURCE: ESA 2021.

Toxic Air Contaminates

Carcinogenic Health Risk

Excess lifetime cancer risk is estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to carcinogens. As the individual incremental increase in lifetime cancer risk is assessed over long exposure time periods (i.e., 30-year for residential receptors), the potential effects of proposed project-related carcinogenic TAC emissions must include the combination of exposure to construction-related activities and exposure to operation-related activities. For cancer risk, SCAQMD guidance identifies a significant impact if a project would result in an incremental cancer risk that is greater than 10 in one million for any receptor.

The TAC emissions of the proposed project would be generated from mobile sources including diesel-powered heavy-duty trucks and construction equipment. These sources generate DPM from combustion of diesel fuels. The analysis uses exhaust PM10 emissions associated with each construction phase as a surrogate for DPM emissions. The potential emission sources of DPM would be diesel-fueled heavy-duty equipment, on-road travel and idling emissions from diesel-fueled haul trucks. For operational activities the proposed project would not result in new TAC sources and therefore would not contribute to the cumulative health risk of the local sensitive receptors.

The maximum health risk impacts to exposed sensitive receptors was determined through placing receptor locations around the proposed project site and haul truck routs. The estimated incremental cancer risks for the proposed project's construction activities over a maximum 30-year exposure in line with OEHHA guidance starting with the first year of construction as analyzed. Cancer risk for the maximum impacted sensitive receptor is 11.16 per million which would exceed the SCAQMD's threshold of 10 per million. As the cancer risk would exceed the SCAQMD's significance thresholds, the lifetime cancer risk that would result from construction and operation of the proposed project would result in significant impacts without mitigation.

Implementation of Mitigation Measure AIR-1 would reduce DPM emissions from the proposed project's construction activities. The estimated incremental cancer risk for the proposed project's construction activities with implementation of Mitigation Measure AIR-1 would be between 1.43 per million and 3.44 per million depending on the level at which the mitigation is implemented.

Non-carcinogenic Health Risk

As previously discussed, an HRA was prepared to evaluate the risk of potential non-carcinogenic negative health outcomes related to TACs exposure from airborne emissions during the construction of the proposed project. For construction, the potential TAC emission sources were heavy-duty equipment and haul/vendor trucks used during the improvements to the reservoir. Non-cancer effects of chronic (i.e., long- term) exposure were evaluated using the HI approach consistent with the OEHHA and SCAQMD guidance.

A chronic HI equal to or greater than 1.0 represents a significant chronic health hazard. A chronic health effect could include irritation to eyes, throat, lungs or neurological damage. Construction of the proposed project would result in non-carcinogenic health risk of 0.02 under the unmitigated scenario and between 0.004 and 0.02 with implementation of mitigation. Both unmitigated and mitigated non-carcinogenic health risk would be below the significance threshold of a chronic HI of 1.0 for the maximum impacted receptor. Therefore, this this impact would be less than significant.

Operation

The localized operational air quality analysis was conducted using the methodology prescribed in the SCAQMD Localized Significance Threshold Methodology (June 2003, revised July 2008). The screening criteria provided in the Localized Significance Threshold Methodology were used to determine the localized operational thresholds of significance for the proposed project. The maximum daily localized emissions would not exceed 1 pound per day and therefore would not exceed localized significance thresholds. Detailed emissions calculations are provided in Appendix B of this Draft EIR. As the proposed project's maximum localized operational emissions would not exceed the localized thresholds of significance for NO_X, CO, PM10, or PM2.5, operational emissions impacts to sensitive receptors would be less than significant.

Mitigation Measures

Implement Mitigation Measure AIR-1

Significance Determination

Less than Significant Impact with Mitigation

Other Emissions

Impact 3.2-4: The proposed project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

Construction

Potential activities that may emit odors during the proposed project's construction include the use of architectural coatings and solvents, as well as the combustion of diesel fuel in on-and off-road equipment. SCAQMD Rule 1113 would limit the amount of VOCs in architectural coatings and solvents. In addition, the proposed project would comply with the applicable provisions of the CARB Air Toxics Control Measure regarding idling limitations for diesel trucks. Through mandatory compliance with SCAQMD Rules, no construction activities or materials are expected to create objectionable odors affecting a substantial number of people. Furthermore, as shown in Table 3.2-5, construction emissions would not exceed the SCAQMD regional significance thresholds for attainment, maintenance, or unclassifiable criteria air pollutants (i.e., CO and SO_2). Therefore, the proposed project's construction activities would result in less-than-significant impacts with respect to other emissions, including those leading to odors.

Operation

According to the SCAQMD *CEQA Air Quality Handbook*, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. The proposed project would not include any uses identified by the SCAQMD as being associated with substantial odors. As a result, the proposed project is not expected to discharge contaminants into the air in quantities that would cause a nuisance, injury, or annoyance to the public or property pursuant to SCAQMD Rule 402. Furthermore, as discussed under Impact 3.2-2 above, operational emissions would not exceed the SCAQMD regional significance thresholds for attainment, maintenance, or unclassifiable criteria air pollutants (i.e., CO and SO_2). Therefore, operation of the proposed project would result in less-than-significant impacts with respect to other emissions, including those leading to odors.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Cumulative Impacts

Impact 3.1-5: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative short-term and long-term impacts to air quality.

The following cumulative impact analysis is based on the recommendations provided by SCAQMD in the Potential Control Strategies to Address Cumulative Impacts from Air Pollution White Paper. SCAQMD's guidance for assessing a project's cumulative impacts recommends the use of two alternative methodologies: (1) that project-specific air quality impacts be used to determine the project's potential cumulative impacts to regional air quality; or (2) that a project's consistency with the AQMPs are used to determine its potential cumulative impacts.

Under SCAQMD's guidance, "[p]rojects that exceed the project-specific significance thresholds are considered by SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant." Therefore, consistent with this guidance, the potential for the Proposed Project to results in cumulative impacts from regional emissions is assessed based on SCAQMD thresholds.

Consistency with AQMP

As described above under Impact AIR-1, construction of the proposed project would not be consistent with the AQMP as the proposed project would generate emissions of nonattainment pollutants or precursors (i.e., NO_X) that exceed the applicable significance thresholds. Based on SCAQMD guidance, the exceedance of these thresholds indicates that the proposed project would have a considerable contribution to a significant impact. Construction-related daily emissions would be reduced to below the SCAQMD threshold of significance for NO_X with the implementation of Mitigation Measure AIR-1. Implementation of this mitigation measure would slightly increase the emissions of CO due to the emissions control technology used, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. For all other criteria pollutants, emission levels would remain below the applicable thresholds of significance. As the proposed project's maximum regional emissions from construction would not exceed the regional thresholds of significance, the proposed project would be consistent with the AQMP and cumulative impacts would be less than significant.

Operation of the proposed project would be consistent with the AQMP as the proposed project would not generate emissions of nonattainment pollutants or precursors (i.e., VOC, $NO_{X,}$ CO, SOx, PM10, and PM2.5) that exceed the applicable significance thresholds. Therefore, the proposed project would result in a less than significant cumulative operational impact.

Project-Specific Impacts

Construction

As described above under Impact 3.2-2 and Impact 3.2-3, regional and localized emissions during construction of the proposed project would exceed the SCAQMD significance threshold for NO_X. Thus, based on SCAQMD methodology, the proposed project construction emissions would represent a considerable contribution to a cumulative impact, resulting in a potentially significant cumulative impact. The proposed project's construction-related daily emissions would be reduced to below the SCAQMD regional and local thresholds of significance for NO_X with the implementation of Mitigation Measure AIR-1. Implementation of Mitigation Measure AIR-1 would slightly increase the emissions of CO due to the emissions control technology used, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. As the proposed project's maximum mitigated regional emissions from construction would not exceed the regional thresholds of significance, the proposed project would not represent a considerable contribution to a cumulative impact, resulting in a less than cumulative impact.

Operation

As discussed under Impact 3.2-2 and Impact 3.2-3, above, regional and localized operational emissions of VOC, NO_X, CO, PM10, and PM2.5 would not exceed the SCAQMD significance thresholds. Thus, based on SCAQMD methodology, the proposed project operational emissions would not represent a considerable contribution to a cumulative impact, resulting in a less than significant cumulative impact.

Mitigation Measures

Implement Mitigation Measure AIR-1

Significance Determination

Less than Significant Impact with Mitigation

3.2.4 References

California Air Resources Board (CARB). 2004. Final Regulation Order, Amendments to the California Diesel Fuel Regulations, July 15, 2004.

CARB. 2016. California Ambient Air Quality Standards. Updated May 4.

CARB. 2020a. California Ambient Air Quality Standards. Available at https://ww2.arb.ca.gov/resources/california-ambient-air-quality-standards. Accessed June 2020.

CARB. 2020b. Ozone & Health, Health Effects of Ozone. Available at https://ww2.arb.ca.gov/resources/ozone-and-health. Accessed June 2020.

CARB. 2020c. Common Air Pollutants. Available at https://ww2.arb.ca.gov/resources/common-air-pollutants. Accessed June 2020.

CARB. 2020d. Nitrogen Dioxide & Health. Available at https://ww2.arb.ca.gov/resources/nitrogen-dioxide-and-health. Accessed June 2020.

CARB. 2020e. Carbon Monoxide & Health, https://ww2.arb.ca.gov/resources/carbon-monoxide-and-health. Accessed June 2020.

CARB. 2020f. Sulfur Dioxide & Health. Available at https://ww2.arb.ca.gov/resources/sulfur-dioxide-and-health. Accessed June 2020.

CARB. 2020g. Inhalable Particulate Matter and Health (PM2.5 and PM10). Available at https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm. Accessed June 2020.

CARB. 2020h. Lead & Health. Available at https://ww2.arb.ca.gov/resources/lead-and-health. Accessed June 2020.

CARB. 2020i. Sulfates and Health. Available at https://ww2.arb.ca.gov/resources/sulfate-and-health. Accessed June 2020.

CARB. 2020j. Hydrogen Sulfide and Health. Available at https://ww2.arb.ca.gov/resources/hydrogen-sulfide-and-health. Accessed June 2020.

CARB. 2020k. Visibility-Reducing Particles & Health. Available at https://ww2.arb.ca.gov/resources/visibility-reducing-particles-and-health. Accessed June 2020.

CARB. 2020l. Vinyl Chloride and Health. Available at https://ww2.arb.ca.gov/resources/vinyl-chloride-and-health. Accessed June 2020.

CARB. 2020m. Overview of the Air Toxics Hotspots Information and Assessment Act. Available at https://ww2.arb.ca.gov/overview-air-toxics-hot-spots-information-and-assessment-act. Accessed June 2020.

CARB 2020n. Overview Diesel Exhaust & Health. Available at https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health. Accessed June 2020.

CARB 2020o. CARB Identified Toxic Air Contaminants. Available at https://ww2.arb.ca.gov/resources/documents/carb-identified-toxic-air-contaminants. Accessed June 2020.

CARB. 2020p. Area Designations Maps/State and National. Available at http://www.arb.ca.gov/desig/adm/adm.htm. Accessed May 2020.

Office of Environmental Health Hazard Assessment (OEHHA). 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. February. Available at https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed June 2020.

South Coast Air Quality Management District (SCAQMD). 1993. *CEQA Air Quality Handbook*. November.

SCAQMD. 2005. Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning. May 06. Available at https://www.aqmd.gov/home/research/guidelines/planning-guidance/guidance-document. Accessed June 2020.

SCAQMD. 2006. Final – Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds. October. Available at http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/particulate-matter-(pm)-2.5-significance-thresholds-and-calculation-methodology/final_pm2_5methodology.pdf. Accessed June 2020.

SCAQMD. 2008a. Final Localized Significance Threshold Methodology. June 2003, Revised July 2008. Available at http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf. Accessed June 2020.

SCAQMD. 2008b. MATES III Report, 2008. Available at http://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iii/mates-iii-final-report. Accessed June 2020.

SCAQMD. 2013. Final 2012 Air Quality Management Plan. February 2013. Available at http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/aqmp-archive. Accessed June 2020.

SCAQMD. 2015a. Final Report – Multiple Air Toxics Exposure Study in the South Coast Air Basin, ES-2, 2-11, 6-1. Available at https://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iv. Accessed June 2020.

SCAQMD. 2015b. Multiple Air Toxics Exposure Study, MATES IV Carcinogenic Risk Interactive Map. Available at https://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iv. Accessed June 2020.

SCAQMD 2015c. Amicus Brief in Support of Neither Party, Sierra Club v. County of Fresno, 2015.

SCAQMD. 2017a. *Final 2016 Air Quality Management Plan*. March 2017. Available at https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/final2016aqmp.pdf?sfvrsn=15http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/aqmp-archive. Accessed June October 2020.

SCAQMD. 2017b. Risk Assessment Procedures for Rule 1401, 1401.1, and 212, Version 8.1, September 1. Available at http://www.aqmd.gov/docs/default-source/permitting/rule-1401-risk-assessment/riskassessproc-v8-1.pdf?sfvrsn=12. Accessed June 2020.

SCAQMD. 2017c. Permit Application Package "N", September 1. Available at http://www.aqmd.gov/docs/default-source/permitting/rule-1401-risk-assessment/attachmentn-v8-1.pdf?sfvrsn=4. Accessed June 2020.

SCAQMD. 2018. *NAAQS/CAAQS and Attainment Status for South Coast Air Basin*. September. Available at http://www.aqmd.gov/home/air-quality/clean-air-plans. Accessed June 2020.

SCAQMD. 2019. SCAQMD Air Quality Significance Thresholds. Revised April. Available at www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf. Accessed June 2020.

SCAQMD. 2020a, Air Quality Modeling. Available at https://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-modeling. Accessed October 2020.

SCAQMD. 2020b. Historical Data by Year for years 2017, 2018, and 2019. Available at http://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year. Accessed May 2020.

SCAQMD. 2020c. Air Quality Analysis Handbook. Available at www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook. Accessed October 2020.

SCAQMD. 2020d. What is Title V?. Available at http://www.aqmd.gov/home/permits/title-v/what-is-title-v-. Accessed June 2020.

SCAQMD. 2020e. South Coast Air Quality Management District, Map of Monitoring Areas. Available at http://www.aqmd.gov/docs/default-source/default-document-library/map-of-monitoring-areas.pdf. Accessed October 2020.

Southern California Association of Governments (SCAG). 2016. *2016 Regional Transportation Plan/Sustainable Communities Strategy*. April. Available at http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx. Accessed June 2020.

U.S. Environmental Protection Agency (USEPA). 2004. Air Toxics Risk Assessment Reference Library, Volume 1 Technical Resource Manual, April.

USEPA. 2016a. Criteria Air Pollutants, NAAQS Table. Updated December 20. Available at https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed June 2020.

USEPA. 2016b. Nitrogen Dioxide (NO_2) Pollution. Updated September 8. Available at https://www.epa.gov/no2-pollution/basic-information-about-no2#Effects. Accessed June 2020.

USEPA. 2016c. Carbon Monoxide (CO) Pollution in Outdoor Air. Updated September 8. Available at https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution. Accessed June 2020.

USEPA. 2017a. Technical Overview of Volatile Organic Compounds. Updated April 12. Available at https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds. Accessed June 2020.

USEPA. 2017b. Volatile Organic Compounds Impact on Indoor Air Quality. Updated November 6. Available at https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality. Accessed June 2020.

USEPA. 2017c. Lead Air Pollution. Updated November 29. Available at https://www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution. Accessed June 2020.

USEPA. 2017d. What are Hazardous Air Pollutants. Updated February 9. Available at https://www.epa.gov/haps/what-are-hazardous-air-pollutants. Accessed June 2020.

USEPA. 2017e. Title V Operating Permits. March 15. Available at https://www.epa.gov/title-v-operating-permits/who-has-obtain-title-v-permit. Accessed June 2020

USEPA. 2018a. Pollutants and Sources. Updated September 26. Available at https://www3.epa.gov/airtoxics/pollsour.html. Accessed June 2020.

USEPA. 2018b. Particulate Matter (PM) Pollution. Updated November 14. Available at https://www.epa.gov/pm-pollution/particulate-matter-pm-basics. Accessed June 2020.

USEPA. 2019a. Health Effects of Ozone Pollution. Updated July 30. Available at https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution. Accessed June 2020.

USEPA. 2019b. Sulfur Dioxide (SO_2) Pollution. Updated April 2. Available at https://www.epa.gov/so2-pollution/sulfur-dioxide-basics. Accessed June 2020.

USEPA. 2020. The Green Book Non-Attainment Areas for Criteria Pollutants. Updated May 31. Available at https://www.epa.gov/green-book. Accessed October 2020.

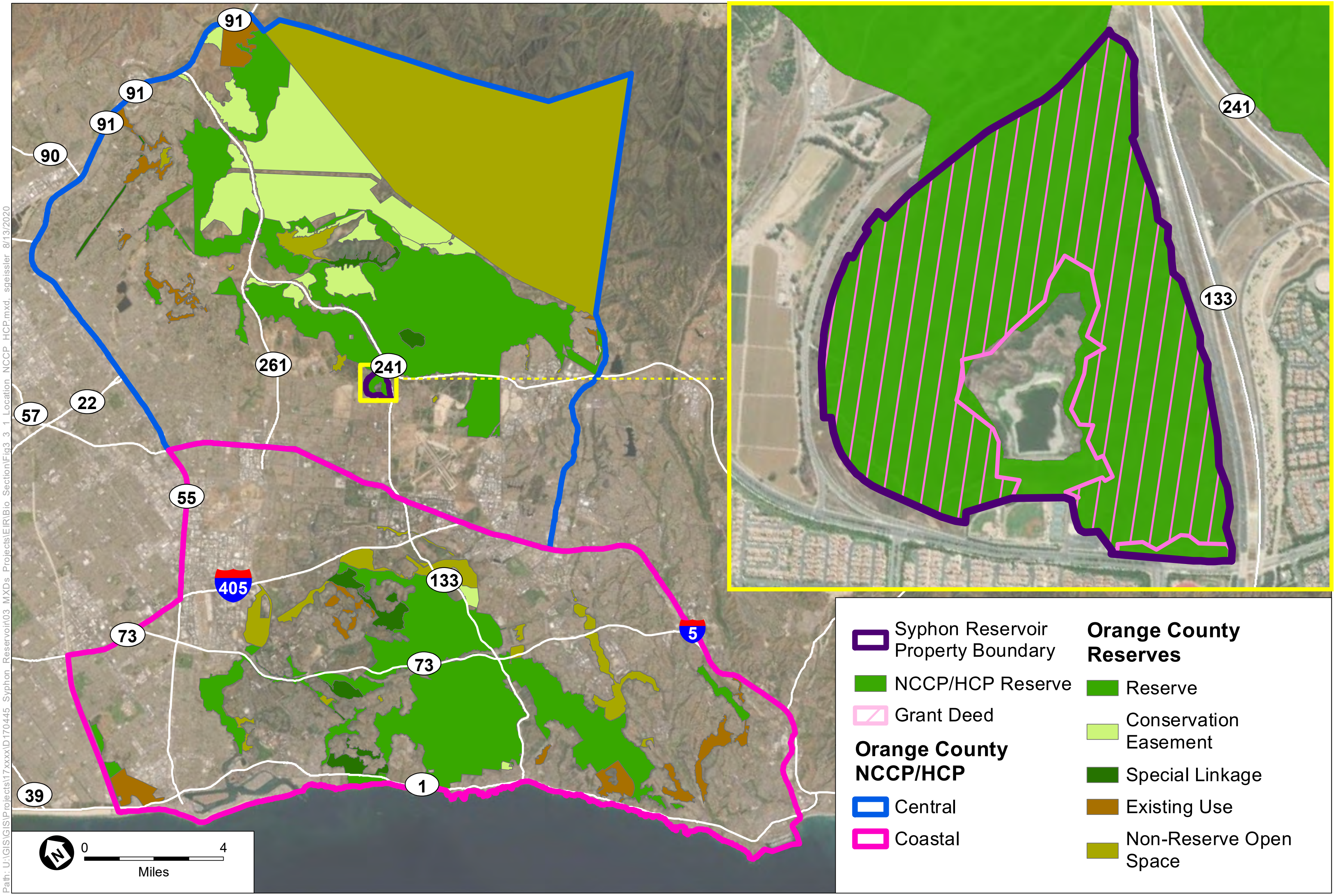
3.3 Biological Resources

This section evaluates the potential for impacts related to biological resources resulting from construction and operation of the proposed project. This section includes: a description of the existing biological resources conditions in and around the proposed project site; a summary of applicable regulations related to biological resources; and an evaluation of the potential impacts of the proposed project related to biological resources in and around the Project site, including cumulative impacts. The biological resources described in this section are based on the findings provided in the Syphon Reservoir Improvement Project Biological Resources Technical Report (ESA 2021; **Appendix C**).

3.3.1 Environmental Setting

The proposed project site is located within central Orange County, California. The proposed project site is within the Central Subregion of the Orange County Central & Coastal Subregions Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Although the proposed project site is located within the NCCP/HCP Reserve (**Figure 3.3-1**), the existing reservoir is not actually within the NCCP/HCP Reserve; rather, it is surrounded by it. Significant regional geographic features around the area include the Santa Ana Mountains to the northeast, the Tustin plain and the City of Irvine to the north and southwest. The proposed project site is within the Newport Bay watershed. The climate in the region is Mediterranean, with dry summers and moderately wet winters; however, the region has experienced severe drought conditions in recent years.

The proposed project site was previously part of the Irvine Ranch and was subject to disturbance in the 1940s for planting of orchards and construction of the reservoir to provide irrigation for agricultural uses. In the 1970s, agriculture was expanded within the eastern and northern portions of the project site, mainly for citrus orchards. Following construction of the dam, impounded water accumulated from direct runoff from the Highline Canal. Currently within the proposed project site, a portion of the Highline Canal conveys recycled water flows from IRWD's Rattlesnake Reservoir into Syphon Reservoir. The Highline Canal, located southwest of the Syphon Reservoir, was historically used for irrigation but has been abandoned. Additionally, a culvert inlet in the northeast portion of the project site conveys stormwater runoff from a portion of the open space area east of the reservoir (under SR-133 and SR-241), and multiple culverts within the project site drain the upland portions of the reservoir. The central drainage supports riparian habitat and conveys intermittent flow through the center of the project site to the reservoir. With the exception of limited seasonal inflows from rain events, IRWD controls all flows in and out of the reservoir, as part of their recycled water storage and management. The reservoir currently drains through a series of underground pipes that convey flows through a strainer and chlorination facility, before being distributed to customers through IRWD's recycled water system.



SOURCE: ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 3.3-1
Project Site Location within NCCP/HCP

ESA

Between 1995 and 2000, approximately 102 acres of the project site were preserved and 112 acres were restored to native coastal sage scrub habitat as mitigation for the Transportation Corridor Agencies (TCA) Eastern Transportation Corridor Project's impacts to coastal California gnatcatcher (*Polioptila californica californica*). Restoration activities involved removal of orchard trees, native coastal sage scrub planting, temporary irrigation, and monitoring. The revegetation was successfully completed in accordance with regulatory requirements and supported mature coastal sage scrub suitable for California gnatcatcher (Dudek 2012). When IRWD acquired Syphon Reservoir from the Irvine Company (TIC), the Conveyance Agreement included a Grant Deed with use restrictions to protect biological resources within the area that was used for mitigation for the TCA (as shown in Figure 3.3-1).

Since completion of the restoration program in 2000, on-site management of biological resources was limited to annual cowbird trapping (which is required in perpetuity) and few additional studies, including a cactus transplantation and subsequent cactus wren monitoring in the northwest portion of the property. In October 2007, the entire project site burned in the Santiago Fire and was in post-fire succession through 2020 (Dudek 2012). The proposed project site supports native vegetation communities, restored coastal sage scrub, and some disturbed communities.

The majority of the proposed project site was burned again in the October 2020 Silverado Fire, and much of the vegetation on-site was destroyed by the fire. However, since native natural communities such as coastal sage scrub are adapted to fire, it is anticipated most of the vegetation should regrow to pre-fire conditions or similar, though it is possible the habitat quality may be degraded by opportunistic non-native invasive plant species. To provide a conservative assessment, this analysis presents the biological conditions at the time the Notice of Preparation (NOP) was published and analyzes proposed project impacts against those conditions.

Topography

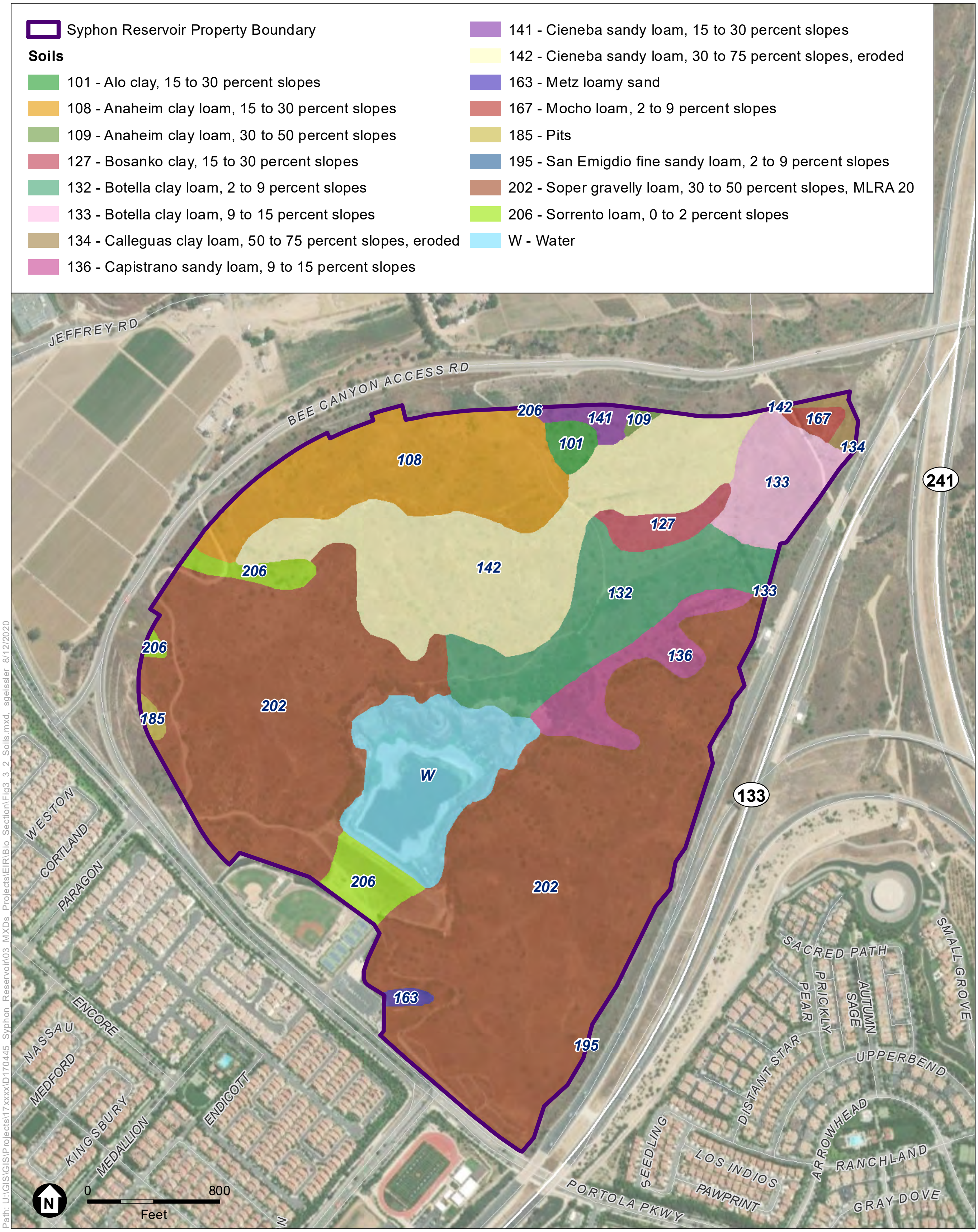
The proposed project site is characterized by steep topography of rolling hills, ridgelines and terraced slopes (from previous agricultural activities) surrounding the reservoir in the center of the project site. Within the project site, elevations range from 326 to 654 feet (99 to 200 meters) above mean sea level.

Soils

Based on review of the Natural Resources Conservation Service (NRCS) *Web Soil Survey* (2018), the proposed project site contains 16 soil series (**Figure 3.3-2**). The following is a brief description of mapped soils within the project site.

Alo Clay

Alo clay, 15 to 30 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay in the first 22 inches, and weathered bedrock from 22 to 59 inches. Alo clay loam is not considered hydric by the NRCS.



SOURCE: ESRI, 2016; USDA, 2018

Syphon Reservoir Improvement Project

Figure 3.3-2
Soils

ESA

Anaheim Clay Loam

Anaheim clay loam, 15 to 30 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay loam in the first 26 inches, and weathered bedrock from 26 to 59 inches. Anaheim clay loam is not considered hydric by the NRCS.

Anaheim clay loam, 30 to 50 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay loam in the first 26 inches, and bedrock from 26 to 59 inches. Anaheim clay loam is not considered hydric by the NRCS.

Bosanko Clay

Bosanko clay, 15 to 30 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is slightly alkaline to moderately acidic. The profile consists of clay in the first 31 inches, and weathered bedrock from 31 to 59 inches. Bosanko clay is not considered hydric by the NRCS.

Botella Clay Loam

Botella clay loam, 2 to 9 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is slightly alkaline to moderately acidic. The profile consists of clay loam in the first 8 inches, silty clay loam between 8 and 35 inches, and clay loam from 35 to 66 inches. Botella clay loam is not considered hydric by the NRCS.

Botella clay loam, 9 to 15 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay loam in the first 8 inches, silty clay loam between 8 and 35 inches, and sandy clay loam from 35 to 66 inches. Botella clay loam is not considered hydric by the NRCS.

Calleguas Clay Loam

Calleguas clay loam, 50 to 75 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay loam in the first 11 inches, very channery clay loam between 11 and 15 inches, and bedrock from 15 to 42 inches. Calleguas clay loam is not considered hydric by the NRCS.

Capistrano Sandy Loam

Capistrano sandy loam, 9 to 15 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is neutral to medium acidic. The profile consists of sandy loam in the first 27 inches and fine sandy loam between 27 and 65 inches. Capistrano sandy loam is not considered hydric by the NRCS.

Cieneba Sandy Loam

Cieneba sandy loam, 15 to 30 percent slopes, is a somewhat excessively-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of sandy loam in the first 17 inches, and weathered bedrock from 17 to 59 inches. Cieneba sandy loam is not considered hydric by the NRCS.

Cieneba sandy loam, 30 to 75 percent slopes, is a somewhat excessively drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is neutral to strongly acidic. The profile consists of sandy loam in the first 17 inches and weathered bedrock between 17 and 59 inches. Cieneba sandy loam is not considered hydric by the NRCS.

Metz Loamy Sand

Metz loamy sand is a somewhat excessively-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of loamy sand in the first 17 inches, and stratified sand to fine sandy loam from 17 to 63 inches. Metz loamy sand is not considered hydric by the NRCS.

Mocho Loam

Mocho loam, 2 to 9 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of loam in the first 60 inches. Mocho loam is not considered hydric by the NRCS.

Pits

Pits consist of concave igneous, metamorphic, and sedimentary rock. The profile consists of extremely gravelly coarse sand in the first 6 inches, and extremely gravelly sand, extremely gravelly coarse sand, or very gravelly coarse sand from 6 to 60 inches. Pits are not considered hydric by the NRCS.

San Emigdio Fine Sandy Loam

San Emigdio fine sandy loam, 2 to 9 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of fine sandy loam in the first 7 inches, and stratified gravelly loamy coarse sand to fine sandy loam from 7 to 61 inches. San Emigdio fine sandy loam is not considered hydric by the NRCS.

Soper Gravelly Loam

Soper gravelly loam**,** 30 to 50 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is mildly alkaline to slightly acidic. The profile consists of gravelly loam in the first 8 inches, gravelly clay loam between 8 and 29 inches, and bedrock from 29 to 79 inches. Soper gravelly loam is not considered hydric by the NRCS.

Sorrento Loam

Sorrento loam, 0 to 2 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of loam in the first 12 inches, silty clay loam between 12 and 62 inches, and sandy loam from 62 to 72 inches. Sorrento loam is not considered hydric by the NRCS.

Natural Communities

The upland parts of the proposed project site primarily exhibit forms of coastal sage scrub and non-native herbaceous communities with variable levels of native versus non-native plant species cover. The most prevalent forms include the California sagebrush alliance and non-native herbaceous cover/California sagebrush alliance (i.e., communities intermixed with both native and non-native species) in the upland areas. Woody riparian vegetation (e.g., arroyo willow and mule fat) and patches of tules (i.e., a form of freshwater marsh habitat dominated by cat tails and bulrushes) occur around the fringe of the existing reservoir in areas that are frequently inundated.

Natural communities are mapped in **Figure 3.3-3**. The natural communities are described below according to the *Methods Used to Survey the Vegetation of Orange County Parks and Open Space Areas and The Irvine Company Property* (Jones & Stokes Associates 1993), *Orange County Habitat Classification System* (OCHCS) (Gray and Bramlet 1992) and California natural alliances described in *A Manual of California Vegetation, Second Edition* (Sawyer et al. 2009). Acreages of each natural community in the proposed project site are summarized in **Table 3.3-1**. Alternate names for communities are indicated in parentheses. Natural communities considered that are identified as sensitive on the California Natural Community List (California Department of Fish and Wildlife [CDFW] 2019b) are also noted as such.

Arroyo Willow Thicket

Arroyo willow thicket (i.e., *Salix lasiolepis* Shrubland Alliance or Arroyo Willow Riparian Forest [OCHCS 7.6]) is characterized by a canopy cover dominated by mature arroyo willow (*Salix lasiolepis*) with an understory of smaller willows, and variable herbaceous layer. This alliance is typically found within stream banks and benches, slope seeps, and stringers along drainages (Sawyer et al. 2009). A total of 0.24 acre of arroyo willow thicket occurs primarily within the northern and northeastern portions of the proposed project site.

Arroyo willow thicket is considered a sensitive natural community by CDFW (61.201.01 – *Salix lasiolepis*) (CDFW 2019b).

Black Willow Thicket

Black willow thicket (i.e., *Salix gooddingii* Woodland Alliance or Black Willow Riparian Forest [OCHCS 7.7]) is characterized by a canopy cover dominated by mature black willow (*Salix gooddingii*) with an understory of smaller willows, mule fat (*Baccharis salicifolia*), and variable herbaceous layer. This alliance is typically found on terraces along large rivers, canyons, and along rocky floodplains of small, intermittent streams, seeps, and springs (Sawyer et al. 2009). Species associated with this alliance include native arroyo willow and non-native tamarisk (*Tamarix ramosissima*) and red gum (*Eucalyptus camaldulensis*). A total of 4.13 acres of black willow thicket was mapped around the northern and northeastern perimeter of the reservoir within the center of the proposed project site.

Black willow thicket is considered a sensitive natural community by CDFW (61.211.01 – *Salix gooddingii*) (CDFW 2019b).

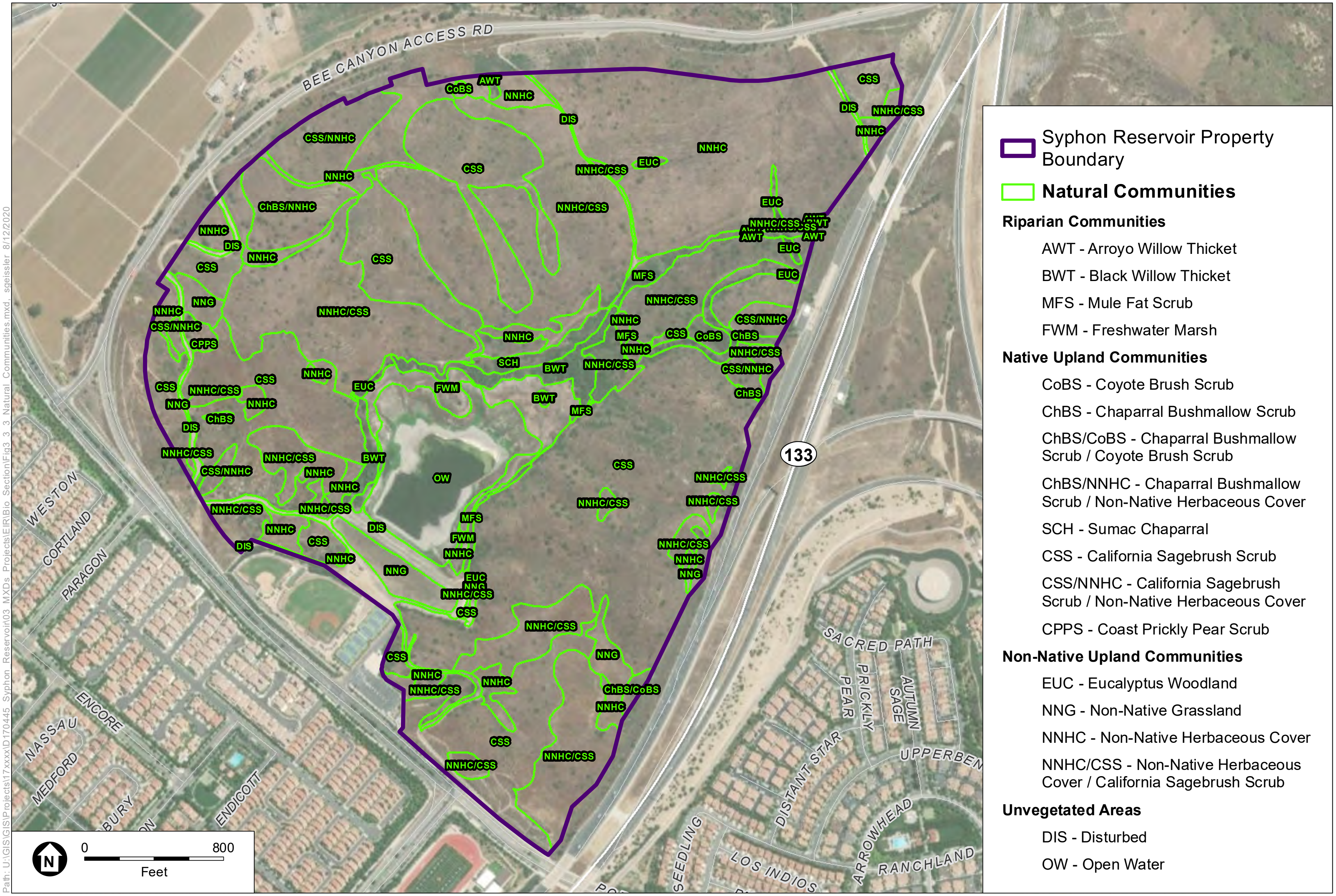
TABLE 3.3-1
NATURAL COMMUNITIES

Natural Community	Acres	State Rank[1]
Riparian Communities		
Arroyo Willow Thicket*	0.24	S4
Black Willow Thicket*	4.13	S3
Mule Fat Scrub	2.25	S4
Freshwater Marsh	5.87	S4
Native Upland Communities		
Coyote Brush Scrub**	0.91	S5
Chaparral Bushmallow Scrub**	0.45	S4
Chaparral Bushmallow Scrub/Coyote Brush Scrub**	0.49	S4/S5
Chaparral Bushmallow Scrub/Non-Native Herbaceous Cover**	4.72	S4/None
Sumac Chaparral	1.63	S4
California Sagebrush Scrub**	91.74	S5
California Sagebrush Scrub**/Non-Native Herbaceous Cover	7.86	S5/None
Coast Prickly Pear Scrub*	0.69	S3
Non-Native Upland Communities		
Eucalyptus Woodland	2.78	None
Non-Native Grassland	5.27	None
Non-Native Herbaceous Cover	44.16	None
Non-Native Herbaceous Cover/California Sagebrush Scrub**	71.70	None/S5
Unvegetated Areas		
Open Water	13.93	None
Disturbed	6.92	None
Total	**265.74**	

* Asterisk indicates that an alliance/association is considered sensitive by CDFW.

** Double asterisk indicates that an alliance/association that is a covered habitat type under the NCCP/HCP and is therefore considered a sensitive natural community.

1 CDFW state rank denotes the rarity of a natural type within the state as follows:
S1 = Critically Imperiled – At very high risk of extirpation due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
S2 = Imperiled – At high risk of extirpation due to restricted range,
few populations or occurrences, steep declines, severe threats, or other factors.
S3 = Vulnerable – At moderate risk of extirpation due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4 = Apparently Secure – At a fairly low risk of extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5 = Secure - At very low or no risk of extirpation due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-3
Natural Communities

ESA

Mule Fat Scrub

Mule fat scrub (i.e., mulefat thickets [*Baccharis salicifolia* Shrubland Alliance]; OCHCS 7.3) is characterized by large shrub cover dominated by mule fat and variable herbaceous layer. This alliance is typically found within canyon bottoms, floodplains, lake margins, and stream channels with soils of mixed alluvium (Sawyer et al. 2009). Species associated with this alliance include native black willow, California sagebrush (*Artemisia californica*), laurel sumac (*Malosma laurina*), cocklebur (*Xanthium strumarium*), and non-native Spanish false fleabane (*Pulicaria paludosa*), and black mustard (*Brassica nigra*). A total of 2.25 acres of black willow thicket were mapped around the northern and northeastern perimeter of the reservoir within the center of the proposed project site.

Mule fat scrub is not considered a sensitive natural community by CDFW (63.510.01 – *Baccharis salicifolia*) (CDFW 2019b).

Freshwater Marsh

Freshwater marsh (i.e., California Bulrush Marsh [*Schoenoplectus californicus* Herbaceous Alliance]; OCHCS 6.4) is characterized by a dominance of dense stands of California bulrush (*Schoenoplectus californicus*) in the herbaceous layer. This alliance is typically found within freshwater or brackish marshes, shores, bars, and channels of river mouth estuaries, within areas with soils that have a high organic contents and are poorly aerated (Sawyer et al. 2009). Dried cattails (*Typha* sp.) were also observed within this alliance. A total of 5.87 acres of freshwater marsh occur around the northern and northeastern perimeter of the reservoir in the center of the proposed project site.

Freshwater marsh is not considered a sensitive natural community by CDFW (52.114.02 – *Schoenoplectus californicus*) (CDFW 2019b).

Coyote Brush Scrub

Coyote brush scrub (i.e., *Baccharis pilularis* Shrubland Alliance; Coyote Brush [OCHCS 2.3.9]) is characterized by a dominance of coyote brush (*Baccharis pilularis*) in the shrub layer. This alliance is typically found within river mouths, stream sides, terraces, open slopes, and ridges, within variable soils (Sawyer et al. 2009). A total of 0.91 acre of coyote brush scrub was mapped around the northern and northeastern portions of the proposed project site.

Coyote brush scrub is not considered a sensitive natural community by CDFW (32.060.23 – *Baccharis pilularis*) (CDFW 2019b).

Chaparral Bushmallow Scrub

Chaparral bushmallow scrub (i.e., bush mallow scrub [*Malacothamnus fasciculatus* Shrubland Alliance]; Bush Mallow [OCHCS 2.3.11]) is dominated by chaparral bushmallow (*Malacothamnus fasciculatus*) in the shrub layer. This alliance is typically found within gentle to very steep slopes of variable aspect within loam or clay soils (Sawyer et al. 2009). Species associated with this alliance include native laurel sumac, California brittlebush (*Encelia californica*), California matchweed (*Gutierrezia californica*), giant wild rye (*Elymus condensatus*), and non-native short-podded mustard (*Hirschfeldia incana*). A total of 0.45 acre of chaparral bushmallow scrub was mapped around the northeastern and western portions of the proposed project site.

Chaparral bushmallow scrub is not considered a sensitive natural community by CDFW (45.450.01 – *Malacothamnus fasciculatus*) (CDFW 2019b).

Chaparral Bushmallow Scrub/Coyote Brush Scrub

Chaparral bushmallow scrub/coyote brush scrub (OCHCS 2.3.11/2.3.9) is characterized by a shrub layer with a dominance of chaparral bushmallow and a sub-dominance of coyote brush. A total of 0.49 acre of chaparral bushmallow scrub/coyote brush scrub was mapped in the southern portion of the proposed project site.

Chaparral bushmallow scrub/coyote brush scrub is not considered a sensitive natural community by CDFW (45.450.01 – *Malacothamnus fasciculatus*/32.060.23 – *Baccharis pilularis*) (CDFW 2019b).

Chaparral Bushmallow Scrub/Non-Native Herbaceous Cover

Chaparral bushmallow scrub/non-native herbaceous cover (OCHCS 2.3.11; *Brassica (nigra)* and Other Mustards [Semi-Natural Herbaceous Stand]; Ruderal [OCHCS 4.6]) is characterized by a shrub layer with a dominance of chaparral bushmallow and a sub-dominance of non-native herbaceous cover. A total of 4.72 acres of chaparral bushmallow scrub/non-native herbaceous cover were mapped in the western portion of the proposed project site.

Chaparral bushmallow scrub/non-native herbaceous cover is not considered a sensitive natural community by CDFW (45.450.01 – *Malacothamnus fasciculatus*) (CDFW 2019b).

Sumac Chaparral

Sumac chaparral (i.e., *Malosma laurina* Shrubland Alliance; Toyon-Sumac [OCHCS 3.12]) is characterized by large shrub cover dominated by laurel sumac with a variable understory of coastal sage scrub species and/or herbaceous grassy layer. This alliance is typically found on slopes, which are often steep, within soils that are shallow and fine-textured (Sawyer et al. 2009). Species associated with this alliance include native California sagebrush. A total of 1.63 acres of sumac chaparral were mapped throughout the eastern portion of the proposed project site.

Sumac chaparral is not considered a sensitive natural community by CDFW (45.455.01 – *Malosma laurina*) (CDFW 2019b).

California Sagebrush Scrub

California sagebrush scrub (i.e., *Artemisia californica* Shrubland Alliance; Sagebrush [OCHCS 2.3.6]) is characterized by a dominance of by California sagebrush intermixed with coastal sage scrub species and a variable herbaceous layer. This alliance is typically found on slopes that are usually steep and rarely flooded within soils that are alluvial or colluvial derived shallow (Sawyer et al. 2009). Species associated with this alliance include native California buckwheat (*Eriogonum fasciculatum*), laurel sumac, California brittle bush, California matchweed, deerweed (*Acmispon* *glaber*), lemonadeberry (*Rhus integrifolia*), chaparral bushmallow, coast live oak (*Quercus agrifolia*), toyon (*Heteromeles arbutifolia*), Island false bindweed (*Calystegia macrostegia*), foothill needlegrass (*Stipa lepida*), black sage (*Salvia mellifera*), white sage (*Salvia apiana*), soap plant (*Chlorogalum pomeridianum*), prickly pear (*Opuntia littoralis*), common goldenstar (*Bloomeria crocea*), false rosinweed (*Osmadenia tenella*), California plantain (*Plantago erecta*), and Ladies' tobacco (*Pseudognaphalium californicum*), and non-native black mustard, foxtail chess (*Bromus madritensis*), Mexican fan palm (*Washingtonia robusta*), giant yucca (*Yucca gigantea*), oleander (*Nerium oleander*), Chinese elm (*Ulmus parvifolia*), and fountaingrass (*Pennisetum setaceum*). A total of 91.74 acres of California sagebrush scrub occurs throughout the proposed project site.

California sagebrush scrub is not considered a sensitive natural community by CDFW (32.010.01 – *Artemisia californica*) (CDFW 2019b). However, this alliance is recognized as a covered habitat type within the Central & Coastal NCCP/HCP, and is therefore considered a sensitive natural community.

California Sagebrush Scrub/Non-Native Herbaceous Cover

California sagebrush scrub/non-native herbaceous cover (i.e., *Artemisia californica* Shrubland Alliance; Sagebrush [OCHCS 2.3.6]; *Brassica (nigra)* and Other Mustards [Semi-Natural Herbaceous Stand]; Ruderal [OCHCS 4.6]) is characterized by a dominance of California sagebrush intermixed with a sub-dominance of non-native herbaceous cover primarily comprised of black mustard. Species associated with this alliance include native California buckwheat, chaparral bushmallow, fascicled tarweed (*Deinandra fasciculata*), black sage, prickly pear, splendid mariposa lily (*Calochortus spendens*), wishbone bush (*Mirabilis laevis*), golden yarrow (*Eriophyllum confertiflorum*), and non-native tocalote (*Centaurea melitensis*), slender oat (*Avena barbata*), Australian saltbush (*Atriplex semibaccata*). A total of 7.86 acres of California sagebrush scrub/non-native herbaceous cover occurs throughout the proposed project site.

California sagebrush scrub/non-native herbaceous cover is not considered a sensitive natural community by CDFW (32.010.01 – *Artemisia californica*) (CDFW 2019b). However, this alliance is recognized as a covered habitat type within the Central & Coastal NCCP/HCP, and is therefore considered a sensitive natural community.

Coast Prickly Pear Scrub

Coast prickly pear scrub (i.e., *Opuntia littoralis* Shrubland Alliance; Southern Cactus [OCHCS 2.4]) is characterized by a dominance of by prickly pear intermixed with coastal sage scrub species. This alliance is typically found on south-facing slopes within soils that are shallow loams and clays that may be rocky (Sawyer et al. 2009). Species associated with this alliance include native laurel sumac, lemonadeberry, California sagebrush, California buckwheat, deerweed, blue elderberry (*Sambucus nigra* ssp. *caerulea*), and non-native fountaingrass and tree tobacco (*Nicotiana glauca*). A total of 0.69 acre of coast prickly pear scrub occurs within the western portion of the proposed project site.

Coast prickly pear scrub is considered a sensitive natural community by CDFW (32.150.02 – *Opuntia littoralis* – mixed coastal sage scrub) (CDFW 2019b).

Eucalyptus Woodland

Eucalyptus woodland (i.e., eucalyptus groves [*Eucalyptus* Semi-Natural Woodland Stands]; Ornamental Landscaping [OCHCS 15.5]) is dominated of by planted rows of gum trees. Associated species include native coyote brush and laurel sumac. A total of 2.78 acres of eucalyptus woodland occurs within the central and northeastern portion of the proposed project site.

Eucalyptus woodland is not considered a sensitive natural community by CDFW (CDFW 2019b).

Non-Native Grassland

Non-native grassland (i.e., *Bromus madritensis* [Semi-Natural Herbaceous Stands]; Annual [OCHCS 4.1]) is dominated of by foxtail chess with a mix of non-native and native grasses and forbs. Species associated with this alliance include native telegraph weed (*Heterotheca grandiflora*), Island false bindweed, California buckwheat, deerweed, Menzies' goldenbush (*Isocoma menziesii* var. *menziesii*), blue elderberry, prickly pear, fiddleneck (*Amsinckia* sp.), and non-native red-stemmed filaree (*Erodium cicutarium*), Russian thistle (*Salsola tragus*), castor bean (*Ricinus communis*), and fountaingrass. A total of 5.27 acres of non-native grassland occurs within the southern portion of the proposed project site.

Non-native grassland is not considered a sensitive natural community by CDFW (CDFW 2019b).

Non-Native Herbaceous Cover

Non-native herbaceous cover (i.e., *Brassica (nigra)* and other mustard species [Semi-Natural Herbaceous Stand]; Ruderal [OCHCS 4.6]) is characterized by a dominance of by black mustard. This alliance is typically associated with fallow fields, grasslands, roadsides, disturbed scrublands, riparian areas, and waste places (Sawyer et al. 2009). Species associated with this alliance include native telegraph weed, laurel sumac, fascicled tarweed, Our Lord’s candle (*Hesperoyucca whipplei*), foothill needlegrass, mule fat, western prickly pear (*Opuntia occidentalis*), and non-native foxtail chess, Peruvian pepper (*Schinus molle*), ripgut brome (*Bromus diandrus*), horehound (*Marrubium vulgare*), and tuna cactus (*Opuntia ficus-indica*). A total of 44.16 acres of non-native herbaceous cover coast occurs throughout the proposed project site.

Non-native herbaceous cover is not considered a sensitive natural community by CDFW (CDFW 2019b).

Non-Native Herbaceous Cover/California Sagebrush Scrub

Non-native herbaceous cover/California sagebrush scrub (i.e., *Brassica (nigra)* and Other Mustards [Semi-Natural Herbaceous Stand]; Ruderal [OCHCS 4.6]; *Artemisia californica* Shrubland Alliance; Sagebrush [OCHCS 2.3.6]) is dominated by black mustard with a sub-dominance of intermixed coastal sage scrub species. A total of 71.70 acres of non-native herbaceous cover/California sagebrush scrub coast occurs throughout the proposed project site.

Non-native herbaceous cover/California sagebrush scrub is not considered a sensitive natural community by CDFW (CDFW 2019b). Although California sagebrush scrub is recognized as a covered habitat type within the Central & Coastal NCCP/HCP and is considered to have value to covered species in that context, this non-native herbaceous cover/California sagebrush scrub community is predominantly disturbed and dominated by non-native herbaceous cover; thus, it is not considered a sensitive natural community.

Open Water

Open water (OCHCS 12.2) consists of the reservoir, and natural vegetation present within this area is negligible. A total of 13.93 acres of open water occurs within the proposed project site.

Open water is not considered a sensitive natural community by CDFW (CDFW 2019b).

Disturbed

Disturbed (i.e., Disturbed or Barren [OCHCS 16.1]) includes lands that have been significantly disturbed as the result of human activity, and natural vegetation is very sparse or absent from these areas. Associated species found occasionally may include non-native foxtail chess, short-podded mustard, yellow sweetclover (*Melilotus officinalis*), Mexican sprangletop (*Leptochloa fusca* ssp. *uninervia*), fountaingrass, tree tobacco, red-stemmed filaree, and Mediterranean grass (*Schismus barbatus*). Disturbed areas within the project site include unpaved dirt trails that provide access around the perimeter of the reservoir and also include the earthen dam which is actively maintained to limit any vegetation from becoming established. A total of 6.92 acres of disturbed areas occur within the proposed project site.

Disturbed areas are not considered a sensitive natural community by CDFW (CDFW 2019b).

Jurisdictional Resources

The U.S. Army Corps of Engineers (USACE) issued an Approved Jurisdictional Determination letter (Appendix C), which confirmed the determination that waters of the U.S. do not occur within the proposed project site since Syphon Reservoir is an intrastate isolated water with no apparent interstate or foreign commerce connection (USACE 2018). Thus, the proposed project site only includes features potentially subject to the jurisdiction of the State (i.e., Regional Water Quality Control Board [RWQCB] wetlands and non-wetland waters of the State, and CDFW lakes, streams, and associated vegetation). **Table 3.3-2** and **Figures 3.3-4A and 3.3-4B** identify and quantify the areas regulated by the RWQCB and CDFW within the project site.

TABLE 3.3-2
POTENTIALLY JURISDICTIONAL AREAS

Jurisdiction Types	Acres
RWQCB Wetlands	4.33
RWQCB Non-Wetland Waters of the State	13.95
CDFW Lakes, Streams, and Associated Vegetation	26.55

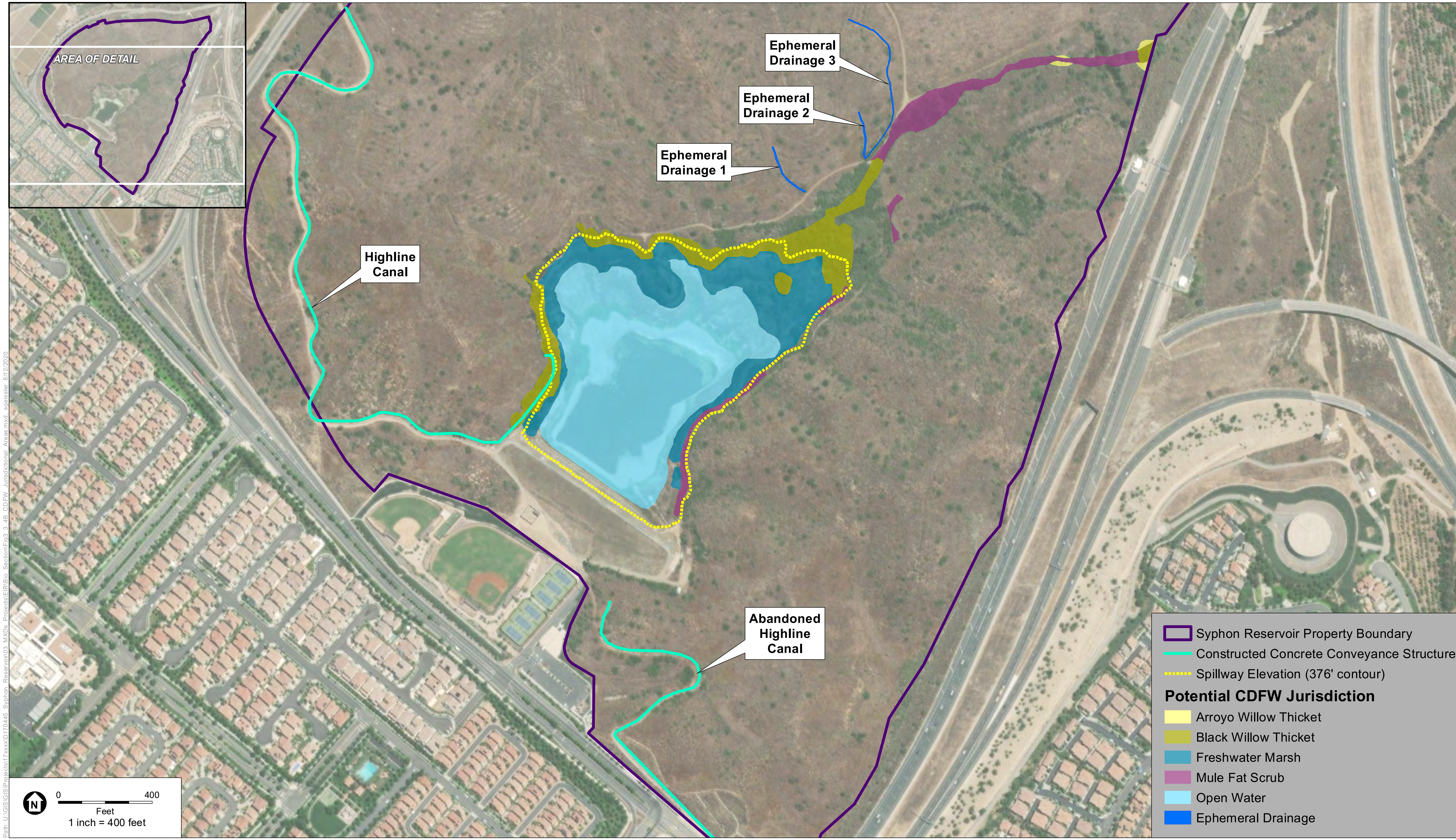
SOURCE: ESA, 2018

SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-4A
RWQCB Jurisdictional Areas

ESA



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-4B
CDFW Jurisdictional Areas

ESA

RWQCB Wetlands and Waters of the State

Wetlands

The freshwater wetlands within the proposed project site are largely dominated by native plant species including California bulrush (OBL[1]), black willow (FACW[2]), and yellow sweetclover (*Melilotus officinalis*, FACU[3]). This habitat also supports a range of non-native plant species including seaside heliotrope (*Heliotropium curassavicum*, FACU), spiny cocklebur (*Xanthium strumarium*, FAC), short-podded mustard (UPL[4]), and telegraph weed (UPL). The wetlands occur along the margins of Syphon Reservoir (Figure 3.3-4A). Although not mapped as hydric soils according to NRCS, hydric soil indicators were observed in the wetlands include the presence of muck, hydrogen sulfide, depleted below dark surface, redox dark surface, and sandy gleyed matrix. The wetland areas generally had very silty loam, clay soils, while sandy soils were encountered at one soil pit. Indicators of wetland hydrology include a high water table, saturation, biotic crust, and hydrogen sulfide odor.

Waters of the State

The ordinary high-water mark (OHWM) of the reservoir was determined to be along the edge of the reservoir where surface water was observed at the time of the delineation, or based on physical characteristics of water fluctuation, such as downed emergent vegetation (Figure 3.3-4A). The water surface elevation of the reservoir is influenced by IRWD's management of the recycled water system. The reservoir functions as a seasonal recycled water storage facility; as such, the reservoir includes areas where open water persists throughout the year at a minimum water surface elevation but fluctuates seasonally up to a maximum water surface elevation based on demands for recycled water. The reservoir captures runoff from adjacent areas, including a primary drainage in the central portion of the project site that supports intermittent flows and riparian vegetation north of the reservoir and wetlands. However, there was no OHWM observed in this central drainage and the primary drainage was not mapped as potential waters of the State.

In addition, two ephemeral drainages (Ephemeral Drainage 1 and Ephemeral Drainage 2) were mapped north of the reservoir. These drainages convey stormwater runoff from upland areas to the central drainage via a culvert under the existing dirt road that runs along the west and north sides of the reservoir. The OHWM was an average of two feet wide, based on evidence of shelving. Ephemeral Drainage 1 supports a mix of non-native herbaceous cover and California sagebrush scrub, while Ephemeral Drainage 2 supports a mix of non-native herbaceous cover, California sagebrush scrub, and laurel sumac scrub. No surface water was observed in either drainage.

---

1 OBL – obligate. Plant species with this wetland indicator status occur almost always under natural conditions in wetlands.

2 FACW – facultative wetland. Plant species with this wetland indicator status usually occur in wetlands but are occasionally found in non-wetlands.

3 FACU – facultative upland. Plant species with this wetland indicator status usually occur in non-wetlands but are occasionally found in wetlands.

4 UPL – upland. Plant species with this wetland indicator status occur in wetlands in another region, but occur almost always under natural conditions in non-wetlands in the Arid West Region.

CDFW Lakes, Streams, and Associated Vegetation

Areas within CDFW jurisdiction typically refer to streambeds and associated wetland or riparian vegetation. Within the proposed project site, the potential extent of CDFW limits was taken to the outer edge of the overhanging riparian or wetland vegetation adjacent to the reservoir, and to the top of bank for the ephemeral drainages (Figure 3.3-4B). Therefore, as shown in Table 3.3-2, approximately 26.55 acres of the proposed project site are deemed to be subject to CDFW jurisdiction.

Plant Species

The proposed project site currently supports native vegetation communities, restored coastal sage scrub, and natural communities that are moderately to substantially dominated by non-native species. A compendium of the plant species observed within the proposed project site is included in Appendix C. Special-status plant species are discussed in Section 3.3.8.2.

Wildlife Species

The upland and riparian communities within the proposed project site provide suitable habitat for a variety of wildlife species including reptiles, birds, and mammals, and many species were observed during surveys conducted in the project site. A compendium of the wildlife species observed within the proposed project site is included in Appendix C. Special-status wildlife species are discussed in Section 3.3.8.2.

Special-Status Biological Resources

Sensitive Natural Communities

Sensitive natural communities are designated as such by various resource agencies, such as the CDFW, or in local policies and regulations. These communities are generally considered to have important functions or values for wildlife and/or are recognized as declining in extent or distribution and may be considered threatened enough to warrant some level of protection. Sensitive natural communities include those that are identified in the CDFW *California Natural Community List* (CDFW 2019b). The CDFW state rank denotes the rarity and endangerment of a vegetation type within the state as described below, with S1 through S3 considered to be a sensitive natural community by CDFW.

State Conservation Rank

S1 = Critically Imperiled – At very high risk of extirpation due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.

S2 = Imperiled – At high risk of extirpation due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

S3 = Vulnerable – At moderate risk of extirpation due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

S4 = Apparently Secure – At a fairly low risk of extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.

S5 = Secure - At very low or no risk of extirpation due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

Based on the state ranks, ten sensitive natural communities occur within the proposed project site: arroyo willow thicket, black willow thicket, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/coyote brush scrub, chaparral bushmallow scrub/non-native herbaceous cover, California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coast prickly pear scrub, and non-native herbaceous cover/California sagebrush scrub (**Figure 3.3-5**).

Special-Status Species

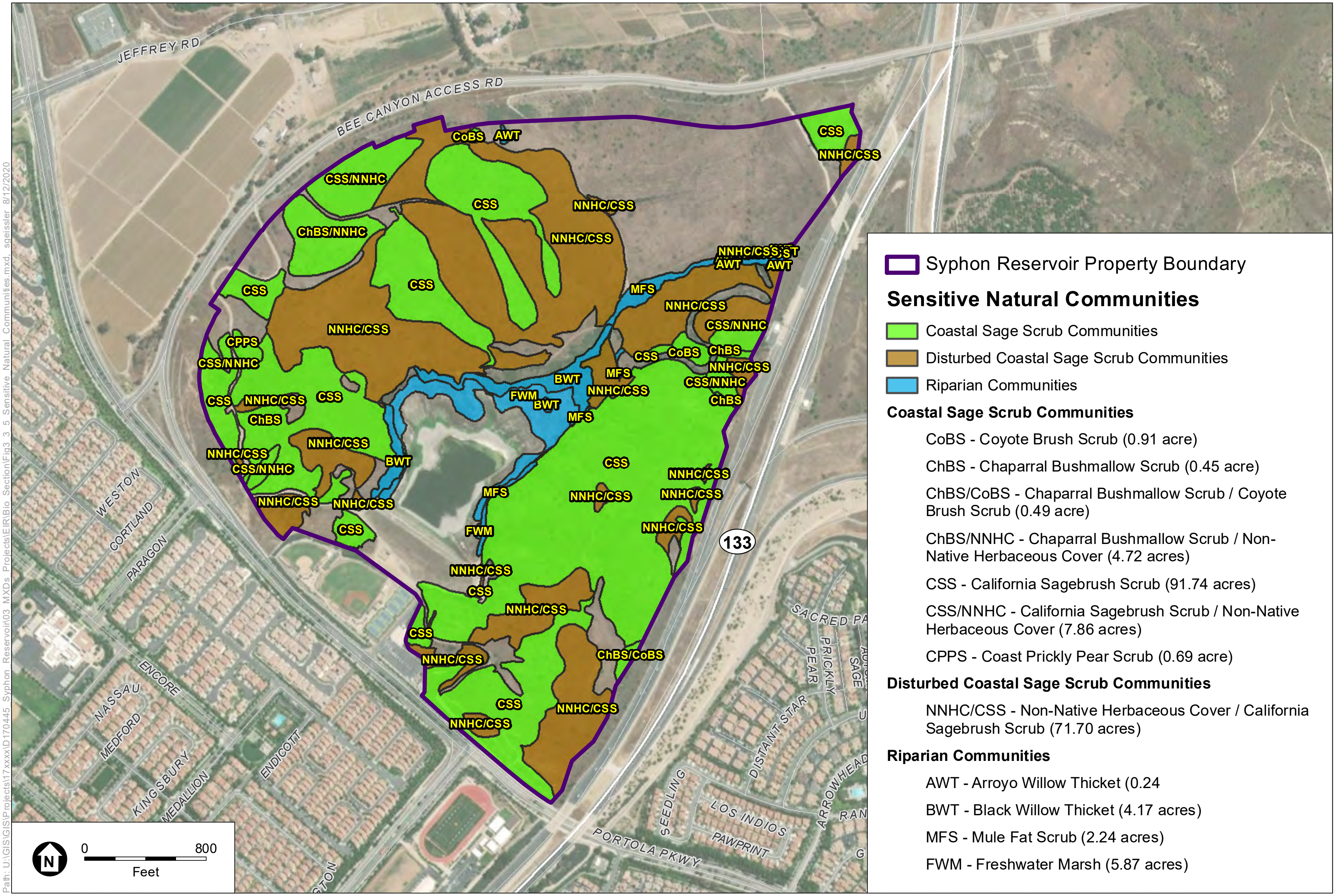
"Special-status" species are plants and animals that are listed under the California Endangered Species Act (CESA) or Federal Endangered Species Act (FESA), as well as species protected under other regulations and species that are considered sufficiently rare or sensitive by the scientific community to be considered rare. Special-status species are categorized as follows:

- Species listed or proposed for listing as threatened or endangered, or designated as candidates for possible future listing as threatened or endangered, under CESA or FESA.
- Species protected under the federal Bald and Golden Eagle Protection Act.
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines § 15380).
- Plants designated as rare or endangered in accordance with the California Native Plant Protection Act (NPPA) (Fish and Game Code § 1900 et seq.).
- Plants considered by the CDFW and California Native Plant Society (CNPS) to be rare (California Rare Plant Ranks [CRPR] 1A, 1B, 2A, and 2B) in California.
- Species covered under an adopted Natural Community Conservation Plan (NCCP)/Habitat Conservation Plan (HCP).
- Species identified by CDFW and designated as Special Animals, including wildlife species designated as species of special concern in California (SC).
- Wildlife species listed as fully protected in California (California Fish and Game Code § 3511, 4700, and 5050).

Based on the literature review and field reconnaissance, special-status species were evaluated for their potential to occur within the proposed project site or immediate vicinity, using the following definitions:

Unlikely: The proposed project site or immediate vicinity do not support suitable habitat for a particular species, and therefore the species is unlikely to occur within the proposed project site.

Low Potential: The proposed project site or immediate vicinity only provide low-quality or very limited habitat for a particular species. In addition, the proposed project site may lie outside the known geographic or elevational range for a particular species.



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-5
Sensitive Natural Communities

ESA

Moderate Potential: The proposed project site or immediate vicinity provide suitable habitat for a particular species. However, the habitat or substrate may be limited or the desired vegetation assemblage or density is less than ideal.

High Potential: The proposed project site or immediate vicinity provides high-quality suitable habitat conditions for a particular species. Additionally, known populations of the species may occur in the project site or immediate vicinity.

Present: The species were observed within the proposed project site during relevant biological surveys or other project visits.

Based on the database search results, a list of potentially occurring special-status species was developed and evaluated for the study area. Special-status species with potential to occur were defined as those species whose geographic and elevational range include the project site and that require habitat similar to habitat present within the proposed project site or immediate vicinity.

Special-Status Plant Species

Of the 56 special-status plant species considered for their potential to occur within the proposed project site, 37 species are unlikely to occur and 15 species were assessed as having low potential to occur because the project site is outside of the known elevation range for these species and/or lacks suitable habitat to support these species. None of the special-status plant species with a low potential to occur were observed during focused surveys conducted in 2018 and 2019. Species determined to be unlikely or to have only a low potential to occur are included in Appendix C. These species are not discussed further in this analysis.

Four special-status plant species were observed within the proposed project site during focused surveys in 2018 and 2019, including Catalina mariposa lily (*Calochortus catalinae*) (CRPR 4.2, NCCP/HCP Covered), intermediate mariposa lily (*Calochortus weedii* var. *intermedius*) (CRPR 1B.2), multi-stemmed dudleya (*Dudleya multicaulis*) (CRPR 1B.2), and San Diego County viguiera (*Bahiopsis laciniata*) (CRPR 4.3).

Approximately 309 Catalina mariposa lily individuals were observed on-site in the western and southeastern portions of the proposed project site. This species was also observed on-site during previous surveys by Harmsworth Associates in 1998 (Dudek 2012). Approximately 19 intermediate mariposa lily individuals were observed on-site in the western portion of the proposed project site. Approximately 109 multi-stemmed dudleya above-ground specimens were observed on-site in the western portion of the project site. San Diego County viguiera was not noted by the California Natural Diversity Database (CNDDB) and CNPS database searches as a plant with potential to occur; however, one individual was observed on-site in the easternmost portion of the proposed project site.

Appendix C provides details of each special-status species, their habitat, and their potential to occur within the proposed project site. Special-status species noted in the U.S. Fish and Wildlife Service (USFWS) and CNDDB databases in the vicinity of the proposed project site are shown in **Figures 3.3-6A and 3.3-6B**. Special-status plant species observed on-site are shown in **Figure 3.3-7A**.

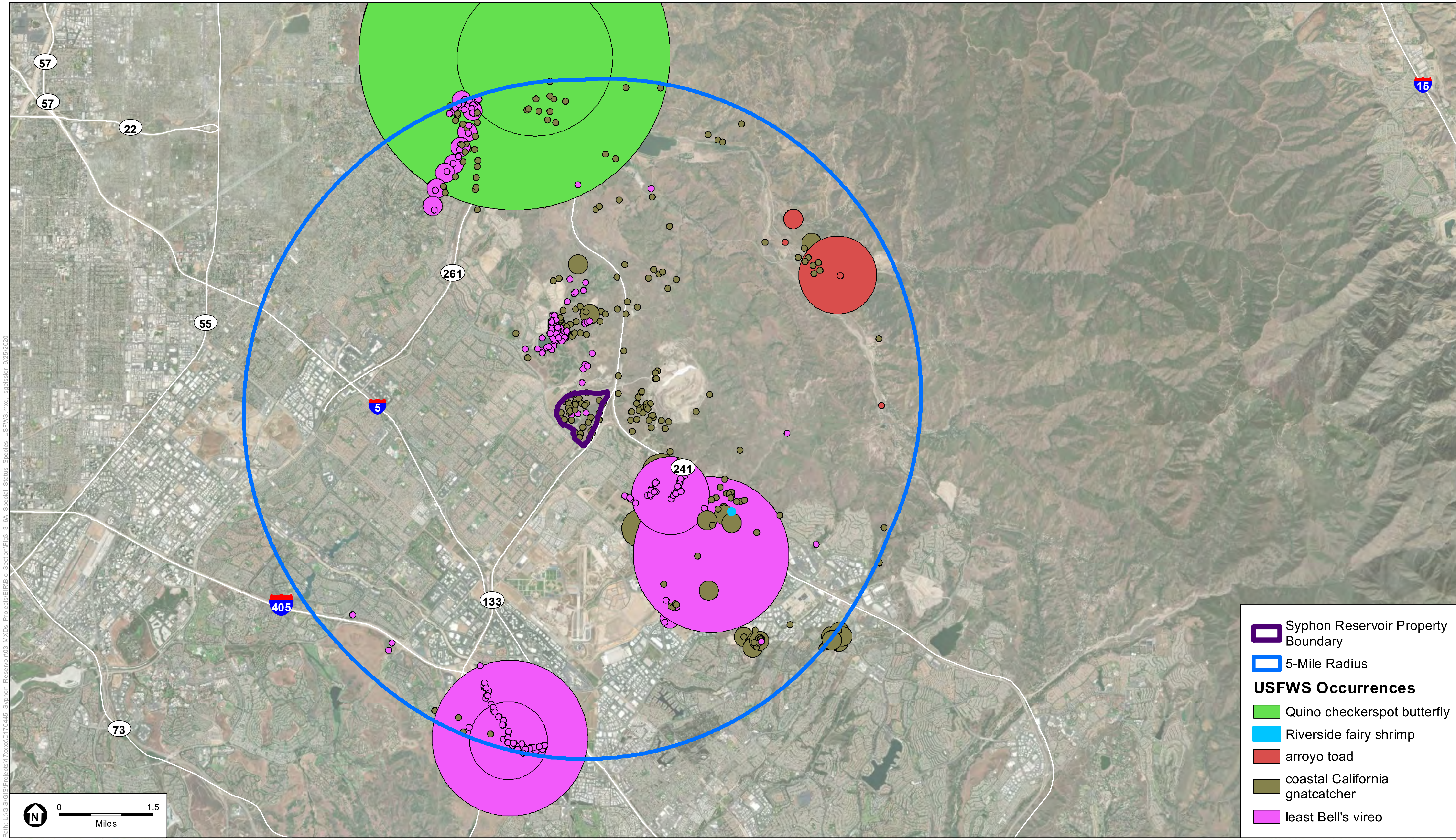
Special-Status Wildlife Species

Of the 68 special-status wildlife species considered regarding their potential to occur within the proposed project site, 37 species are deemed unlikely to occur due to the lack of any potentially suitable habitat and 14 species were assessed as having low potential to occur because the proposed project site lacks suitable habitat to support these species and/or is outside of the known geographic or elevational range for these species. Species considered but determined to be unlikely or to have a low potential to occur are still included in Appendix C. It should be noted that coastal cactus wren (*Campylorhynchus brunneicapillus cousei*) (Species of Special Concern [SC], NCCP/HCP Covered Species) was previously observed on-site in 1999 and reported in the CNDDB and also around 2000, prior to the Santiago Fire that burned the entire site in October 2007 (Dudek 2012). However, there are currently very limited, isolated coast prickly pear cactus plants on-site so this species has a low potential to occur due to presence of a negligible amount of cacti-dominated vegetation on-site or within the immediate vicinity. These species are not discussed further in this analysis.

ESA conducted focused surveys for western spadefoot (*Spea hammondii*), least Bell's vireo (*Vireo bellii pusillus*), and southwestern willow flycatcher (*Empidonax traillii extimus*) in 2019. No western spadefoot (SC, NCCP/HCP Covered Species) or southwestern willow flycatcher (Federally Endangered [FE], State Endangered [SE], NCCP/HCP Conditionally Covered) were detected during focused surveys.

Seven special-status species were observed within the proposed project site during 2018 and/or 2019 surveys, including least Bell's vireo (FE, SE, NCCP/HCP Conditionally Covered Species), coastal California gnatcatcher (Federally Threatened [FT], SC, NCCP/HCP Covered Species), yellow warbler (*Setophaga petechia*) (SC), yellow-breasted chat (*Icteria virens*) (SC), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*) (NCCP/HCP Covered Species), Vaux's swift (*Chaetura vauxi*) (SC), and orange-throated whiptail (*Aspidoscelis hyperythra*) (NCCP/HCP Covered Species). In addition, coastal cactus wren and seven other special-status species have been observed within the proposed project site during previous surveys or were reported in the CNDDB, including grasshopper sparrow (*Ammodramus savannarum*) (SC), red-shouldered hawk (*Buteo lineatus*) (NCCP/HCP Covered Species), northern harrier (*Circus cyaneus*) (SC, NCCP/HCP Covered Species), white-tailed kite (*Elanus leucurus*) (State Fully Protected [FP]), prairie falcon (*Falco mexicanus*) (NCCP/HCP Conditionally Covered Species), American peregrine falcon (*Falco peregrinus anatum*) (FP, NCCP/HCP Covered Species), and coyote (*Canis latrans*) (NCCP/HCP Covered Species) (Dudek 2012). It must be recognized that among the raptors (birds of prey) noted above, the prairie falcon and American peregrine falcon are noted as species that may soar above or occasionally forage in this area but that have a negligible potential to nest on-site.

In addition, one special-status species, sharp-shinned hawk (*Accipiter striatus*) (NCCP/HCP Covered Species), has a high potential to occur. Two special-status species, coastal whiptail (*Aspidoscelis tigris stejnegeri*) (SC, NCCP/HCP Covered Species) and San Diego desert woodrat (*Neotoma lepida intermedia*) (SC, NCCP/HCP Covered Species), have a moderate potential to occur.

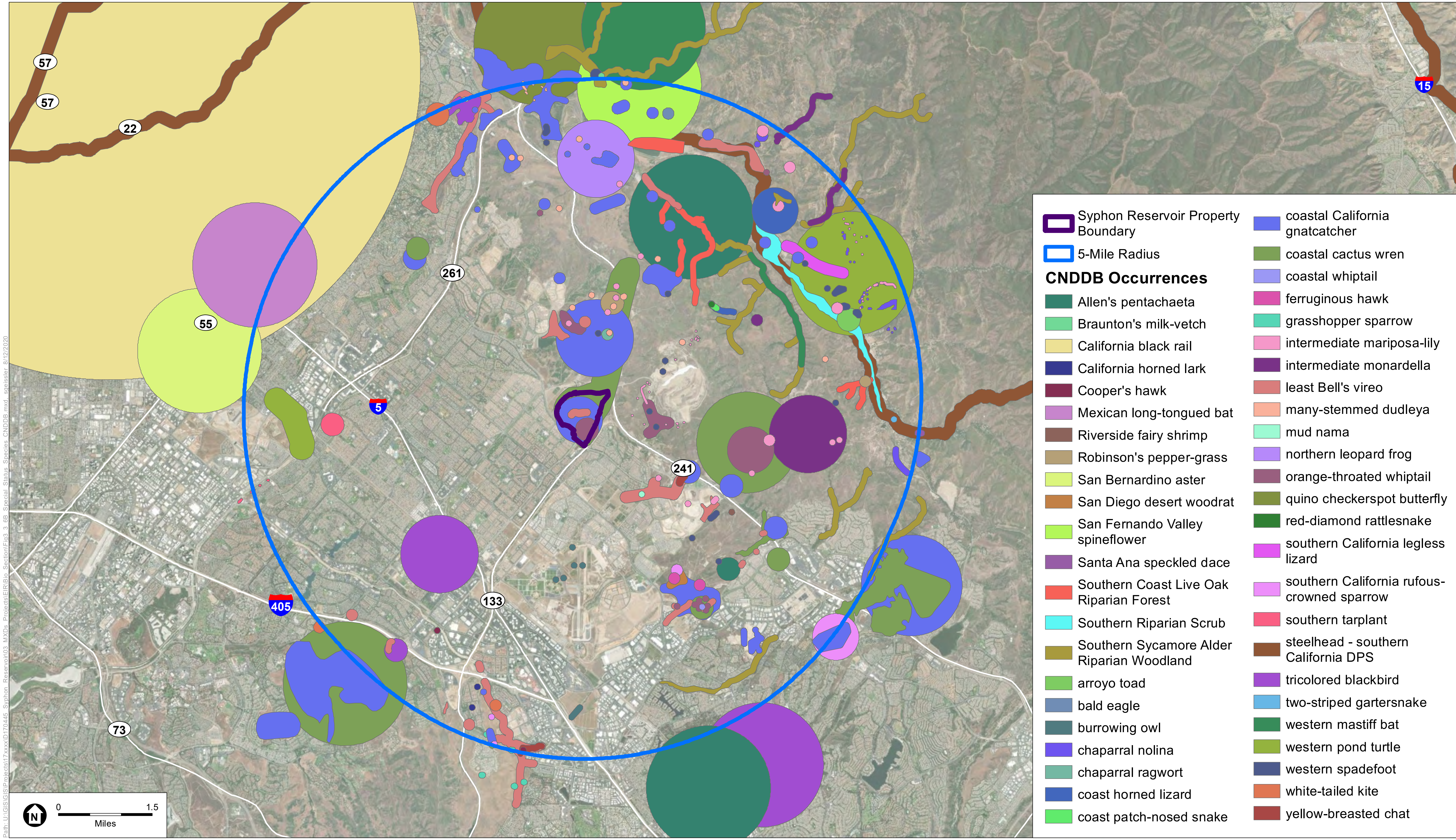


SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-6A
Special-Status Species Occurrences (USFWS)

ESA

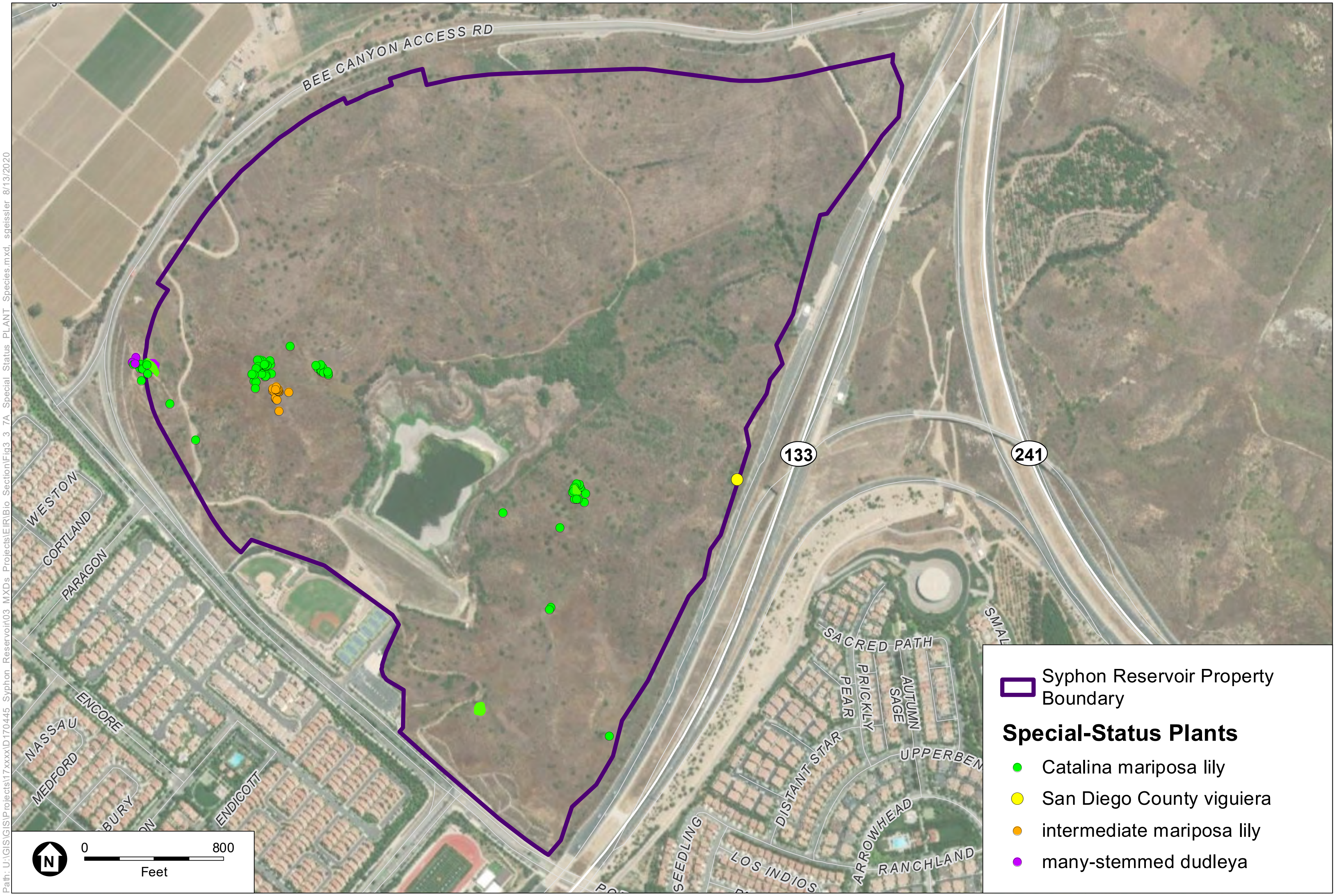


SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-6B
Special-Status Species Occurrences (CNDDB)

ESA



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-7A
Special-Status Plant Species Observed Within the Project Site in 2018 and 2019

Appendix C provides details for each special-status species, their habitat associations, and a determination regarding their potential to occur within the proposed project site. Special-status species occurrences from the USFWS and CNDDB occurrences databases within the vicinity of the proposed project site are shown in Figures 3.3-6A and 3.3-6B. Special-status wildlife species observed on-site are shown in **Figure 3.3-7B**.

Critical Habitat

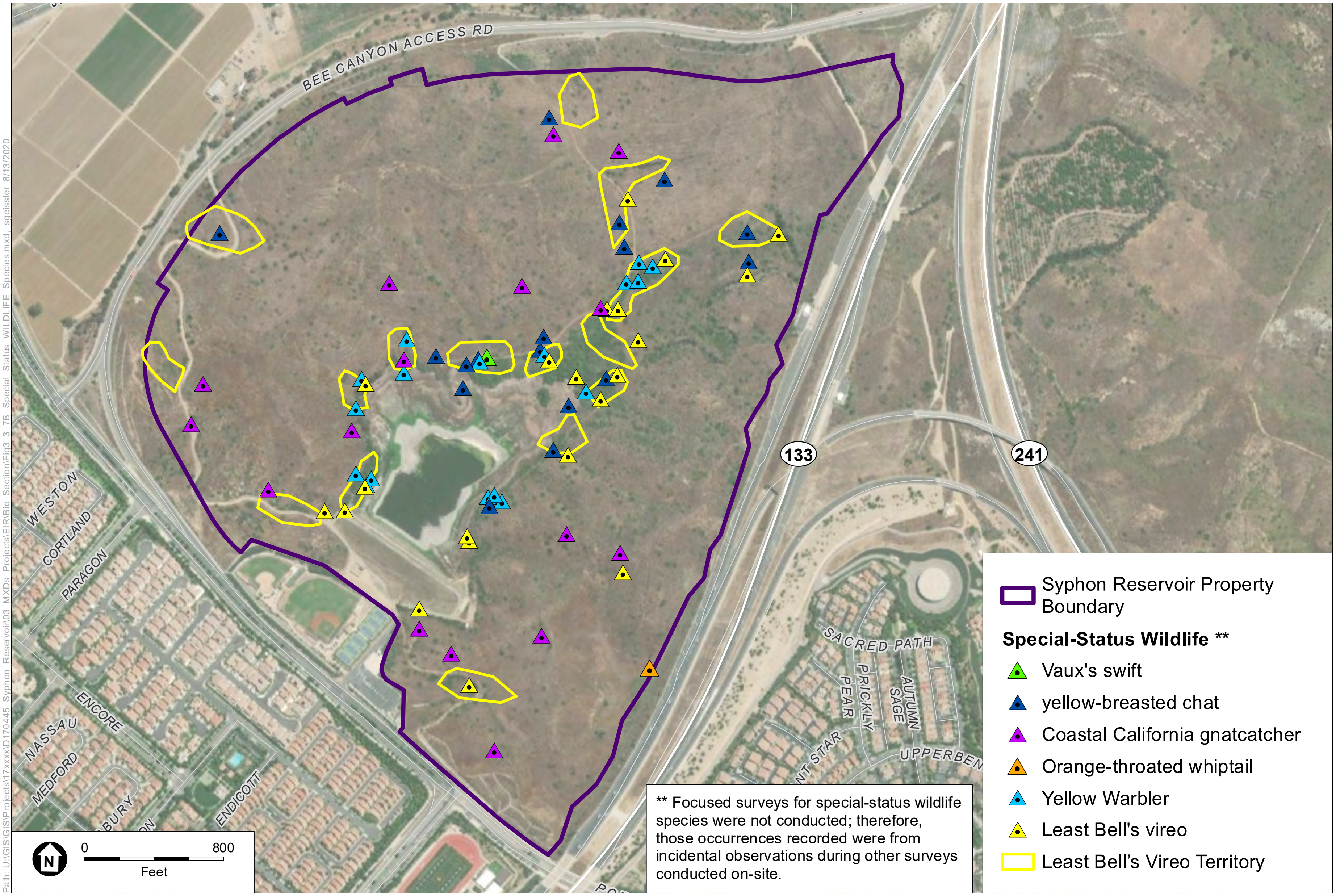
Under the FESA, when species are proposed for listing as Threatened or Endangered, the USFWS is required to consider whether there are geographic areas that contain essential features or areas that are essential to conserve the specie, and if so, USFWS may propose designating these areas as critical habitat. Critical habitat is defined as areas that contain the physical or biological features that are essential to the conservation of endangered and threatened species and that may need special management or protection. Critical habitat may also include areas that were not occupied by the species at the time of listing but are essential to its conservation. Critical habitat designations affect only Federal agency actions or federally funded or permitted activities. Critical habitat designations do not affect activities by private landowners if there is no Federal "nexus"—that is, no Federal funding or authorization (USFWS 2017).

The proposed project site does not occur or overlap within any USFWS-designated critical habitat areas (USFWS 2020b). The nearest designated critical habitat areas are both located a bit more than 2 miles to the southeast, on the south side of the SR-241 where a very small area is designated as Critical Habitat for the Federally Endangered Riverside fairy shrimp (*Streptocephalus wootoni*) and larger area is designated for the Federally Threatened coastal California gnatcatcher.

Wildlife Movement

Effective wildlife movement is essential for dispersal, genetic exchange, migration, foraging, and breeding. Wildlife movement corridors or habitat linkages are linear habitat features that connect blocks of habitat that are otherwise disconnected. Functional wildlife movement corridors are especially important in highly fragmented habitat, such as developed or agricultural areas. Wildlife movement corridors are generally used by terrestrial animals, although they may also be important for aquatic species, avian dispersal, and as avenues for genetic exchange in plants. On a regional scale, movement corridors can include bird flyways, such as wetland areas that provide essential habitat to be used as a stopover for several days during migration.

The proposed project site lies within central Orange County between the City of Irvine and the foothills of the Santa Ana Mountains. The proposed project site is not identified as a Missing Linkage in the *South Coast Missing Linkages* report (South Coast Wildlands 2008). However, the proposed project site is identified as a Small Natural Area in the California Essential Habitat Connectivity Project (CEHC) (California Department of Transportation and California Department of Fish and Game 2010). CEHC is a CDFW and California Department of Transportation (CalTrans) project that ran a statewide assessment of essential habitat connectivity using spatial analyses and modeling techniques to identify large remaining blocks of intact habitat or natural landscape and model linkages between them that need to be maintained, particularly as corridors for wildlife.



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

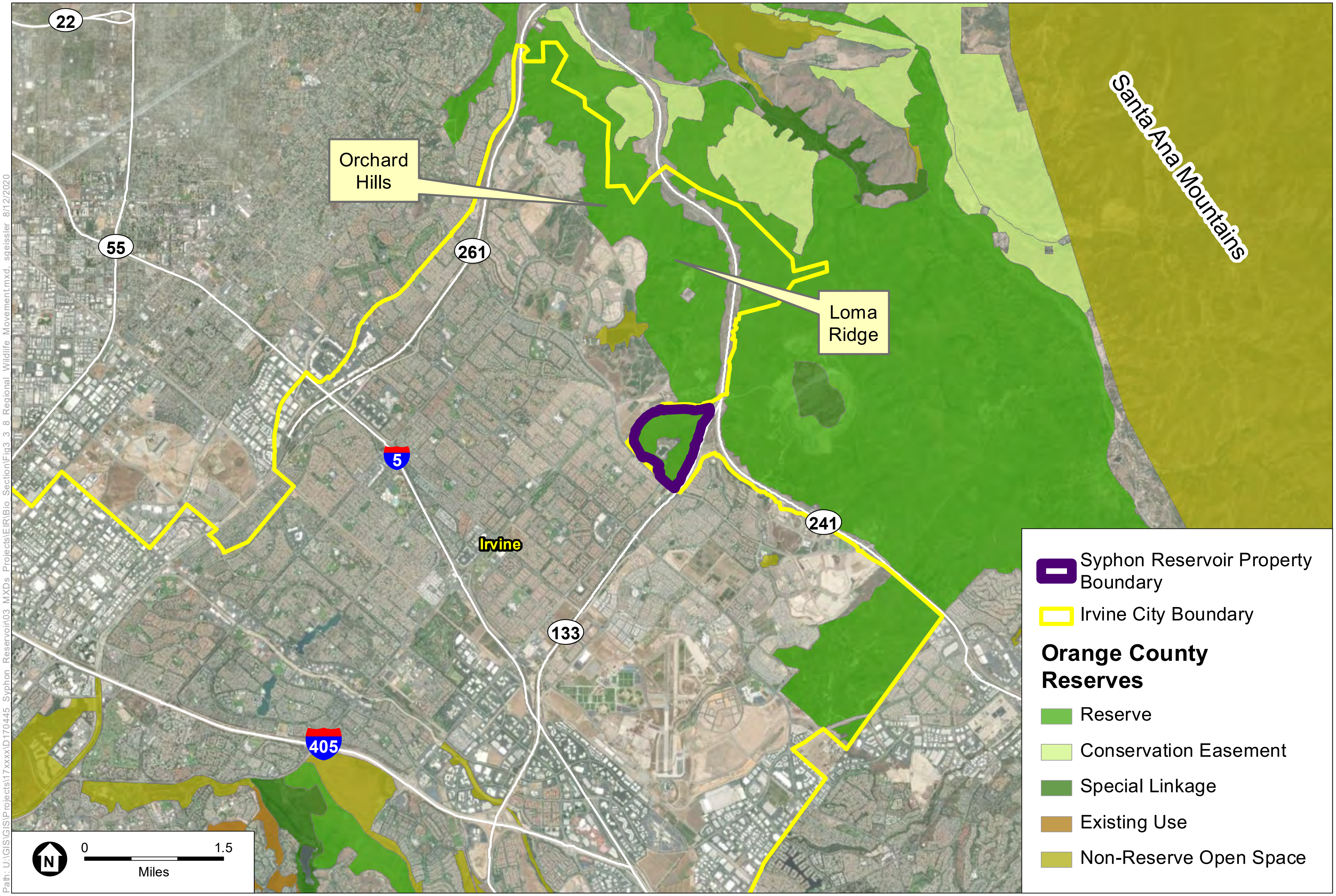
Figure 3.3-7B
Special-Status Wildlife Species Observed
Within the Project Site in 2018 and 2019

ESA

The proposed project site is located within the Central Subregion of the County of Orange NCCP/HCP, and the majority is located within the NCCP/HCP Reserve (i.e., the central portion of the reservoir is excluded from the Reserve) (**Figure 3.3-8**). Although the proposed project site is bordered by dense residential development to the southwest and southeast, as well as by the SR-133 and SR-241 and interchange to the east and northeast, it is contiguous to agricultural and undeveloped areas to the west along Loma Ridge in the Orchard Hills planning area. Additionally, the proposed project site includes upland and riparian habitat that provides important resources for wildlife, such as foraging habitat, potential nesting and denning sites, and cover. Although terrestrial wildlife movement through the proposed project site is extremely restricted to the northeast, east, or south, the proposed project site lies at the southeastern limit of a larger contiguous block of habitat that may be used by local terrestrial wildlife movement and provide a small part of regional habitat connectivity for avian species (e.g., dispersal habitat for coastal California gnatcatcher within this region). The reservoir is also an important regional water source that attracts a number of avian species. Thus, from a regional perspective, the proposed project site functions as a part of a wildlife movement corridor, particularly for avian species.

On a local scale, the proposed project site provides live-in habitat for a variety of invertebrate, fish, amphibian, reptile, bird, and mammal species, and movement habitat for invertebrate, reptile, bird, and mammal species. Immediately surrounding the proposed project site, the City of Irvine is located to the south, and human activity and dense development within these residential and commercial areas do not provide suitable habitat or resources for most native wildlife, with the exception of a few wide-ranging species that are adapted to urban environments (e.g., raccoon, skunk, coyote, some birds). In addition, the SR-133 and Bee Canyon Landfill Access Road, which is frequented by trucks hauling trash to the landfill, are hazards to wildlife. However, the proposed project site is undeveloped, contains natural habitats, and wildlife movement is not restricted within the project site or to and from other undeveloped and agricultural areas to the north with the exception of a chain-link fence around the perimeter of the property. Thus, although some wildlife movement (e.g., more secretive wildlife that require larger home ranges, such as mountain lion and deer) may be deterred by the human activity and development nearby, these barriers to movement (e.g., development and roads) would not preclude smaller wildlife that are better adapted to urbanized areas from moving through the project site or the surrounding region.

In summary, the proposed project site supports live-in and movement habitat for species on a local scale, and likely functions to facilitate movement for a number of avian species on a regional scale.



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-8
Regional Wildlife Movement

ESA

3.3.2 Regulatory Framework

Federal

Endangered Species Act (USC, Title 16, § 1531 through 1543)

The FESA and subsequent amendments provides for the conservation and protection of wildlife and plant species that are listed or proposed for listing as endangered or threatened species and the ecosystems upon which they depend. The FESA also provides statutory framework for the conservation and recovery of threatened and endangered species as well as for the conservation of designated critical habitat that USFWS determines is required for the survival and recovery of these listed species.

Section 7 of the FESA requires federal agencies, in consultation with and assistance from the Secretary of the Interior or the Secretary of Commerce, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. The USFWS and National Marine Fisheries Service (NMFS) share responsibilities for administering the FESA. Regulations governing interagency cooperation under Section 7 are found in CCR Title 50, Part 402. The opinion issued at the conclusion of consultation will include a statement authorizing "take" (to harass, harm, pursue, hunt, wound, kill, etc.) that may occur incidental to an otherwise legal activity. Although federal funding is not expected, if the proposed project were to receive federal funding the funding agency would be required to initiate a consultation with USFWS under Section 7. The consultation process would then lead to issuance of a Biological Opinion from USFWS. In most cases, a Biological Opinion addresses the proposed project's potential to result in "take" of listed species (as defined below), and includes mandatory conditions that would allow for limited incidental take to occur subject to prescribed conditions.

Section 9 lists those actions that are prohibited under the FESA. Although take of a listed species is prohibited, it is allowed when it is incidental to an otherwise legal activity. Section 9 prohibits take of listed species of fish, wildlife, and plants without special exemption. The definition of "harm" includes significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns related to breeding, feeding, or shelter. "Harass" is defined as actions that create the likelihood of injury to listed species by disrupting normal behavioral patterns related to breeding, feeding, and shelter significantly.

Section 10 provides a means whereby a non-federal action with the potential to result in take of a listed species can be allowed under an incidental take permit which may be issued once a HCP is approved. Application procedures are found at 50 CFR 13 and 17 for species under the jurisdiction of USFWS and 50 CFR 217, 220, and 222 for species under the jurisdiction of NMFS.

In addition, a local regulatory program established by the NCCP/HCP and associated governing documents provides for regional conservation of many species while also allowing limited impacts to biological resources in association with planned development. The NCCP/HCP establishes an alternative pathway to the Section 10 and Section 7 procedures by which local projects in the Plan Area may receive both State and federal incidental take authorization for species identified as “covered” and “conditionally covered”, based on compliance with relevant conditions set forth in the plan. Further details about the regional NCCP/HCP and its provisions for incidental take coverage are discussed in the local regulatory framework below.

Migratory Bird Treaty Act (16 USC 703 through 711)

The Migratory Bird Treaty Act (MBTA) is the domestic law that affirms, or implements, a commitment by the U.S. to four international conventions (with Canada, Mexico, Japan, and Russia) for the protection of a shared migratory bird resource. The MBTA makes it unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, or kill migratory birds. ‘‘Migratory bird’’ means any bird protected by any of the treaties and currently includes 1,027 bird species in the United States (50 CFR 10.13), regardless of whether the particular species actually migrates. The law also applies to the removal of nests occupied by migratory birds during the breeding season. The MBTA makes it unlawful to take, pursue, molest, or disturb these species, their nests, or their eggs anywhere in the United States.

Federal Clean Water Act (33 USC 1251 through 1376)

The USACE regulates “discharge of dredged or fill material” into “waters” of the United States, which includes tidal waters, interstate waters, and "all other waters, interstate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce or which are tributaries to waters subject to the ebb and flow of the tide" (33 C.F.R. 328.3(a)), pursuant to provisions of Section 404 of the Clean Water Act (CWA). The CWA also excludes certain features from this regulation, including “wastewater recycling facility constructed on dry land” (see 33 CFR §230.3 (o)(2)(vii)). Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not considered waters of the U.S. The USACE determination stated that they do not consider the site to contain waters of the U.S. (Appendix C).

Fish and Wildlife Conservation Act

The Fish and Wildlife Conservation Act declares that fish and wildlife are of ecological, educational, esthetic, cultural, recreational, economic, and scientific value to the United States. The purposes of this Act are to encourage all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities and to conserve and to promote conservation of non-game fish and wildlife and their habitats. Another purpose is to provide financial and technical assistance to the states for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife.

State

California Endangered Species Act (California Fish and Game Code § 2050 et seq.)

CESA establishes the policy of the state to conserve, protect, restore, and enhance threatened or endangered species and their habitats. CESA mandates that state agencies should not approve projects that would jeopardize the continued existence of threatened or endangered species if reasonable and prudent alternatives are available that would avoid jeopardy. There are no state agency consultation procedures under CESA. For projects that would affect a listed species under both CESA and FESA, compliance with FESA would satisfy CESA if CDFW determines that the federal incidental take authorization is "consistent" with CESA under California Fish and Game Code Section 2080.1. For projects that would result in take of a species listed under the CESA only, the project operator would have to apply for a take permit under Section 2081(b). Further details about the regional NCCP/HCP are discussed in the local regulatory framework below.

California Fish and Game Code § 1600 et seq.

CDFW is responsible for protecting and conserving fish and wildlife resources, and the habitats upon which they depend. Under Section 1600 of the California Fish and Game Code, CDFW administers the Lake and Streambed Alteration (LSA) Program and regulates all substantial diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake (which typically include reservoirs), which supports fish or wildlife.

Applicants proposing changes to such regulated water resources must submit a Lake or Streambed Alteration Notification to CDFW for such projects. CDFW will then determine if the proposed activity may substantially adversely affect an existing fish or wildlife resource and will issue a final agreement for the applicant's signature that includes reasonable measures necessary to protect the resource. Preliminary notification to, and project review by CDFW may occur during or after the CEQA environmental review process but prior to project implementation.

California Fish and Game Code §§ 2080 and 2081

Section 2080 of the California Fish and Game Code states that "No person shall import into this state [California], export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the Commission [State Fish and Game Commission] determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, or the Native Plant Protection Act, or the California Desert Native Plants Act." Pursuant to Section 2081, CDFW may authorize individuals or public agencies to import, export, take, or possess state-listed endangered, threatened, or candidate species. These otherwise prohibited acts may be authorized through Incidental Take permits or Memoranda of Understanding if the take is incidental to an otherwise lawful activity, impacts of the authorized take are minimized and fully mitigated, the permit is consistent with any regulations adopted pursuant to any recovery plan for the species, and the project operator ensures adequate funding to implement the measures required by CDFW, which makes this determination based on available scientific information and considers the ability of the species to survive and reproduce.

Since the NCCP/HCP provides coverage for take of some State-listed species, there would not be a need for an additional 2081 permit process unless a project does not comply with NCCP/HCP requirements and may result in take of a State-listed species or if a State-listed species not covered by the NCCP/HCP were to result in take. Further details about the regional NCCP/HCP are discussed in the local regulatory framework below.

California Fish and Game Code §§ 3503 and 3503.5

Under these sections of the California Fish and Game Code, the project operator is not allowed to conduct activities that would result in the taking, possessing, or destroying of any birds of prey; the taking or possessing of any migratory nongame bird as designated in the MBTA; the taking, possessing, or needlessly destroying of the nest or eggs of any raptors or nongame birds protected by the MBTA; or the taking of any nongame bird pursuant to California Fish and Game Code Section 3800.

California Environmental Quality Act Guidelines, § 15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines § 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in CEQA primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a candidate species that has not been listed by either USFWS or CDFW. Thus, CEQA provides an agency with the ability to protect a species from the potential impacts of a project until the respective government agencies have an opportunity to designate the species as protected, if warranted. CEQA also calls for the protection of other locally or regionally significant resources, including natural communities. Although natural communities do not at present have legal protection of any kind, CEQA calls for an assessment of whether any such resources would be affected and requires findings of significance if there would be substantial losses. Natural communities listed by CNDDB as sensitive are considered by CDFW to be significant resources and fall under the State CEQA Guidelines for addressing impacts. Local planning documents such as General Plans often identify these resources as well.

California Water Quality Control Act (Porter-Cologne California Water Code Section 13260)

The State Water Resources Control Board (SWRCB) and the RWQCB (together “Boards”) are the principal State agencies with primary responsibility for the coordination and control of water quality. The Boards regulate activities pursuant to Section 401(a)(1) of the federal CWA as well as the Porter Cologne Water Quality Control Act (Porter-Cologne) (Water Code Section 13260). Section 401 of the CWA specifies that certification from the State is required for any applicant requesting a federal license or permit to conduct any activity including but not limited to the construction or operation of facilities that may result in any discharge into navigable waters. The certification shall originate from the State in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable water at the point where the discharge originates or will originate. Any such discharge will comply with the applicable provisions of Sections 301, 302, 303, 306, and 307 of the CWA.

In Porter-Cologne, the Legislature declared that the "State must be prepared to exercise its full power and jurisdiction to protect the quality of the waters in the State from degradation..." (California Water Code Section 13000). Porter-Cologne grants the Boards the authority to implement and enforce the water quality laws, regulations, policies and plans to protect the groundwater and surface waters of the State. It is important to note that enforcement of the State's water quality requirements is not solely the purview of the Boards and their staff. Other agencies (e.g., CDFW) have the ability to enforce certain water quality provisions in state law.

The State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (procedures), adopted by the State Water Resources Control Board on April 2, 2019, became effective May 28, 2020. Based on the procedures, artificial wetlands greater than or equal to one acre in size constructed for purposes of treatment, storage, or distribution of recycled water are not waters of the State unless specifically identified in a water quality control plan as a wetland or other water of the State. Since Syphon Reservoir is identified in the 1995 Water Quality Control Plan for the Santa Ana River Basin (most recently updated in June 2019; California Regional Water Quality Control Board 2019) as a water of the State, the wetlands would likely also be considered waters of the State.

Local

County of Orange

General Plan, Land Use Element

The Land Use Element is one of nine elements of the restructured General Plan, and contains official County policies on the location and character of land uses necessary for orderly growth and development. One of the major land use policies adopted for the purpose of guiding the planning and development of those areas for both the short-term and long-term future includes:

Policy 9. Enhancement of Environment – To guide development so that the quality of the physical environment is enhanced. The purpose of the Enhancement of Environment Policy is to ensure that all land use activities seek to enhance the physical environment, including the air, water, sound levels, landscape, and plant and animal life. This policy does not mean that environmental enhancement precludes development. It recognizes the need to improve both the manmade and natural environments. Where aspects of the natural environment are deemed to be truly significant, this policy requires measures be taken to preserve these aspects.

General Plan, Resources Element

The Resources Element contains official County policies on the conservation and management of resources, including natural resources. Some of the goals, objectives, and policies pertaining to natural resources includes:

> Goal 1 – Protect wildlife and vegetation resources and promote development that preserves these resources.
>
> Objective 1.1 – To prevent the elimination of significant wildlife and vegetation through resource inventory and management strategies.
>
> Policy 1. Wildlife and Vegetation – To identify and preserve the significant wildlife and vegetation habitats of the County.

County of Orange Central & Coastal Subregion NCCP/HCP

In 1996, the Orange County Central & Coastal Subregion NCCP/HCP, a comprehensive natural resources conservation and management plan for central and coastal Orange County, was adopted. The purpose of the NCCP/HCP was to create a multiple-species and multiple-habitat reserve system and to implement a long-term conservation program on a subregional level to primarily protect coastal sage scrub and the species that use this habitat, while allowing for social and economic uses compatible with the protection of these resources.

The NCCP/HCP was prepared in cooperation with the UFSWS and CDFW, who are the agencies responsible for implementing the FESA and CESA, respectively. Implementation of the NCCP/HCP in accordance with the terms of the Implementation Agreement allows for the conservation of large, diverse areas of natural habitat, including habitat for the coastal California gnatcatcher and other federally-listed species; provides for the conservation, protection, and management of three "Target Species" and 36 "Identified Species" and their habitats; and satisfies federal and state mitigation requirements for designated development.

IRWD and the County of Orange, among others, are participating landowners of the Central & Coastal NCCP/HCP. As a participating landowner that contributed significant funding toward land acquisition, management, and the implementation of the NCCP/HCP Reserve System, IRWD was allotted 60 acres of Incidental Take Credits from within the NCCP/HCP Reserve and 27 acres of Incidental Take Credits outside of the NCCP/HCP Reserve (i.e., non-Reserve lands) for impacts to coastal sage scrub communities (Dudek 2012). An additional 9 acres of Incidental Take Credits from within the NCCP/HCP Reserve were acquired through IRWD's consolidation with Santiago County Water District (SCWD). For participating landowners, development activities and uses that are addressed by the NCCP/HCP are considered fully mitigated under the NCCP Act, FESA, and CESA for impacts to habitat occupied by listed and other species "identified" by the NCCH/HCP and Implementation Agreement. Satisfactory implementation of the NCCP/HCP under the terms of the Implementation Agreement means that no additional mitigation is required of the participating landowners for impacts to "identified" species and their habitat, or for species residing in specified non-coastal sage scrub habitats, or covered habitats.

The NCCP/HCP included provisions for IRWD to build a future reservoir "as a permitted use within the Reserve System" (R.J. Meade Consulting 1996a). At the time that the NCCP/HCP was prepared, IRWD was considering four alternative locations (including the Syphon Reservoir site) for seasonal recycled water storage reservoirs, all of which were located within the subregional Reserve System, though only one reservoir would ultimately be needed. The need for a future reservoir was identified as "a permitted use within the Reserve System in the event that public health, safety, and welfare require such a facility in the future. At the time such a facility is needed, IRWD will review the plans with appropriate agencies and propose a specific mitigation plan or pay fees adequate to mitigate the Incidental Take associated with the new reservoir" (R.J. Meade Consulting 1996a).

3.3.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from Appendix G of the *CEQA Guidelines* are used as thresholds of significance to determine the impacts of the proposed project as related to biological resources. The proposed project would have a significant impact if it would:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.
3. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.
7. Result in cumulatively considerable impacts to biological resources.

Methodology

This section describes the potential effects of the proposed project on biological resources that may occur as a result of project implementation, including net ecological benefits. Direct, indirect, temporary, and/or permanent effects to biological resources may occur as a result of project implementation, as defined below:

- **Direct Effects:** Any alteration, disturbance, or destruction of biological resources that would result from project-related activities is considered a direct effect. Examples include loss of individual species and/or their associated plant communities, diversion of surface water flows, and encroachment into wetlands. Under FESA, direct effects are defined as the immediate effects of a project on a species or its habitat, including construction noise disturbance, sedimentation, or habitat loss.

- **Indirect Effects:** Biological resources may also be affected in an indirect manner as a result of project-related activities. Under FESA, indirect effects are defined as those effects that are caused by, or would result from, a proposed project but occur later in time and are reasonably certain to occur [50 C.F.R. §402-02]. An example of indirect effects may include irrigation runoff from a developed area into surrounding natural vegetation. Indirect effects could also include increased wildfire frequency as a result of power line failures.
- **Temporary Effects:** Any effects to biological resources that are considered reversible can be viewed as temporary. Examples include the generation of fugitive dust during construction activities.
- **Permanent Effects:** All effects that result in the irreversible removal of biological resources are considered permanent. Examples include constructing a building or permanent road on an area with native vegetation, such that the native vegetation is permanently removed and replaced with a developed structure.

A project is generally considered to have a significant effect if it proposes or results in any of the effects or conditions described in the significance thresholds discussed below, absent specific evidence to the contrary. Conversely, if a project does not propose or result in any of the following effects or conditions, it would generally not be considered to have a significant effect on biological resources, absent specific evidence of such an effect.

Impact Analysis

Candidate, Sensitive, or Special Status Species

Impact 3.3-1: The proposed project could have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Construction

Special-Status Plant Species

Four special-status plant species, Catalina mariposa lily (CRPR 4.2, NCCP/HCP Covered), intermediate mariposa lily (CRPR 1B.2), multi-stemmed dudleya (CRPR 1B.2), and San Diego County viguiera (CRPR 4.3), were observed within the proposed project site during focused surveys in 2018 and 2019. The proposed project will avoid removal or damage to any specimens of intermediate mariposa lily, multi-stemmed dudleya, and San Diego County viguiera. Therefore, the proposed project would not impact these special-status plant species, and no mitigation is required.

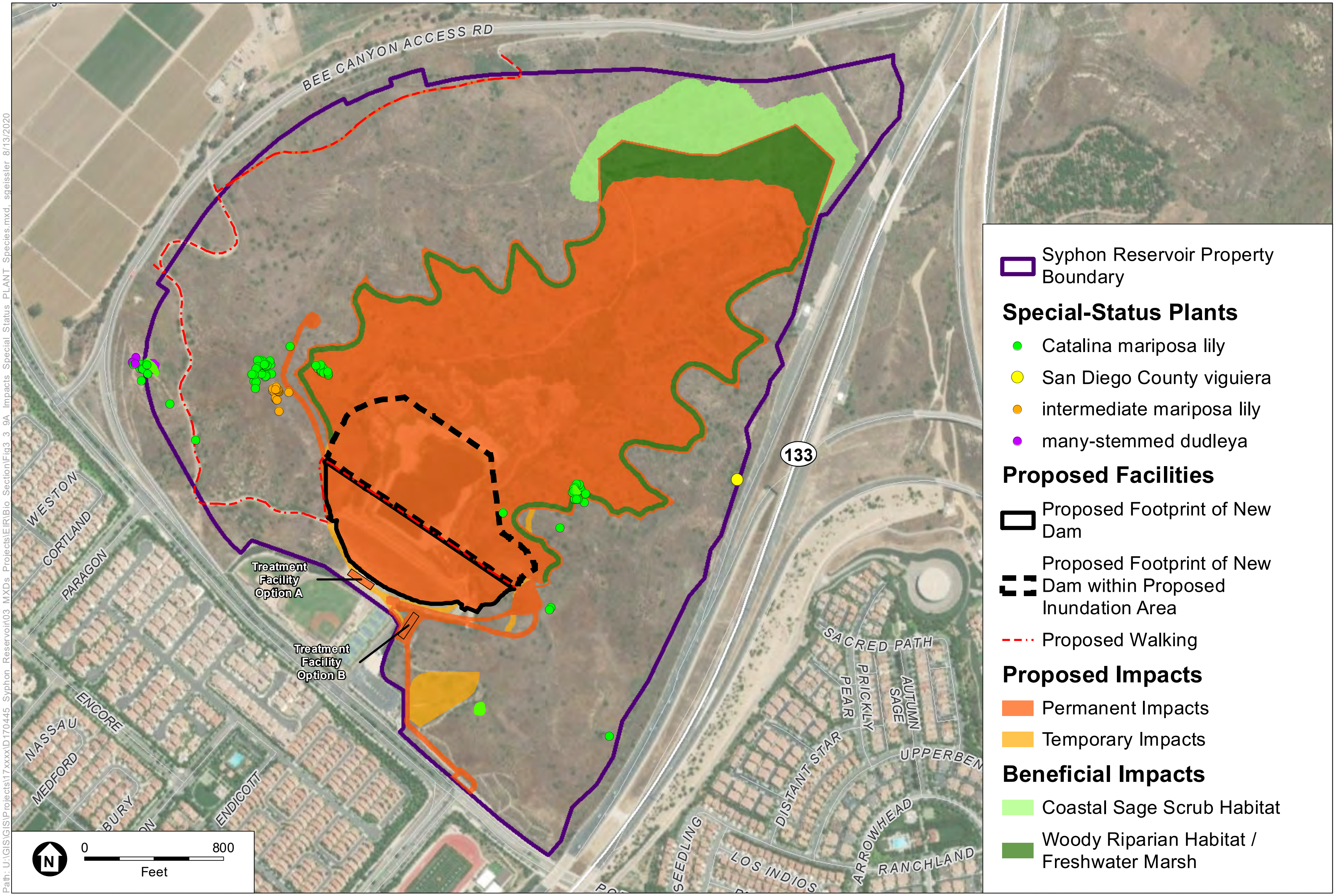
The proposed project will avoid more than 90 percent of the Catalina mariposa lily specimens identified on-site, and would remove approximately 24 of the total 309 Catalina mariposa lily individuals during construction (shown in **Figure 3.3-9A**). The number affected comprises less than 8 percent of the total population on-site. Impacts to 24 individuals is not considered a substantial loss for this species which is known to occur over a wide area in southern California. This loss would not threaten the existence of the on-site population, and would not be significant. Moreover, Catalina mariposa lily is a covered species under the NCCP/HCP provided that the proposed project complies with the NCCP/HCP provisions, and thus this species is considered conserved since the NCCP/HCP Reserve provides for the regional conservation for this and other covered species. Although the majority of the proposed project site is within the NCCP/HCP Reserve and potential impacts to any Catalina mariposa lily would occur within the Reserve, at the time that the NCCP/HCP was prepared the NCCP/HCP included provisions for IRWD to build a future reservoir, and the proposed project is “a permitted use within the Reserve System” (R.J. Meade Consulting 1996a). Thus, even with potential impacts to this species within the Reserve, this species is considered adequately covered under the NCCP/HCP. Therefore, impacts to Catalina mariposa lily are less than significant, and no mitigation is required.

Special-Status Wildlife Species

Special-status wildlife species observed, or considered to have a moderate or high potential to occur within the proposed project site, include the following NCCP/HCP Covered Species: coastal California gnatcatcher, orange-throated whiptail, southern California rufous-crowned sparrow, red-shouldered hawk, northern harrier, American peregrine falcon, sharp-shinned hawk, coastal whiptail, San Diego desert woodrat, and coyote. Two species that are Conditionally Covered under the NCCP/HCP, least Bell’s vireo and prairie falcon, were also observed. Several other species that are not “covered species” under the NCCP/HCP were also identified, including yellow warbler, yellow-breasted chat, grasshopper sparrow, Vaux’s swift, and the California fully protected white-tailed kite. It should be noted that the two falcons and Vaux’s swift may fly over the site but have virtually no potential to nest on site. Likewise, white-tailed kite has only been observed foraging or flying over but is not known to nest in the study area. Locations where special-status wildlife species were observed in the project site in 2018 and 2019 are shown in **Figure 3.3-9B**.

The coastal California gnatcatcher, orange-throated whiptail, southern California rufous-crowned sparrow, red-shouldered hawk, northern harrier, prairie falcon,[5] American peregrine falcon, sharp-shinned hawk, coastal whiptail, San Diego desert woodrat, and coyote, as covered species under the NCCP/HCP, are considered to be conserved within the NCCP/HCP region provided that the project complies with the NCCP/HCP provisions. As previously mentioned, although the majority of the proposed project site is within the NCCP/HCP Reserve and potential impacts to NCCP/HCP Covered Species may occur within the Reserve, the NCCP/HCP included provisions for IRWD to build a future reservoir.

[5] Prairie falcon is a conditionally covered under the NCCP/HCP. Planned activities are authorized if the habitat is more than one-half mile from an active or historically active nesting site, and this species is currently not known to nest within Orange County, and have not occurred within the county for over a decade (CDFW 2020, Catino-Davenport 2019).



Path: U:\GIS\GIS\Projects\17xxxx\D170445_Syphon_Reservoir\03_MXDs_Projects\EIR\Bio_Section\Fig3_3_9A_Impacts_Special_Status_PLANT_Species.mxd, sgeissler 8/13/2020

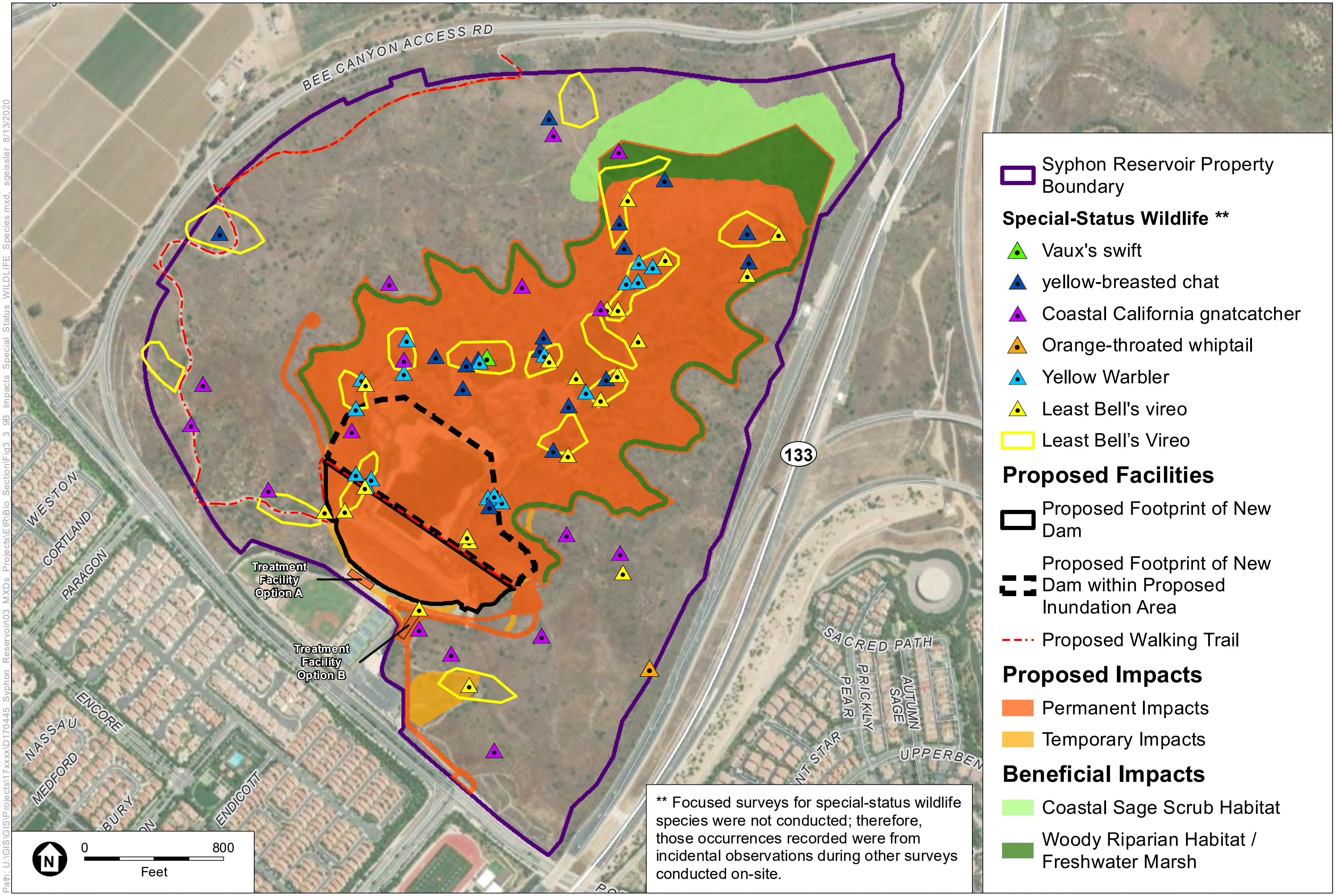
SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-9A

Impacts to Special-Status Plant Species Observed Within the Project Site in 2018 and 2019

ESA



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-9B
Impacts to Special-Status Wildlife Species Observed Within the Project Site in 2018 and 2019

ESA

As a future infrastructure improvement that was originally recognized by the NCCP/HCP and for which IRWD has a credit allotment that can be "spent" or exchanged for the displacement of areas within the NCCP Reserve, the proposed project is considered a permitted use within the Reserve System. Potential impacts to Covered Species within the Reserve are considered adequately covered under the NCCP/HCP provided that the proposed project complies with the NCCP/HCP provisions. The proposed project would permanently impact a total of 28.37 acres (with Treatment Facility Option A[6])/28.49 acres (with Treatment Facility Option B) of coastal sage scrub communities.[7] The proposed project would temporarily impact 0.85 acre of California sagebrush scrub. Implementation of Mitigation Measures BIO-1 (to spend allotted Incidental Take Credits for participating landowners), BIO-2, and BIO-3, prescribed below, would reduce impacts to a less than significant level.

The least Bell's vireo is federal and state Endangered and is a Conditionally Covered species under the NCCP/HCP. This species is found in riparian habitat, and 17 least Bell's vireo individuals and/or territories were observed on-site in 2019 (point locations and territories are shown in Figure 3.3-9B). The proposed reservoir improvement project will include dam replacement, reservoir enlargement, and the installation of an on-site riparian and upland habitat area around the perimeter of the reservoir. The proposed project would displace approximately 6.41 acres of woody riparian communities (including 0.09 acre of arroyo willow thicket, 4.07 acres of black willow thicket, and 2.25 acres of mule fat scrub). However, the proposed project would also create at least 6.58 acres of on-site woody riparian habitat that would provide replacement nesting habitat for the least Bell's vireo and will also create up to approximately 5.88 acres consisting of additional on-site woody riparian vegetation and/or freshwater marsh habitat that would replace the other wetland habitat values impacted by construction. The new riparian and wetland habitat areas will be maintained with supplemental irrigation and will not depend on the reservoir being full or nearly full to be sustained. Woody riparian and freshwater marsh habitats around the larger reservoir perimeter, once established will provide both foraging and nesting opportunities that would benefit least Bell's vireo and other species.

Ultimately, there will be no net loss of woody riparian habitat for least Bell's vireo, and no net loss of any wetland habitat, with the creation of both riparian and wetland habitat areas on-site as part of the proposed project. IRWD is engaged with the Wildlife Agencies and is collaboratively developing a comprehensive program to address potential impacts to least Bell's vireo. Based on provision of acceptable mitigation, the Wildlife Agencies have indicated that the NCCP/HCP conditional coverage will apply for the proposed project's impacts to least Bell's vireo.[8]

---

6 Indicates impact acreages for Treatment Facility Option A/Option B. The potential locations of the treatment facilities, which would be determined during detailed design, are depicted in Figure 3.3-9B (labeled as Treatment Facility Option A and Option B). Only one treatment facility in one of the optional locations will be built-out as part of the proposed project.

7 This total includes 26.37 acres (Treatment Facility Option A)/26.49 acres (Treatment Facility Option B) of California sagebrush scrub, 0.98 acre of California sagebrush scrub/non-native herbaceous cover, 0.06 acre of chaparral bushmallow scrub/non-native herbaceous cover, 0.19 acre of chaparral bushmallow scrub, and 0.77 acre of coyote brush scrub.

8 This determination was made over the course of extensive discussions between IRWD, ESA, and the Wildlife Agencies, which considered multiple factors to arrive at this determination, including but not limited to IRWD being a Participating Landowner, Syphon Reservoir being a man-made waterbody sustained by an artificial water source, consideration of least Bell's vireo population distribution within the NCCP/HCP plan area, and because impacts will be temporary as riparian habitat will be replaced on-site.

Nevertheless, there will be a temporary loss of these habitats until construction is completed and riparian habitat can be reestablished that the species can use again. This temporary loss would be potentially significant in terms of the temporary reduction to the amount of habitat available in the local region. Implementation of Mitigation Measures BIO-3 and BIO-4, prescribed below, would reduce impacts to a less than significant level.

The yellow warbler, yellow-breasted chat, and grasshopper sparrow are species of special concern, Vaux's swift, and white-tailed kite is a state fully protected species. The yellow warbler and yellow-breasted chat occur within the riparian habitat on-site; the grasshopper sparrow favors native grasslands on rolling hills with a mix of grasses, forbs, and scattered shrubs; Vaux's swift inhabits redwood and Douglas-fir habitat in northern California and the Sierra Nevada; and the white-tailed kite prefers grasslands, meadows, or marshes for foraging next to deciduous woodland with dense-topped trees for nesting and perching. Since Vaux's swift was observed flying over and likely a migrant that is not expected to nest on-site, it is not discussed further in this analysis.

For yellow warbler and yellow-breasted chat, which utilize woody riparian habitat similar to the least Bell's vireo, several of each species were observed on-site in 2019. The locations of yellow warbler and yellow-breasted chat observed within the project site are shown in Figure 3.3-9B; many of these are multiple point locations of the same individual taken on multiple dates, but based on the clustering of point locations, there are likely eight yellow warbler territories and nine yellow-breasted chat territories. The proposed project would have both impacts and benefits to the riparian and marsh habitat that supports these special-status species. As stated above, the proposed project would permanently impact 12.28 acres of woody riparian (6.37 acres) and freshwater marsh communities (5.88 acres). However, the proposed project would also create at least 6.58 acres of on-site woody riparian and will also provide approximately 5.88 acres of on-site woody riparian and/or freshwater marsh habitat that would be maintained to consistently provide habitat year-round. Construction of the larger reservoir would also expand the open water areas that may be used for foraging, which would also be a benefit to these and other species. As noted previously, although there will ultimately be no net loss of riparian habitat for these special-status species with the creation of riparian habitat areas on-site, the temporal loss of habitat for yellow warbler and yellow-breasted chat may be considered potentially significant as it would reduce the amount of available habitat for these species in the local region until an equivalent habitat area is reestablished. Implementation of Mitigation Measures BIO-3 and BIO-4, prescribed below, would reduce impacts to a less than significant level.

Grasshopper sparrow was previously observed on-site; however, there are no recent records or observations of this species during the numerous surveys conducted in 2018 and 2019. For grasshopper sparrow, which favors native grasslands with a mix of grasses, forbs, and scattered shrubs, the proposed project will impact 2.53 acres of non-native grassland but will avoid 2.74 acres. In addition, the proposed project will impact 27.25 acres of non-native herbaceous cover and 28.18 acres of non-native herbaceous cover/California sage scrub, but avoid 67.31 acres of mixed grass and forblands with scattered shrubs (16.91 acres of non-native herbaceous cover, 43.52 acres of non-native herbaceous cover/California sagebrush scrub, and 6.88 acres California sagebrush scrub/non-native herbaceous cover) that would remain available to this species within the approximately 265-acre project site. Given the potentially suitable habitat acreage that will be avoided by the proposed project, as well as natural areas within the surrounding vicinity, the limited potential impacts to foraging and/or nesting habitat for this species if still present on-site is not expected to threaten regional populations.

White-tailed kite was previously observed on-site; however, there were no recent records or observations of this species during the numerous surveys conducted in 2018 and 2019 and this species has not been documented to nest on-site. For white-tailed kite, which uses grasslands and marshes for foraging and isolated, dense-topped trees for nesting, the proposed project would impact 2.53 acres of non-native grassland, 5.87 acres of freshwater marsh, 0.09 acre of arroyo willow thicket, 4.07 acres of black willow thicket, and 2.67 acres of eucalyptus woodland. The proposed project would avoid 2.74 acres of non-native grassland, 0.15 acre of arroyo willow thicket, 0.06 acres of black willow thicket, and 0.11 acre of eucalyptus woodland, which would provide habitat for this species if still present on-site, as well as natural areas within the surrounding vicinity; thus, potential impacts to foraging and/or nesting habitat for these species are not expected to threaten regional populations. The proposed project would also create at least 6.58 acres of riparian woodland and an additional 5.88 acres of woody riparian and/or freshwater marsh wetland habitat.

Direct impacts to avian species during the non-breeding season would not be potentially significant as these species are mobile and would be expected to fly away from the construction area, if present. However, if construction and maintenance work cannot be scheduled outside of nesting season, impacts to nesting special-status bird species would be potentially significant. Implementation of Mitigation Measure BIO-3, prescribed below, would reduce impacts to a less than significant level.

Operation

The majority of proposed project impacts to biological resources would occur during project construction, and impacts associated with operations and maintenance activities of the reservoir are expected to be negligible and similar to the current operations and maintenance of the existing Syphon Reservoir. Similar to the current reservoir, operation of the proposed project would not require daily on-site staffing but, rather, would require only periodic maintenance. Water levels at Syphon Reservoir would fluctuate substantially and typically would follow a seasonal pattern wherein water would be stored in winter when recycled water supply exceeds demand, and the reservoir would be drawn down in summer when recycled water demand is high.

It is anticipated that a strip of opportunistic herbaceous vegetation and some woody riparian species may develop intermittently just below the reservoir’s upper inundation limit during periods when the reservoir is not full. If a fringe of incidental vegetation occasionally arises during periods when the reservoir is partly drained, such intermittent vegetation would be purely incidental and would not be associated with the proposed riparian woodland and freshwater marsh that are intended to be established around the perimeter of the reservoir. Any temporary habitat values provided by adventive vegetation below the “rim” of the filled reservoir would not be subject to protection or maintenance and are expected to be very short-lived since soils would not be expected to retain sufficient moisture for extended periods when the water level drops. Also, adventive vegetation below the upper fill level would disappear whenever the reservoir is completely refilled. As any vegetation that may develop around the fringe of the reservoir would not be maintained and is not expected to persist since soils will dry out quickly, it is not likely that such vegetation would provide suitable habitat for special-status species. However, it is possible that special-status birds, such as least Bell's vireo, yellow warbler, or yellow-breasted chat, could use such incidental fringe vegetation. Due to its operational requirements, it will not be practical, and IRWD will be under no obligation, to manage or protect such areas, and removal of such vegetation to avoid creating potential nesting habitat will not be considered a "new" impact as this area is not meant to be vegetated and should not provide potentially suitable nesting habitat that, if occupied, might interfere with operational requirements.

IRWD's operations and maintenance of the expanded Syphon Reservoir may not be construed to result in a "take" of a listed species. Rather, any incidental vegetation that may be allowed to develop briefly during drawdown of the reservoir would be considered to be an unintended indirect benefit to special-status wildlife species.

Maintenance of the created riparian and upland habitat areas around the perimeter at the maximum fill level is expected to continue for up to 5 years after construction is complete for the proposed habitat areas to meet success criteria and provide good quality wildlife habitat. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The riparian and upland habitat areas would be irrigated as needed from a main supply line installed around the perimeter of the reservoir that connects to the reservoir water source. When maintenance of the riparian and upland habitat areas involves vegetation removal (e.g., weeding) and cannot be scheduled outside of nesting season, such work could impact nesting special-status bird species, which could be potentially significant. Implementation of Mitigation Measure BIO-3, prescribed below, would reduce impacts to a less than significant level.

In addition, a walking trail is proposed to be made available for passive recreation along the south and western sides of the proposed project site. The trail will begin at the new permanent access road at Portola Parkway and Sand Canyon Avenue and traveling along that route, then across the dam crest. A large portion of the proposed walking trail will then follow the existing dirt access road along the Highline Canal alignment, and an additional extension is being considered to continue northeast past the Highline Canal to a northern access road. The proposed walking trail traverses through coastal sage scrub and disturbed coastal sage scrub communities (and direct impacts to vegetation are included in the construction impact acreages discussed above). Three least Bell's vireo territories, three California gnatcatcher occurrences, and one yellow-breasted chat occurrence were observed during 2019 surveys along habitat areas immediately adjacent to the existing Highline Canal and the associated dirt access road. No special-status wildlife species were observed along the alignment of the portion of the proposed trail from the existing Highline Canal along the northwestern boundary of the proposed project site to a northern access road. However, this area also contains coastal sage scrub and disturbed coastal sage scrub communities and, although not directly along the alignment, one least Bell's vireo territory, one California gnatcatcher occurrence, and one yellow-breasted chat occurrence were observed in the vicinity of the northern extent of the proposed walking trail during 2019 surveys. The property is currently closed to public use, so opening a walking trail would increase human use of the area. Noise from pedestrian use would be relatively minimal, and the northwestern boundary of the proposed project site is already subject to considerable noise from truck traffic on the adjacent Bee Canyon Access Road. Nevertheless, pedestrians on the trail could indirectly impact special-status wildlife species and such impacts may occasionally be potentially significant. Implementation of Mitigation Measure BIO-5, prescribed below, would reduce impacts to a less than significant level.

Mitigation Measures

BIO-1: IRWD has been engaged in close coordination with the Wildlife Agencies (i.e., USFWS and CDFW) since 2018 to develop a multi-faceted mitigation strategy to address impacts to California gnatcatcher, as well as to address the additional mitigation the agencies mandate to compensate for displacement of habitat and land previously set aside for mitigation and subject to the restrictions and requirements imposed under the Mitigation Grant Deed, of which USFWS is a third party beneficiary. To date, IRWD has researched numerous off-site lands with high value habitat and biological resources, and initiated negotiations with landowners for possible acquisition. IRWD shall implement one, or a combination, of the following measures to mitigate permanent impacts to special-status wildlife species:

a. Use of Incidental Take Credits for participating landowners (within the Reserve, or outside of the Reserve) to offset permanent impacts to coastal sage scrub (e.g., California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/non-native herbaceous cover, and non-native herbaceous cover/California sagebrush scrub) at a 1:1 impact-to-mitigation ratio.

b. On- and/or off-site creation, restoration, and/or enhancement containing natural communities suitable for special-status species or comparable, as determined acceptable by the USFWS and CDFW.

c. Off-site land acquisition, preservation, creation, restoration, and/or enhancement containing natural communities suitable for special-status species or comparable, as determined acceptable by the USFWS and CDFW.

d. Areas where temporary impacts occur would be returned to pre-project conditions (i.e., pre-project elevation contours and revegetated with native upland scrub species) within one-year after construction is completed, and will be monitored for three years, or until a qualified biologist determines that the project site has returned to pre-project conditions. A revegetation plan would be prepared to re-seed/re-plant the area with local species, and would include performance standards, success criteria, maintenance, and future monitoring.

BIO-2: In accordance with the NCCP/HCP, certain construction-related mitigation measures are required to minimize impacts to the coastal California gnatcatcher and other coastal sage scrub species. The removal of coastal sage scrub communities will be conducted in compliance with the NCCP/HCP's Construction Related Minimization Measures:

a. To the maximum extent practicable, no grading of coastal sage scrub habitat that is occupied by nesting gnatcatchers will occur during the breeding season (February 15 through July 15).

b. Prior to the commencement of grading operations or other activities involving significant soil disturbance, all areas of coastal sage scrub habitat to be avoided under the provisions of the NCCP/HCP shall be identified with temporary fencing or other markers clearly visible to construction personnel. Additionally, prior to the commencement of grading operations or other activities involving disturbance of coastal sage scrub, a survey will be conducted to locate gnatcatchers and cactus wrens within 100 feet of the outer extent of projected soil disturbance activities and the locations of any such species shall be clearly marked and identified on the construction/grading plans.

c. A monitoring biologist, acceptable to USFWS/CDFW, will be on-site during any clearing of coastal sage scrub. IRWD will advise USFWS/CDFW at least seven calendar days (and preferably fourteen calendar days) prior to the clearing of any habitat occupied by Identified Species[9] to allow USFWS/CDFW to work with the monitoring biologist in connection with bird flushing/capture activities. The monitoring biologist will flush Identified Species (avian or other mobile Identified Species) from occupied habitat areas immediately prior to brush-clearing and earth-moving activities. If birds cannot be flushed, they will be captured in mist nets, if feasible, and relocated to areas of the site to be protected or to the NCCP/HCP Reserve System. It will be the responsibility of the monitoring biologist to assure that Identified bird species will not be directly impacted by brush-clearing and earth-moving equipment in a manner that also allows for construction activities on a timely basis.

d. Following the completion of initial grading/earth moving activities, all areas of coastal sage scrub habitat to be avoided by construction equipment and personnel will be marked with temporary fencing and other appropriate markers clearly visible to construction personnel. No construction access, parking, or storage of equipment or materials will be permitted within such marked areas.

e. In areas bordering the NCCP Reserve System or Special Linkage/Special Management areas containing significant coastal sage scrub identified in the NCCP/HCP for protection, vehicle/equipment transportation routes and staging areas will be restricted to a minimum number during construction consistent with project construction requirements. Waste dirt or rubble will not be deposited on adjacent coastal sage scrub identified in the NCCP/HCP for protection. Pre-construction meetings involving the monitoring biologist, construction supervisors, and equipment operators will be conducted and documented to ensure maximum practicable adherence to these measures.

f. Coastal sage scrub identified in the NCCP/HCP for protection and located within the likely dust drift radius of construction areas shall be periodically sprayed with water to reduce accumulated dust on the leaves as recommended by the monitoring biologist.

BIO-3: Impacts to nesting birds would be avoided by conducting all clearing and grubbing outside of the bird nesting season (i.e., work should occur September 1 to February 14, or July 1 to January 14 for raptors). If clearing and grubbing cannot avoid the bird nesting season, the following measures would be implemented:

a. Prior to work during the bird nesting season (February 15 to August 31, or January 15 to June 31 for raptors), a qualified biologist should conduct a pre-construction survey of all suitable habitat for the presence of nesting birds no more than 7 days prior to construction and/or maintenance activities. The results of the pre-construction survey would be valid for 7 days; if vegetation removal activities do not

9 NCCP/HCP Identified Species that occur, or have potential to occur, on-site include the following: coastal California gnatcatcher, coastal cactus wren, orange-throated whiptail, coastal western whiptail, red-diamond rattlesnake, coast horned lizard, northern harrier, sharp-shinned hawk, prairie falcon, American peregrine falcon, red-shouldered hawk, southern California rufous-crowned sparrow, San Diego desert woodrat, gray fox, and coyote.

commence within 7 days following the survey, a new pre-construction nesting bird survey should be conducted before these activities begin again. If no active nests are found, then no further mitigation is required.

b. If any active nests are found during a pre-construction nesting bird survey, a buffer of 300 feet (500 feet for raptors), or as determined appropriate by the qualified biologist (based on species-specific tolerances and site-specific conditions) in consultation with IRWD, would be delineated, flagged, and avoided until the nesting cycle is complete (i.e., the qualified biologist determines that the young have fledged or the nest has failed). The qualified biologist may also recommend other measures to minimize disturbances to the nest, which may include, but are not limited to, erection of sound barriers (e.g., noise blankets), erection of visual barriers (e.g., hay bales), or full-time monitoring by a qualified biologist.

BIO-4: With the creation of on-site riparian and wetland habitat areas, as part of the proposed project, there will be no net loss of woody riparian habitat for least Bell's vireo and no net loss of any wetland habitat. Nevertheless, there will be a temporary loss of these habitats until construction is completed and riparian habitat can be reestablished that the species can use again. IRWD is engaged with the Wildlife Agencies and is collaboratively developing a comprehensive program to address temporal impacts to least Bell's vireo and other riparian-associated special-status wildlife species (e.g., yellow warbler, yellow-breasted chat). IRWD shall implement the following measure to compensate for temporal impacts to least Bell's vireo and associated riparian special-status wildlife species (e.g., yellow warbler, yellow-breasted chat):

a. Off-site land acquisition and preservation, and/or creation, restoration, and/or enhancement, of areas containing habitat suitable for least Bell's vireo and associated riparian special-status wildlife species (e.g., yellow warbler, yellow-breasted chat) to compensate for temporal loss in an amount or at a ratio determined acceptable by the USFWS and CDFW. Any private lands acquired and/or restored for this mitigation would be permanently preserved and dedicated for habitat conservation.

BIO-5: IRWD shall implement the following measure to mitigate indirect impacts to special-status wildlife species:

a. Educational signage shall be posted at the entrances of the proposed walking trail to inform the public about the sensitive biological resources in the area and local wildlife in the area (e.g., rattlesnakes, coyotes). Signage would also be posted periodically along the proposed trail to remind public to keep on the trail and out of sensitive habitat areas.

b. The proposed trail shall only be open during daylight hours (e.g., dawn to dusk).

c. A Resource Management Plan (RMP) shall be prepared to outline long-term maintenance and management responsibilities for the preservation of the biological resources on-site (e.g., invasive species management, monitoring access issues, off-trail use, erosion, trash). The RMP should also provide guidance to ensure that all operations and maintenance activities performed on-site must also comply with all applicable requirements of the NCCP/HCP and the preservation of the biological resources on-site. The RMP would also outline monitoring requirements for species populations for federal and state-listed species (i.e., least Bell's vireo and California gnatcatcher).

Significance Determination

Less than Significant Impact with Mitigation

Riparian Habitat or Other Sensitive Natural Community

Impact 3.3-2: The proposed project could have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Construction

Table 3.3-3 summarizes the permanent and temporary impacts on natural communities from the proposed project (shown in **Figure 3.3-10**). Ten sensitive natural communities occur within the project site: arroyo willow thicket, black willow thicket, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/coyote brush scrub, chaparral bushmallow scrub/non-native herbaceous cover, California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coast prickly pear scrub, and non-native herbaceous cover/California sagebrush scrub (shown in **Figure 3.3-11**).

The proposed project would permanently impact 61.56 acres (with Treatment Facility Option A[10])/61.68 acres (with Treatment Facility Option B) acres of sensitive natural communities, including 0.09 acre of arroyo willow thicket, 4.07 acres of black willow thicket, 0.77 acre of coyote brush scrub, 0.19 acre of chaparral bushmallow scrub, 0.06 acre of chaparral bushmallow scrub/non-native herbaceous cover, 27.22 acres (with Option A)/27.34 acres (with Option B) of California sagebrush scrub, 0.98 acre of California sagebrush scrub/non-native herbaceous cover, and 28.18 acres of non-native herbaceous cover/California sagebrush scrub. The proposed project would temporarily impact 0.85 acre of California sagebrush scrub. The proposed project would avoid 121.37 acres (with Option A)/121.25 acres (with Option B) of sensitive natural communities (including 0.15 acre of arroyo willow thicket, 0.06 acre of black willow thicket, 0.14 acre of coyote brush scrub, 0.26 acre of chaparral bushmallow scrub, all 0.49 acre of chaparral bushmallow scrub/coyote brush scrub, 4.66 acres of chaparral bushmallow scrub/non-native herbaceous cover, 64.52 acres [with Option A]/64.40 acres [with Option B] of California sagebrush scrub, 6.88 acres of California sagebrush scrub/non-native herbaceous cover, all 0.69 acre of coast prickly pear scrub, and 43.52 acres of non-native herbaceous cover/California sagebrush scrub within the proposed project site.

---

10 The potential locations of the treatment facilities, which would be determined during detailed design, are depicted in Figures 13 and 14 (labeled as Treatment Facility Option A and Option B). Only one treatment facility in one of the optional locations will be built-out as part of the proposed project.

TABLE 3.3-3
IMPACTS TO NATURAL COMMUNITIES

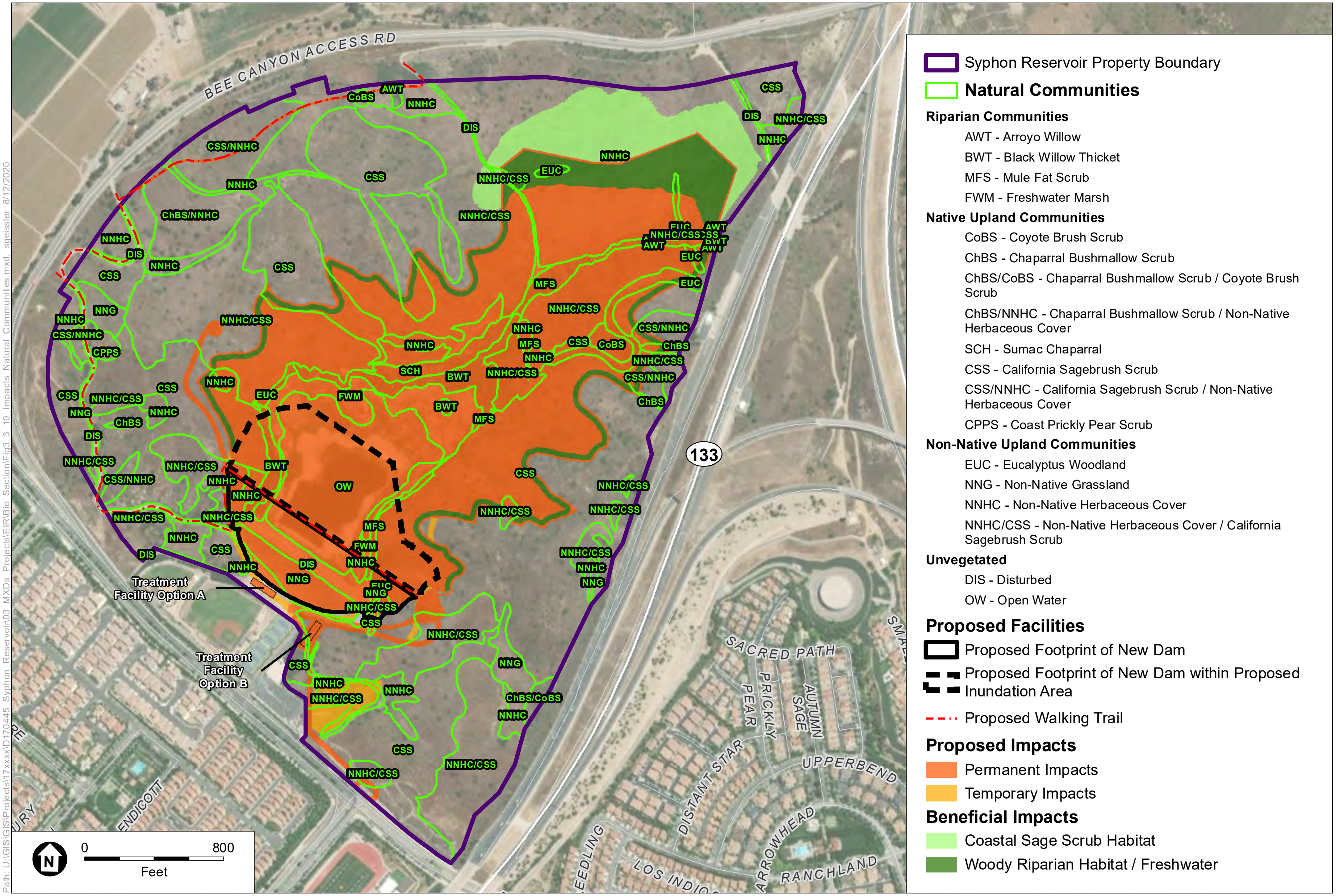
Natural Community	Existing (Acres)	Permanent Impacts (Acres)	Permanent Beneficial Impacts*** (Acres)	Temporary Impacts (Acres)	Total Impacts (Acres)	Avoided (Acres)
Riparian Communities						
Arroyo Willow Thicket*	0.24	0.07	0.02	-	0.09	0.15
Black Willow Thicket*	4.13	4.06	0.01	-	4.07	0.06
Mule Fat Scrub	2.25	2.23	0.02	-	2.25	-
Freshwater Marsh	5.87	5.87	-	-	5.87	-
Native Upland Communities						
Coyote Brush Scrub**	0.91	0.77	-	-	0.77	0.14
Chaparral Bushmallow Scrub**	0.45	0.14	0.05	-	0.19	0.26
Chaparral Bushmallow Scrub/Coyote Brush Scrub**	0.49	-	-	-	-	0.49
Chaparral Bushmallow Scrub/Non-Native Herbaceous Cover**	4.72	0.06	-	-	0.06	4.66
Sumac Chaparral	1.63	1.63	-	-	1.63	-
California Sagebrush Scrub**	91.74	23.22/23.34****	3.15	0.85	27.22/27.34****	64.52/64.40****
California Sagebrush Scrub**/Non-Native Herbaceous Cover	7.86	0.70	0.28	-	0.98	6.88
Coast Prickly Pear Scrub*	0.69	-	-	-	-	0.69
Non-Native Upland Communities						
Eucalyptus Woodland	2.78	2.32	0.37	-	2.67	0.11
Non-Native Grassland	5.27	2.46	-	0.07	2.53	2.74
Non-Native Herbaceous Cover	44.16	10.98	15.89	0.38	27.25	16.91
Non-Native Herbaceous Cover/California Sagebrush Scrub**	71.70	24.14	3.07	0.97	28.18	43.52
Unvegetated Areas						
Open Water	13.93	13.93	-	-	13.93	-
Disturbed	6.92	3.26/3.14****	0.05	0.43	3.74/3.62****	3.18/3.30****
Total	**265.74**	**95.84**	**22.91**	**2.70**	**121.43**	**144.31**

* Asterisk indicates that an alliance/association is considered sensitive by CDFW.

** Double asterisk indicates that an alliance/association that is a covered habitat type under the NCCP/HCP and is therefore considered a sensitive natural community.

*** Although these areas will be permanently impacted by the proposed project, they will be replaced by the creation of riparian and upland habitat areas on-site, which in some cases may have an equivalent or beneficial effect.

**** Indicates impact acreages for Option A/Option B, which were calculated for the Proposed Filter/Chlorination/De-chlorination Facility Option A or Option B. Only one option will be selected.

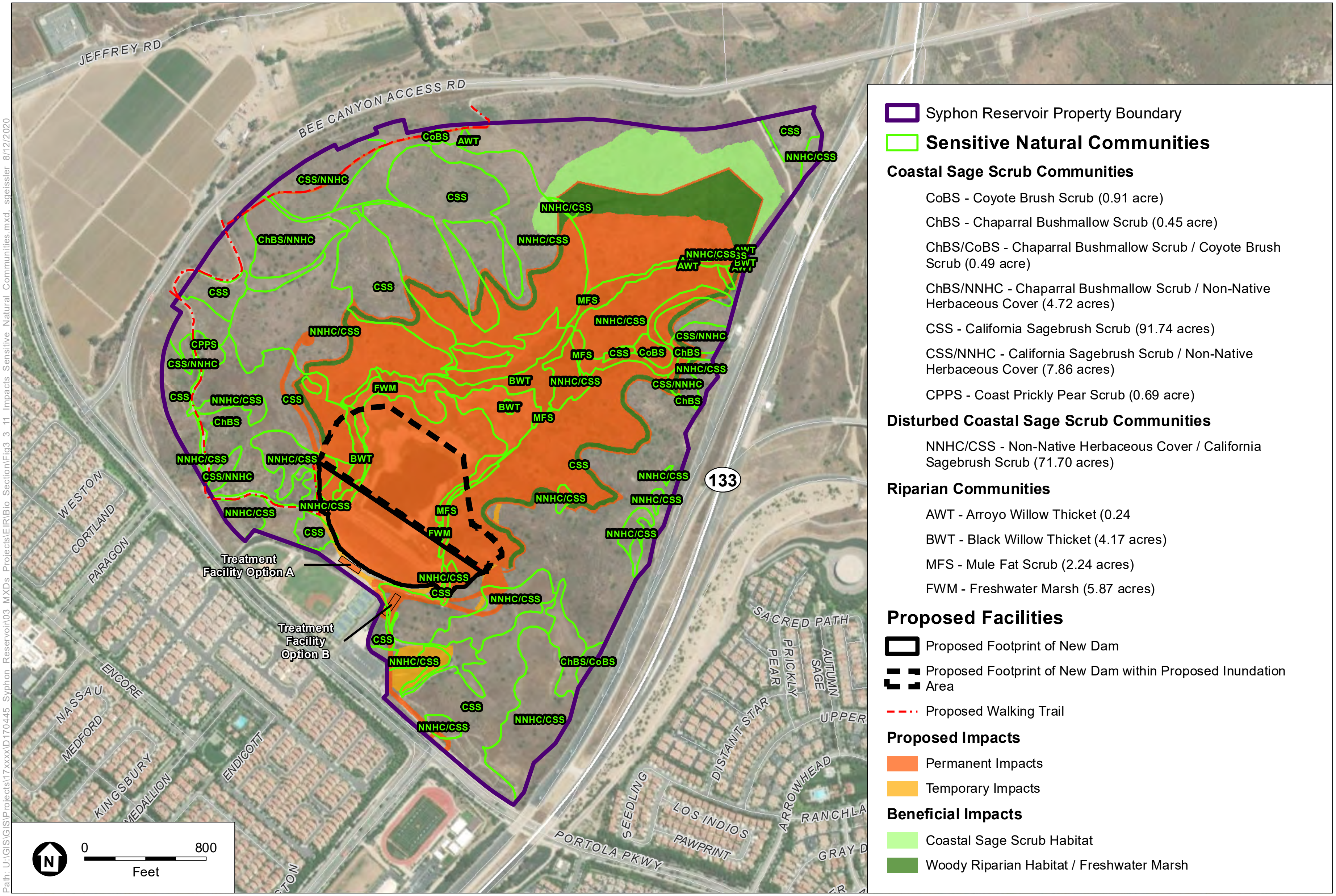


SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-10
Impacts to Natural Communities

ESA



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-11
Impacts to Sensitive Natural Communities

ESA

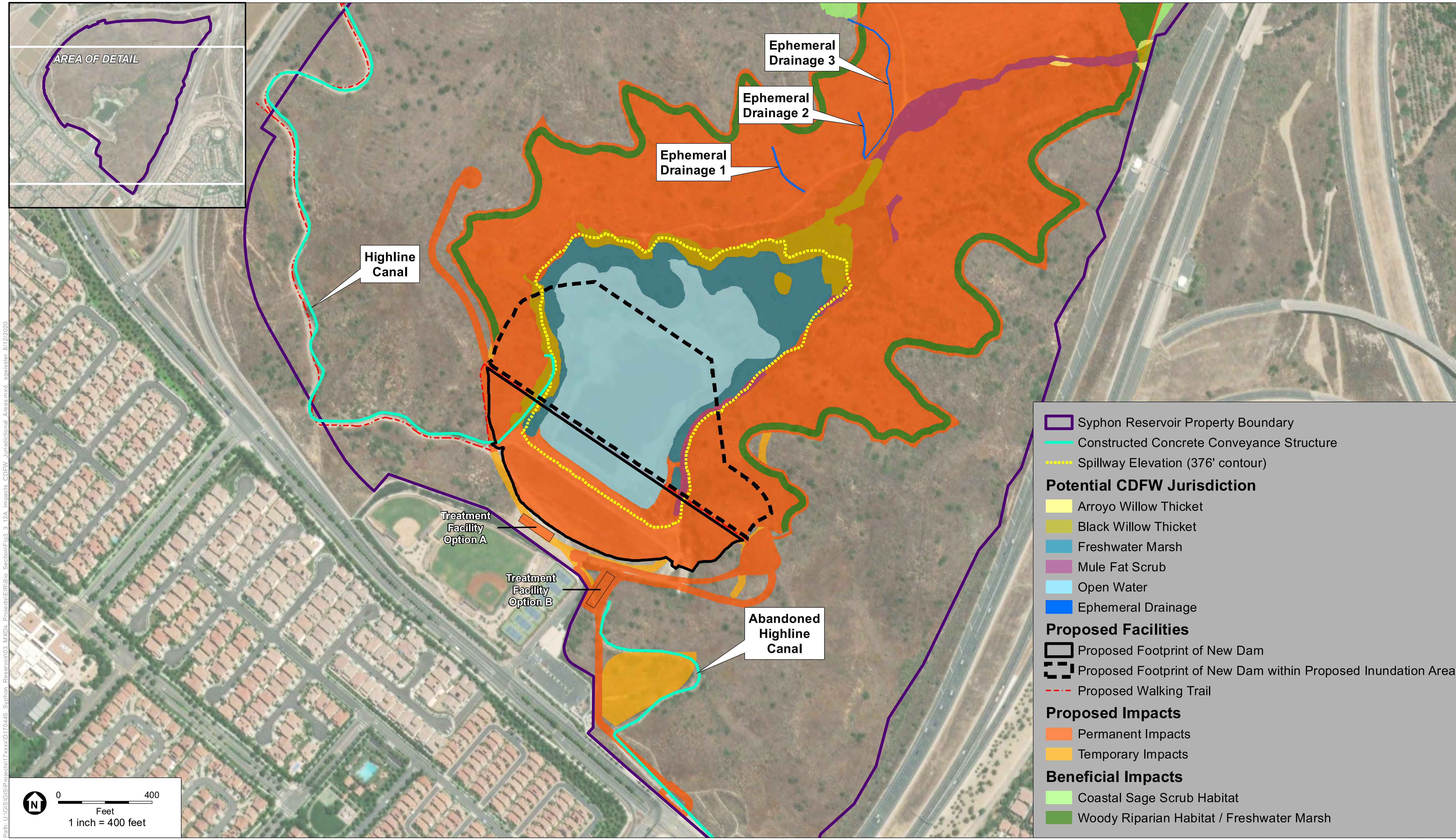
The proposed project would also create at least 6.58 acres of riparian woodland, and approximately 5.88 acres of additional woody riparian and/or freshwater marsh habitat. The proposed project would also potentially add more than 10 acres of coastal sage scrub habitat where it is planned to be restored on the slope that will be cut northeast of the proposed reservoir to make space for the on-site riparian/wetland habitat areas. Impacts to sensitive natural communities that would result from the proposed project would be potentially significant. Implementation of Mitigation Measure BIO-6, prescribed below, would reduce impacts to a less than significant level.

In addition, a large portion of the proposed project site contains riparian and freshwater marsh habitat as well as the open water associated with the existing reservoir, which are all considered to be subject to CDFW jurisdiction, which includes lakes, streams, and associated vegetation. The proposed project would temporarily impact 26.35 acres of CDFW jurisdictional lakes, streams, and associated vegetation, of which 0.05 acre would be considered a beneficial impact (i.e., the areas will be impacted to create riparian woodland or freshwater marsh habitat). **Table 3.3-4** summarizes the temporary impacts on CDFW jurisdictional riparian habitat from the proposed project (shown in **Figure 3.3-12A**). The proposed project would avoid 0.20 acre of CDFW jurisdictional lakes, streams, and associated vegetation within the proposed project site. The proposed project would also create at least 6.58 acres of on-site riparian woodland and approximately 5.88 acres of additional on-site woody riparian and/or freshwater marsh habitat and enlarge the reservoir, which would expand the open water resources on-site. Thus, the proposed project would result in a beneficial impact, which would increase the amount of CDFW jurisdictional riparian habitat, and impacts would be less than significant. Because the proposed project will be altering a substantial area subject to CDFW jurisdiction, the proposed project must comply with Mitigation Measure BIO-7, prescribed below, to obtain a Streambed Alteration Agreement from CDFW.

TABLE 3.3-4
IMPACTS TO CDFW POTENTIALLY JURISDICTIONAL AREAS

Jurisdiction Types	Existing (Acres)	Permanent Impacts (Acres)	Permanent Beneficial Impacts* (Acres)	Temporary Impacts (Acres)	Total Impacts (Acres)	Avoided (Acres)
CDFW Lakes, Streams, and Associated Vegetation	26.55	26.30	0.05	-	26.35	0.20
Total	**26.55**	**26.30**	**0.05**	**0.0**	**26.35**	**0.20**

* Although these areas will be permanently impacted by the proposed project, they will have the beneficial effect of creating riparian and upland habitat areas on-site.



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 3.3-12A
Impacts to CDFW Jurisdictional Areas

ESA

This page intentionally left blank

Operation

The majority of the proposed project's impacts to biological resources, including the beneficial impact of creating wetland/riparian areas, will occur during the proposed project's construction, and impacts associated with operations and maintenance activities of the reservoir are expected to be negligible and similar to the current operations and maintenance of the existing Syphon Reservoir.

Maintenance of the created riparian/wetland habitat areas, which will include creation of sensitive riparian communities that include riparian habitat subject to CDFW regulatory jurisdiction, would be required for up to 5 years after construction is complete for the proposed habitat areas to meet success criteria and provide good quality wildlife habitat. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The work will promote establishment of the habitat that will replace the existing riparian/wetland habitat area currently subject to CDFW jurisdiction. Reestablishing an equivalent or greater area of such habitat would be considered to have a beneficial impact as it would result in no net loss of CDFW jurisdictional area.

Mitigation Measures

BIO-6: IRWD shall implement one, or a combination, of the following measures to mitigate impacts to sensitive natural communities:

a. Use of Incidental Take Credits for NCCP/HCP participating landowners (within the Reserve, or outside of the Reserve) to offset permanent impacts to coastal sage scrub (e.g., California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/non-native herbaceous cover, and non-native herbaceous cover/California sagebrush scrub) at a 1:1 impact-to-mitigation ratio.

b. On- and/or off-site land acquisition and preservation, and/or creation, restoration, and/or enhancement of sensitive natural communities comparable or equivalent to a 1:1 impact-to-mitigation ratio, or as determined acceptable by the USFWS and CDFW.

c. Areas where temporary impacts occur to sensitive natural communities (e.g., California sagebrush scrub) would be returned to pre-project conditions (i.e., pre-project elevation contours and revegetation initiated) within one-year after the construction is completed, and will be monitored for three years, or until a qualified biologist determines that affected natural communities have been restored to equivalent or better condition as compared to pre-project conditions. A revegetation plan would be prepared to re-seed/re-plant the area with locally indigenous native species, and would include performance standards, success criteria, maintenance, and future monitoring.

BIO-7: IRWD shall negotiate and execute a Lake or Streambed Alteration Agreement under Section 1602 of the California Fish and Game Code with CDFW.

Significance Determination

Less than Significant Impact with Mitigation

State or Federally Protected Wetlands

Impact 3.3-3: The proposed project would not have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Construction

In response to a request to review the resources on-site as described in the delineation report, the USACE issued an Approved Jurisdictional Determination letter (Appendix C), which confirmed that waters of the U.S. do not occur within the proposed project site since Syphon Reservoir is an intrastate isolated water with no apparent interstate or foreign commerce connection (USACE 2018). The CWA also excludes certain features from this regulation, including "wastewater recycling facility constructed on dry land" (see 33 CFR §230.3 (o)(2)(vii)). Thus, jurisdictional features identified are only subject to the jurisdiction of the State (i.e., wetlands and non-wetland waters of the State [discussed in this section below], and CDFW lakes, streams, and associated vegetation [previously discussed above]).

The proposed project would permanently impact 18.28 acres of wetlands and waters of the State (4.33 acres of wetlands, 13.95 acres of non-wetland waters of the State). **Table 3.3-5** summarizes the impacts on wetlands and waters of the State from the proposed project (shown in **Figure 3.3-12B**). The proposed project would also create 5.88 acres of freshwater marsh wetland habitat and enlarge the reservoir, which would expand the open water resources on-site. Thus, the proposed project would result in a beneficial impact, which would increase the amount of potential RWQCB jurisdictional wetlands and water of the State, and impacts would be less than significant.

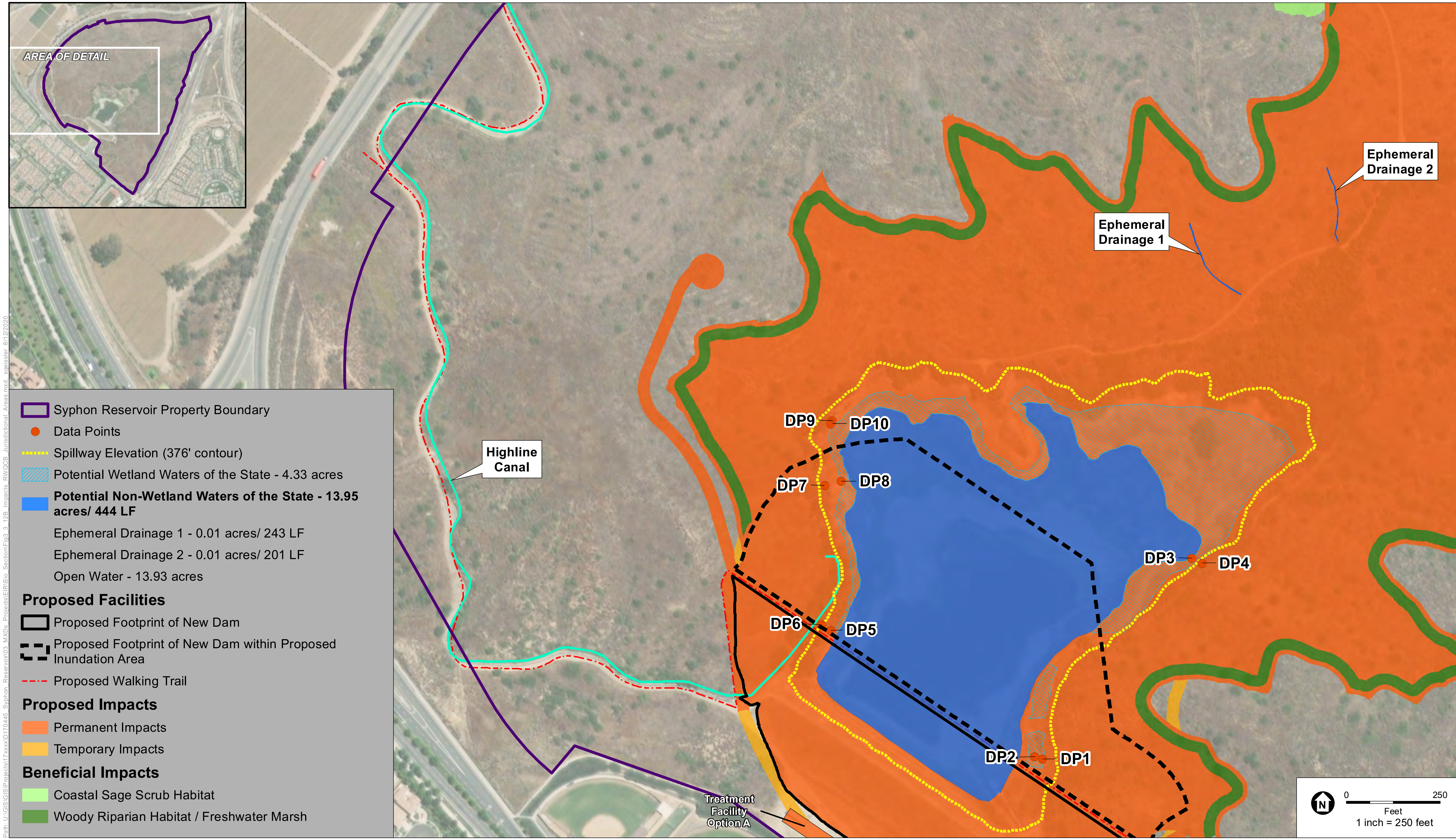
TABLE 3.3-5
IMPACTS TO RWQCB POTENTIALLY JURISDICTIONAL AREAS

Jurisdiction Types	Existing (Acres)	Permanent Impacts (Acres)	Permanent Beneficial Impacts* (Acres)	Temporary Impacts (Acres)	Total Impacts (Acres)	Avoided (Acres)
Wetland Waters of the State	4.33	4.33	-	-	4.33	-
Non-Wetland Waters of the State	13.95	13.95	-	-	13.95	-
Total	**18.28**	**18.28**	**0.0**	**0.0**	**18.28**	**0.0**

* Although these areas will be permanently impacted by the proposed project, they will have the beneficial effect of creating riparian and upland habitat areas on-site.

Operation

The majority of the proposed project's impacts to biological resources, including the beneficial impact of creating more jurisdictional wetlands and water of the State, will occur during project construction, and impacts associated with operations and maintenance activities of the reservoir are expected to be negligible and similar to the current operations and maintenance of the existing Syphon Reservoir.



SOURCE: ESRI, 2016

Syphon Reservoir Geotechnical Investigations Project

Figure 3.3-12B
Impacts to RWQCB Jurisdictional Areas

ESA

This page intentionally left blank

Maintenance of the created wetland areas would be required for up to 5 years after construction is complete to ensure success of the vegetated areas. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. Operations and maintenance efforts to establish and maintain the proposed riparian/wetland habitat around the fringe of the future reservoir would avoid a net loss of areas subject to RWQCB jurisdiction and would therefore have a beneficial impact.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Wildlife Corridors

Impact 3.3-4: The proposed project could interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

Construction

The existing toll roads (SR-133 and SR-241) effectively stop most terrestrial wildlife movement from the proposed project site to the west and Portola Parkway and dense suburban development also block most wildlife from proceeding to the south. Nevertheless, the proposed project site lies at the southeastern edge of a large contiguous block of habitat that is an important element in the context of regional wildlife movement, particularly for avian species (e.g., dispersal habitat for coastal California gnatcatcher within this region). The reservoir is also one of several local water sources that attracts a number of avian species and provides habitat for migrating birds. Thus, the proposed project site functions as a part of a wildlife movement corridor from a regional perspective, as well as providing live-in and movement habitat for a variety of species on a local scale.

The proposed project would temporarily drain the existing reservoir, which is used by a number of birds and other wildlife for water supply and foraging. IRWD already periodically drains the reservoir as part of its current normal operations; however, the reservoir will be drained until project completion. It should be noted that Rattlesnake Reservoir, located just 1.1 miles to the north-northwest, could be utilized as a water source and for riparian habitat by migratory species moving through the region. The proposed project would impact 121.43 acres of natural communities during construction on-site, which could disrupt local movement and displace wildlife within the proposed project's footprint, particularly within the riparian habitats on-site. The proposed project would avoid 144.31 acres of natural communities; thus, displaced wildlife utilizing upland habitats can disperse to other upland areas on-site, and the impacted areas would not inhibit local or regional movement of wildlife within these avoided areas of the proposed project site, though wildlife that is more sensitive to human disturbances and noise may be deterred by the nearby construction activities. Once completed, the enlarged reservoir will provide greater water storage capacity and an expanded open water area for migrating birds, and the proposed project will create at least 6.58 acres of on-site riparian woodland, approximately 5.88 acres of additional on-site woody riparian and/or freshwater marsh habitat that would be maintained to consistently provide habitat year-round, which would be a benefit to migratory species. In addition, approximately 10.47 acres of coastal sage scrub habitat would be created in an area northeast of the reservoir that currently exhibits predominantly low-value ruderal grassland. Therefore, with the creation of the on-site riparian and upland habitat, impacts to local movement are not expected to be significant. Thus, impacts to regional and local wildlife movement are considered less than significant, and no mitigation is required.

Regarding the proposed project's potential to "impede the use of native wildlife nursery sites", to the extent mass grading and construction activities occur during the breeding season and in close proximity to active nests or suitable nesting habitat, the proposed project may have potentially significant direct impacts. Nesting activity typically occurs from February 15 to August 31 (or January 15 to June 31 for raptors). Active nests and eggs are protected under Fish and Wildlife Code Section 3503. Impacts to any active songbird or raptor nests would violate State law and may be considered potentially significant, particularly with regard to special-status bird species. Implementation of Mitigation Measure BIO-3 would avoid violation of the Fish and Game Code and reduce potential impacts to special-status birds to a less than significant level.

Operation

The majority of the proposed project's impacts to biological resources will occur during proposed project construction, and impacts associated with operations and maintenance activities of the reservoir are expected to be negligible and comparable to the current operations and maintenance of the existing Syphon Reservoir. Similar to the current reservoir, operation of the proposed project would not require daily on-site staffing but, rather, would require only periodic maintenance. Water levels at Syphon Reservoir would fluctuate substantially and typically will follow a seasonal pattern wherein water would be stored in winter when recycled water supply exceeds demand, and the reservoir would be drawn down in summer when recycled water demand is high.

Maintenance of the created riparian and upland habitat areas would be required for up to 5 years after construction is complete for the proposed habitat areas to meet success criteria and provide good quality wildlife habitat. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The riparian and upland habitat areas would be irrigated as needed from a main supply line installed around the perimeter of the reservoir that connects to the reservoir water source. When maintenance of the riparian and upland habitat areas involves vegetation removal (e.g., weeding) and cannot be scheduled outside of nesting season, such work could impact nesting bird species, which could be potentially significant. Implementation of Mitigation Measure BIO-3 would reduce impacts to a less than significant level.

In addition, a walking trail is proposed along the northwestern boundary of the proposed project site. The proposed walking trail traverses through coastal sage scrub and disturbed coastal sage scrub communities (and direct impacts to vegetation are included in the construction impact acreages discussed above). The property is currently closed to public use, but a proposed walking trail would increase human use of the area. However, the level of activity and disturbance associated with people occasionally using the proposed trail would not impede local wildlife movement through the area. Thus, impacts would be less than significant and no mitigation is required.

Mitigation Measures

Implement Mitigation Measure BIO-3

Significance Determination

Less than Significant Impact with Mitigation

County Policies or Ordinances

Impact 3.3-5: The proposed project could conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

Construction

The General Plan's Land Use Element Policy 9, Enhancement of Environment ensures that all land use activities seek to enhance the physical environment, including the air, water, sound levels, landscape, and plant and animal life, and recognizes the need to improve both the manmade and natural environments. Where aspects of the natural environment are deemed to be truly significant, this policy requires measures be taken to preserve these aspects. The proposed project's objective is to increase the recycled water storage capacity at Syphon Reservoir in order to meet the seasonal demand of recycled water customers and to enhance IRWD's water supply reliability. Plant and animal life that may be disrupted by the proposed project will be offset through the creation of riparian and upland habitat areas and proposed mitigation, so while these created habitat and mitigation areas may not enhance the physical environment, they will ensure the preservation of biologically equivalent plant and wildlife resources. Thus, the proposed project would not conflict with this policy.

The General Plan's Resources Element Policy 1, Wildlife and Vegetation requires the identification and preservation of the significant wildlife and vegetation habitats of the County. As discussed above, impacts to special-status species and sensitive natural communities are analyzed and mitigation is proposed for impacts that are determined to be potentially significant. Implementation of Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, and BIO-6 would reduce impacts to a less than significant level.

Operation

As discussed above, impacts associated with operations and maintenance activities of the reservoir are expected to be negligible and similar to the current operations and maintenance of the existing Syphon Reservoir.

If maintenance of the riparian and upland habitat areas includes vegetation removal (e.g., weeding) and cannot be scheduled outside of nesting season, impacts to nesting special-status bird species, would be potentially significant. Implementation of Mitigation Measure BIO-3 would reduce impacts to a less than significant level.

Mitigation Measures

Implement Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, and BIO-6

Significance Determination

Less than Significant Impact with Mitigation

Habitat Conservation Plan

Impact 3.3-6: The proposed project could conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Construction

The proposed project site is within the Central Subregion of the County of Orange NCCP/HCP, and is located with the NCCP/HCP Reserve. IRWD is participating landowner and a signatory of the Central & Coastal Subregion NCCP/HCP. The NCCP/HCP included provisions for IRWD to build a future reservoir “as a permitted use within the Reserve System” (R.J. Meade Consulting 1996a). At the time that the NCCP/HCP was prepared, IRWD had identified and was considering four alternative seasonal recycled water storage reservoirs (including the Syphon Reservoir site), all of which were located within the subregional Reserve System, though only one reservoir would ultimately be needed. Thus, the need for a future reservoir was identified as “a permitted use within the Reserve System in the event that public health, safety, and welfare require such a facility in the future. At the time such a facility is needed, IRWD will review the plans with appropriate agencies and propose a specific mitigation plan or pay fees adequate to mitigate the Incidental Take associated with the new reservoir” (R.J. Meade Consulting 1996a).

The proposed Syphon Reservoir Improvement Project is a permitted use within the Reserve System. Compliance with specific conditions required for NCCP/HCP conditionally covered species (i.e., least Bell’s vireo) are discussed above. However, the removal of coastal sage scrub communities would be considered potentially significant. Implementation of Mitigation Measures BIO-1 and BIO-2 would reduce impacts to a less than significant level.

Operation

The operations and maintenance activities of the reservoir are expected to be similar to the current operations and maintenance of the existing Syphon Reservoir.

Maintenance of the created upland habitat areas would be required for up to 5 years after construction is complete to ensure success of the vegetated areas. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The upland habitat areas would be irrigated from a main supply line installed around the perimeter of the reservoir that connects to the reservoir water source. When maintenance of the riparian and upland habitat areas involves vegetation removal (e.g., weeding) and cannot be scheduled outside of nesting season, such work could impact nesting special-status bird species, which could be potentially significant. Implementation of Mitigation Measure BIO-3 would reduce impacts to a less than significant level, and thus would not conflict with the provisions of the Central & Coastal Subregion NCCP/HCP.

Mitigation Measures

Implement Mitigation Measures BIO-1, BIO-2, and BIO-3

Significance Determination

Less than Significant Impact with Mitigation

Cumulative Impacts

Impact 3.3-7: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to biological resources.

Construction and Operation

The cumulative projects to be considered in the analysis of cumulative impacts are listed in Table 3-1 and illustrated on Figure 3-1 in Section 3 of this Draft EIR. The projects listed in Table 3-1 include a range of project types, including residential and commercial development, and park construction and improvements, that could contain biological resources. The geographic area of analysis of cumulative impacts for biological resources includes the area bounded by those projects listed in Table 3-1 and generally corresponds to the portion of Orange County along the front of the Santiago Hills in the vicinity of the proposed project, as well as adjacent mountains and lowlands to the east and west, respectively. This geographic scope of analysis is appropriate because the biological resources within this area are expected to be similar to those that occur on the proposed project site because of their proximity, and because similar habitats, landforms, and hydrology are likely to support a similar composition of plant and wildlife species. However, the greater Central Subregion of the NCCP/HCP (as shown on Figure 3.3-1) is also considered in the context of this cumulative impacts' analysis for biological resources.

Cumulative impacts to biological resources could occur if other related projects, in conjunction with the proposed project, had or would have impacts on biological resources that, when considered together, would be significant. These projects could be constructed simultaneously in areas proximate to, or overlapping geographically with the proposed project. Construction and operation of the proposed project, in combination with other projects in the area, has the potential to contribute to a cumulatively significant impact to biological resources due to the potential disturbance and/or loss of natural communities, some of which are sensitive, and the wildlife species that they support, including special-status species unique to the region.

Cumulative Projects 1 (Peters Canyon Regional Park General Development Plan and Resource Management Plan) and Cumulative Project 2 (2014 Irvine Ranch Open Space Donation Interim Recreation and Resource Management Plan) are proposed within areas that support native habitat, and Peters Canyon Regional Park has known locations of California gnatcatchers and least Bell's vireo; however, both of these projects include recreational improvements (e.g., trail/trailhead improvements, and associated facilities) that will have minimal impacts on biological resources. Cumulative Projects 3, 4, 6, 7, and 17 include a park, residential developments, and a pump station, and all are located on sites that currently or formerly support agriculture; thus, impacts on biological resources are minimal. For all of these projects, significant impacts to biological resources will be mitigated to a less than significant level.

The proposed project site is within the Central Subregion of the Central/Coastal NCCP/HCP. The NCCP/HCP Reserve System design has set aside approximately 37,000 acres within the NCCP/HCP Reserve for long-term management. By preserving large habitat blocks and maintaining connectivity, the NCCP/HCP Reserve System has minimized the cumulative impacts of projects in the region to allow for the protection of natural communities and species while allowing a reasonable amount of economic development in the region. The NCCP/HCP authorizes "take" of 39 "Identified Species" of plants and wildlife to the extent take authorization may be required for those species under the state or federal endangered species acts. The NCCP/HCP addresses the protection and management of coastal sage scrub habitat and coastal sage scrub-obligate species, and other covered habitats and species, and mitigates anticipated impacts to those habitats and species, on a programmatic, sub-regional level, rather than on a project-by-project, single species basis. The 37,000-acre NCCP/HCP Reserve System, adaptive management program, and other measures of the NCCP/HCP were determined to fully mitigate "take" of these species and habitats, and minimize the cumulative impacts of proposed projects within authorized take lands. Conditionally covered species are also authorized for "take" so long as the specific conditions (e.g., mitigation measures) outlined in the NCCP/HCP are implemented.

Mitigation measures are included in this EIR to reduce potentially significant proposed project impacts to biological resources during construction and operation and to comply with the NCCP/HCP, which would reduce the proposed project's incremental contribution to cumulative impacts.

- Mitigation Measure BIO-1 requires mitigation for impacts to coastal sage scrub and the California gnatcatcher, as well as addressing additional mitigation the agencies mandate to compensate for displacement of habitat subject to the restrictions and requirements imposed under the Mitigation Grant Deed.

- For the removal of coastal sage scrub communities during construction, Mitigation Measure BIO-2 outlines construction-related mitigation measures required to minimize impacts to the coastal California gnatcatcher and other coastal sage scrub species in accordance with the NCCP/HCP.
- Mitigation Measure BIO-3 requires clearing and grubbing of vegetation to be conducted outside of the bird nesting season, or pre-construction nesting bird survey must be conducted and avoidance buffers established around any active nests.
- Mitigation Measure BIO-4 requires mitigation for impacts to the least Bell's vireo, which is a conditionally covered species under the NCCP/HCP, and associated riparian special-status wildlife species (e.g., yellow warbler, yellow-breasted chat).
- Mitigation Measure BIO-5 requires educational signage and use restrictions on the trail, as well as a Resource Management Plan to outline long-term maintenance and management responsibilities for the preservation of the biological resources on-site.
- Mitigation Measure BIO-6 requires mitigation for impacts to sensitive natural communities.
- Mitigation Measure BIO-7 requires that a Lake or Streambed Alteration Agreement be obtained from CDFW.

With implementation of Mitigation Measures BIO-1 through BIO-7 as described above, the proposed project would not result in significant impacts to biological resources and would be consistent with the provisions of the NCCP/HCP. Given the required mitigation for the current proposed project, the NCCP/HCP, which minimizes the cumulative impacts of proposed projects within authorized take lands, and requires adherence to federal, state, and local laws for other projects in the cumulative region, the proposed contribution to cumulative impacts to biological resources would not be cumulatively considerable and would be considered less than significant.

Mitigation Measures

Implement Mitigation Measures BIO-1 through BIO-7

Significance Determination

Less than Significant Impact with Mitigation

3.3.4 References

California Department of Fish and Wildlife (CDFW). 2019a. *Special Animals List.* California Natural Diversity Database (CNDDB). August 2019. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406.

———. 2019b. *California Natural Community List.* Vegetation Classification and Mapping Program. November 8, 2019. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline.

———. 2020. *California Natural Diversity Database (CNDDB) Rarefind 5*. Electronic database, Sacramento, California. Accessed at: https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed on April 6 and December 12, 2018 and June 5, 2020.

California Department of Transportation and California Department of Fish and Game (CalTrans and CDFG). 2010. *California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California*. Prepared with Funding from: Federal Highways Administration. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18366

County of Orange. 2015. *Land Use Element*. General Plan. Chapter III, Land Use Element. October 2015. https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=55705.

County of Orange. 2015. *Resources Element*. General Plan. Chapter VI, Resources Element. https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=40235.

Dudek. 2012. *Syphon Reservoir Environmental Regulatory Evaluation Preliminary Draft*. Prepared for Irvine Ranch Water District. October 2012.

Environmental Laboratory. 1987. *U.S. Army Corps of Engineers Wetland Delineation Manual*. Prepared for the U.S. Army Corps of Engineers.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System, Natural Resources, Geographic Information System (GIS) Project*. County of Orange Environmental Management Agency, Santa Ana, CA.

Jones & Stokes Associates, Inc. 1993. *Methods Used to Survey the Vegetation of Orange County Parks and Open Space Areas and The Irvine Company Property*. Prepared for County of Orange, Environmental Management Agency.

Natural Resources Conservation Service (NRCS). 2018. *Web Soil Survey*. U.S. Department of Agriculture. Accessible online at: https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/.

R.J. Meade Consulting, Inc. 1996a. Co*unty of Orange Natural Community Conservation Plan & Habitat Conservation Plan. Central & Coastal Subregion. Parts I & II: NCCP/HCP*. July 17, 1996.

———. 1996b. *County of Orange Natural Community Conservation Plan & Habitat Conservation Plan. Central & Coastal Subregion. Part III: Joint Programmatic EIR/EIR*. May 22, 1996.

———. 1996c. *County of Orange Natural Community Conservation Plan & Habitat Conservation Plan. Central & Coastal Subregion. Part IV: Implementation Agreement*. July 14, 1996.

Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. *A Manual of California Vegetation, Second Edition*. California Native Plant Society, Sacramento, CA.

South Coast Wildlands. 2008. *South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion*. http://www.scwildlands.org/reports/SCMLRegionalReport.pdf. March 2008.

U.S. Army Corps of Engineers (USACE). 2018. *Approved Jurisdictional Determination*. December 17, 2018.

U.S. Fish and Wildlife Service (USFWS). 2017. Critical Habitat: What is it? Accessible online at: https://www.fws.gov/endangered/esa-library/pdf/critical_habitat.pdf.

———. 2020a. *Information for Planning and Consultation*. Accessible online at: https://ecos.fws.gov/ipac/. Accessed on April 6 and December 12, 2018 and June 5, 2020.

———. 2020b. *Critical Habitat Portal*. Accessible online at: http://ecos.fws.gov/crithab/.

This page intentionally left blank

3.4 Cultural Resources

This section describes and evaluates potential impacts related to cultural resources that could result from construction and operation of the proposed project. The section contains: a description of the existing setting as it pertains to cultural resources; a summary of the regulations related to cultural resources; and an evaluation of the potential impacts related to cultural resources associated with the implementation of the proposed project, including cumulative impacts. The cultural resources described in this section are based on the findings provided in the Syphon Reservoir Improvement Project Cultural Resources Assessment Report (ESA 2019).

3.4.1 Environmental Setting

Natural Setting

The proposed project site lies within a shallow valley, commonly referred to as Syphon Canyon, located between Bee and Hicks Canyons (GEI 2012). The site is situated along the southwestern flank of the Loma Ridge in the Santiago Hills portion of the Santa Ana Mountains. The valley and the surrounding terrain drains onto the Tustin Plain, an alluvial plain that extends southwest from the Santa Ana Mountains to the San Joaquin Hills. The Tustin Plain is located at the eastern edge of the large sedimentary basin that incorporates most of the flat-lying areas of Orange and Los Angeles Counties. The proposed project site is hilly, with ridgelines and terraced slopes surrounding the reservoir basin in the central portion of the site. Ground surface elevations at the site range from about 675 feet above mean sea level (amsl) in the northeast corner to about 319 feet amsl at Portola Parkway immediately downstream of the existing reservoir. Beyond the reservoir itself, the hills and lowlands of the proposed project site are generally undeveloped, with the exception of dirt roads, terracing, and erosion control, and are covered with sensitive upland and wetland vegetation communities. The area surrounding the project site is generally developed, with school athletic facilities, major roadways, and residential neighborhoods.

Prehistoric Setting

The chronology of coastal Southern California is typically divided into three general time periods: Early Holocene (11,000 to 8,000 before present [B.P.]), Middle Holocene (8,000 to 4,000 B.P.), and Late Holocene (4,000 B.P. to A.D. 1769). Within this general timeframe, the archaeology of Southern California is generally described in terms of cultural "complexes." A complex is a specific archaeological manifestation of a general mode of life, characterized archaeologically by technology, particular artifacts, economic systems, trade, burial practices, and other aspects of culture.

Early Holocene (11,000 to 8,000 B.P.)

While it is not certain when humans first came to California, their presence in Southern California by about 11,000 B.P. has been well documented. At Daisy Cave, on San Miguel Island, cultural remains have been radiocarbon dated to between 11,100 and 10,950 years B.P. (Byrd and Raab 2007). On the mainland, radiocarbon evidence confirms occupation of the Orange County and

San Diego County coasts by about 9,000 B.P., primarily in lagoon and river valley locations (Gallegos 2002). During the Early Holocene, the climate of Southern California became warmer and more arid and the human population, residing mainly in coastal or inland desert areas, began exploiting a wider range of plant and animal resources (Horne and McDougall 2003).

The primary Early Holocene cultural complex in coastal Southern California was the San Dieguito Complex. The people of the San Dieguito Complex (about 10,000–8,000 B.P.) inhabited the chaparral zones of southwestern California, exploiting the plant and animal resources of these ecological zones (Moratto 1984; Warren 1968). Leaf-shaped and large-stemmed projectile points are typical of San Dieguito Complex material culture.

Middle Holocene (8,000 to 4,000 B.P.)

During the Middle Holocene, there is evidence for the processing of acorns for food and for the increased importance of hunting (Horne and McDougall 2003). As the processing of plant foods, particularly acorns, increased, a wider variety of animals were hunted, and trade with neighboring regions intensified (Horne and McDougall 2003). Major technological changes appeared as well, particularly with the advent of the bow and arrow, which largely replaced the use of the dart and atlatl.

The Middle Holocene La Jolla Complex (about 8,000–4,000 B.P.) is essentially a continuation of the San Dieguito Complex. La Jolla groups lived in chaparral zones or along the coast, often migrating between the two. Coastal settlement focused around the bays and estuaries of coastal Orange and San Diego counties. La Jolla peoples produced large, coarse stone tools, but also produced well-made projectile points, and milling slabs. The La Jolla Complex represents a period of population growth and increasing social complexity, and it was also during this time period that the first evidence of the grinding of seeds for flour appears, as indicated by the abundance of millingstones in the archaeological record (Horne and McDougall 2003).

Late Holocene (4,000 B.P. to A.D. 1769)

During the Late Holocene, native populations of Southern California were becoming less mobile and populations began to gather in small sedentary villages with satellite resource-gathering camps. Evidence indicates that the overexploitation of larger, high-ranked food resources may have led to a shift in subsistence, towards a focus on acquiring greater amounts of smaller resources, such as shellfish and small-seeded plants (Byrd and Raab 2007). In coastal Southern California, conditions became drier and many lagoons were transformed into saltwater marshes. Because of this, populations abandoned mesa and ridge tops to settle nearer to permanent freshwater resources (Gallegos 2002). Trading reached its zenith during this time period, with asphaltum (tar), seashells and steatite being exchanged from Southern California to the Great Basin.

Ethnographic Setting

According to Bean and Smith (1978), the Gabrielino, with the exception of the Chumash to the north, "were the wealthiest, most populous, and most powerful ethnic nationality in aboriginal Southern California." Prior to European colonization, the Gabrielino occupied a diverse area that included: the watersheds of the Los Angeles, San Gabriel, and Santa Ana rivers; the Los Angeles basin; and the islands of San Clemente, San Nicolas, and Santa Catalina (Kroeber 1925). The Gabrielino language was part of the Takic branch of the Uto-Aztecan language family (Kroeber 1925). The Gabrielino subsisted on a variety of resources in several ecological zones. Acorns, sage, and yucca were gathered throughout the inland areas whereas shellfish, fish, as well as a variety of plants and animals were exploited within the marshes and along the coast. Deer and various kinds of small mammals were hunted on an opportunistic basis. Their material culture reflected the subsistence technology. Lithic tools such as arrow points and modified flakes were used to hunt and process animals. A variety of ground stone grinding implements, such as the mortar, pestle, mano, and metate, were used to process both plant and animal remains for food (Bean and Smith 1978).

The settlement patterns of the Gabrielino, and other nearby groups, such as the Juaneño and Luiseño, were similar and they often interacted through marriage, trade and warfare. The seasonal availability of water and floral and faunal resources dictated seasonal migration rounds with more permanent villages and base camps being occupied primarily during winter and spring months. In the summer months, the village populations divided into smaller units that occupied seasonal food procurement areas. The more permanent settlements tended to be near major waterways and food sources and various secular and sacred activities, such as food production and storage and tool manufacturing, were conducted at these areas (Bean and Smith 1978).

Historic Setting

In 1769, the Gaspar de Portola expedition is known to have camped at Tomato Springs, approximately 1.15 miles southeast of the proposed project site (Meadows 1965). At various times, Tomato Springs has been referred to as *Los Ojitos de San Pantaleon, El Aguaje del Padre Gomez*, and *Aguaje de los Tomates*. According to anthropologist John Peabody Harrington's early 20th century notes, Tomato Springs was identified by Native American informants as a camping place by the name of *Usronvana* (Archer 2008).

Upon their arrival, the Spanish divided lands for the missions and a few large private land grants. However, in 1831, after the Mexican government gained independence from Spain, it secularized the missions and distributed ranchos to Mexican citizens who applied for grants. In the vicinity of the proposed project area, these included Rancho Santiago de Santa Ana, Rancho San Joaquin, and Rancho Los de Santiago. The 47,000-acre Rancho Lomas de Santiago, granted to Teodosio Yorba in 1846, encompasses the project site. In 1866, James Irvine, Thomas Flint, and Llewellyn Bixby purchased the rancho for $7,000. The lands were devoted to sheep grazing primarily, although in the 1870s tenant farming was allowed. In 1878, Irvine acquired his partners' shares for $150,000. Irvine passed away in 1886, and in 1893, his son James Irvine Jr., took possession of the rancho, incorporating the land into the Irvine Company a year later. Irvine Jr. shifted the rancho's operations into agricultural activities (olive and citrus orchards). When James Irvine Jr. passed away in 1947, his son Myford took over and started opening small sections of the ranch for urban development. In 1959, the University of California purchased land from the Irvine Company to construct a new school campus. In 1970, the Irvine Company finished the construction of the Irvine Business Complex (including the villages of Turtle Rock, University Park, Culverdale, the Ranch, and Walnut) surrounding the university.

Water Management in the Irvine Ranch

Agricultural development in the Irvine Ranch was originally dependent upon residual streamflow, the Cienega de las Ranas, and the Laguna Lakes. By 1893, James Irvine started "to divert water from Santiago Creek to an area known as, 'the Flats' and down Peters Canyon to the new ranch house" (Nelson 2009: 6). However, the Carpenter and Serrano Irrigation Districts located west of the Irvine Ranch property, which had previously acquired riparian rights to irrigate land, were opposed to this action. By 1928, litigation between the Irvine Ranch and the Serrano Irrigation District led to an agreement to share equal rights to the water supply that would later be conserved with the construction of the Santiago Dam. In the 1920s, and in an effort to provide water to his tenant farmers of grain and bean crops, James Irvine developed a system of acquiring ground water from water wells through gasoline driven and electrical pumping technology. As the groundwater resources started to decline, C.R. Browning, P.E., with the Irvine Company, began to design water conservation facilities for the Syphon Canyon Dam and Reservoir, Peters Canyon Dam, the Highline Canal, the Rattlesnake Canyon Reservoir, Sand Canyon Reservoir, Lambert Reservoir, Laguna Reservoir, Bonita Reservoir, the Irvine Conservation Dam, and the Little Peters Reservoir. Similarly, plans for the Santiago Dam were prepared by A. Kempkey, P.E. The capacity of the reservoirs would total approximately 30,000 acre-feet (Nelson 2009: 6). A summary of these facilities is provided below.

Syphon Canyon Dam and Reservoir

The Syphon Canyon Dam and Reservoir is located within the proposed project boundaries and was created between 1948 and 1949. Since its initial development, the reservoir was used to store irrigation water. According to information provided by the Irvine Irrigation District, water from the reservoir was distributed to two citrus packing plants along the former Santa Fe Railway spur line in the center of the ranch. However, as the Irvine Irrigation District notes, the irrigation service came to an end around 1970 (Nelson 2009). In 2010, the Irvine Ranch Water District (identified as the Transferee) acquired the "Reservoir Property," including the dam, reservoir, and other facilities (consisting of the Highline Canal, pipelines, pump stations, and vaults) along with recreational rights over the reservoir, through a Conveyance Agreement (P.R. No. 30341) between the Irvine Company and the Irvine Community Development Department (identified as the Transferors). In addition, the Transferors handed over "all right, title and interest of Transferor under that certain Entry Agreement between TIC's predecessor in interest and Val Verde Sportsmen's Club… ("The Fishing License") (IRWD 2009:1). The reservoir now operates as a small seasonal storage facility for recycled water with a capacity of 535 acre-feet (174 million gallons) (IRWD 2009).

Highline Canal

Other early water management infrastructure in the area included the Highline Canal. This water conveyance feature was constructed in the 1930s and is lined with unreinforced concrete. A portion of the Highline Canal crosses the southwest portion of the proposed project site. It commences at the Peters Canyon outlet pipeline and follows the contour of the Lomas de Santiago for approximately 7 miles southeast to other lower reservoirs and to orchards and crops. While it served as a functioning water conveyance component since it original construction, its use began to decline in 1970 after connection of the new Irvine Lake Pipeline, which conveyed water from Colorado River to the Rattlesnake Canyon Reservoir (Nelson 2009).

3.4.2 Regulatory Framework

Numerous laws and regulations require federal, state, and local agencies to consider the effects a project may have on cultural resources. These laws and regulations stipulate a process for compliance, define the responsibilities of the various agencies proposing the action, and prescribe the relationship among other involved agencies.

Federal

National Historic Preservation Act

Although federal funding is not expected, if the proposed project were to receive federal funding, the funding agency would be required to comply with Section 106 of the National Historic Preservation Act (NHPA), as amended (54 United States Code of Laws [USC] 300101 et seq.), and its implementing regulations (36 CFR Part 800). The NHPA is the principal federal law addressing historic properties. Section 106 requires a federal agency with jurisdiction over a proposed federal action (referred to as an "undertaking" under the NHPA), including federal funding for projects, to take into account the effects of the undertaking on historic properties, and to provide the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking.

The term "historic properties" refers to "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register" (36 CFR Part 800.16(*l*)(1)). The implementing regulations (36 CFR Part 800) describe the process for identifying and evaluating historic properties, for assessing the potential adverse effects of federal undertakings on historic properties, and seeking to develop measures to avoid, minimize, or mitigate adverse effects. The Section 106 process does not require the preservation of historic properties; instead, it is a procedural requirement mandating that federal agencies take into account effects to historic properties from an undertaking prior to approval.

The steps of the Section 106 process are accomplished through consultation with the State Historic Preservation Officer (SHPO), federally-recognized Indian tribes, local governments, and other interested parties. The goal of consultation is to identify potentially affected historic properties, assess effects to such properties, and seek ways to avoid, minimize, or mitigate any adverse effects on such properties. Consultation between the lead federal agency and SHPO ensures that the Section 106 process has been completed. The agency also must provide an opportunity for public involvement (36 CFR 800.1(a)). Consultation with Indian tribes regarding issues related to Section 106 and other authorities (such as NEPA and Executive Order No. 13007) must recognize the government-to-government relationship between the Federal government and Indian tribes, as set forth in Executive Order 13175, 65 FR 87249 (Nov. 9, 2000), and Presidential Memorandum of November 5, 2009.

National Register of Historic Places

The National Register of Historic Places (National Register) was established by the NHPA of 1966, as "an authoritative guide to be used by federal, State, and local governments, private groups and citizens to identify the Nation's historic resources and to indicate what properties should be considered for protection from destruction or impairment" (36 CFR 60.2) (U.S. Department of the Interior 2002). The National Register recognizes a broad range of cultural resources that are significant at the national, state, and local levels and can include districts, buildings, structures, objects, prehistoric archaeological sites, historic-period archaeological sites, traditional cultural properties, and cultural landscapes. As noted above, a resource that is listed in or eligible for listing in the National Register is considered "historic property" under Section 106 of the NHPA.

To be eligible for listing in the National Register, a property must be significant in American history, architecture, archaeology, engineering, or culture. Properties of potential significance must meet one or more of the following four established criteria:

A. Are associated with events that have made a significant contribution to the broad patterns of our history;
B. Are associated with the lives of persons significant in our past;
C. Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. Have yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting one or more of the criteria of significance, a property must have integrity. Integrity is defined as "the ability of a property to convey its significance" (U.S. Department of the Interior 2002). The National Register recognizes seven qualities that, in various combinations, define integrity. The seven factors that define integrity are location, design, setting, materials, workmanship, feeling, and association. To retain historic integrity a property must possess several, and usually most, of these seven aspects. Thus, the retention of the specific aspects of integrity is paramount for a property to convey its significance (U.S. Department of the Interior 2002).

State

California Environmental Quality Act

CEQA is the principal statute governing environmental review of projects occurring in the state and is codified at Public Resources Code (PRC) Section 21000 et seq. CEQA requires lead agencies to determine if a proposed project would have a significant effect on the environment, including significant effects on historical or unique archaeological resources. Under CEQA (Section 21084.1), a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment.

The CEQA Guidelines (Title 14 California Code of Regulations [CCR] Section 15064.5) recognize that historical resources include: (1) a resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources (California Register); (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); and (3) any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record. The fact that a resource does not meet the three criteria outlined above does not preclude the lead agency from determining that the resource may be an historical resource as defined in PRC Sections 5020.1(j) or 5024.1.

If a lead agency determines that an archaeological site is a historical resource, the provisions of Section 21084.1 of CEQA and Section 15064.5 of the CEQA Guidelines apply. If an archaeological site does not meet the criteria for a historical resource contained in the CEQA Guidelines, then the site may be treated in accordance with the provisions of Section 21083, which is as a unique archaeological resource. As defined in Section 21083.2 of CEQA a "unique" archaeological resource is an archaeological artifact, object, or site, about which it can be clearly demonstrated that without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information;
- Has a special and particular quality such as being the oldest of its type or the best available example of its type; or,
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

If an archaeological site meets the criteria for a unique archaeological resource as defined in Section 21083.2, then the site is to be treated in accordance with the provisions of Section 21083.2, which state that if the lead agency determines that a project would have a significant effect on unique archaeological resources, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place (Section 21083.1(a)). If preservation in place is not feasible, mitigation measures shall be required. The CEQA Guidelines note that if an archaeological resource is neither a unique archaeological nor a historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064.5(c)(4)).

A significant effect under CEQA would occur if a project results in a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5(a). Substantial adverse change is defined as "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired" (CEQA Guidelines Section 15064.5(b)(1)). According to CEQA Guidelines Section 15064.5(b)(2), the significance of a historical resource is materially impaired when a project demolishes or materially alters in an adverse manner those physical characteristics that:

A. Convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register; or
B. Account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in a historical resources survey meeting the requirements of section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
C. Convey its historical significance and that justify its eligibility for inclusion in the California Register as determined by a Lead Agency for purposes of CEQA.

In general, a project that complies with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (Standards) (Grimer 2017) is considered to have mitigated its impacts to historical resources to a less-than-significant level (CEQA Guidelines Section 15064.5(b)(3)).

California Register of Historical Resources

The California Register is "an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility for the California Register are based upon National Register criteria (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for, or listed in, the National Register.

To be eligible for the California Register, a prehistoric or historic-period property must be significant at the local, state, and/or federal level under one or more of the following four criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

A resource eligible for the California Register must meet one of the criteria of significance described above, and retain enough of its historic character or appearance (integrity) to be recognizable as a historical resource and to convey the reason for its significance. It is possible that a historic resource may not retain sufficient integrity to meet the criteria for listing in the National Register, but it may still be eligible for listing in the California Register.

Additionally, the California Register consists of resources that are listed automatically and those that must be nominated through an application and public hearing process. The California Register automatically includes the following:

- California properties listed on the National Register and those formally determined eligible for the National Register;
- California Registered Historical Landmarks from No. 770 onward; and,
- Those California Points of Historical Interest that have been evaluated by the OHP and have been recommended to the State Historical Commission for inclusion on the California Register.

Other resources that may be nominated to the California Register include:

- Historical resources with a significance rating of Category 3 through 5 (those properties identified as eligible for listing in the National Register, the California Register, and/or a local jurisdiction register);
- Individual historical resources;
- Historical resources contributing to historic districts; and,
- Historical resources designated or listed as local landmarks, or designated under any local ordinance, such as an historic preservation overlay zone.

California Health and Safety Code Section 7050.5

California Health and Safety Code Section 7050.5 requires that in the event human remains are discovered, the County Coroner be contacted to determine the nature of the remains. In the event the remains are determined to be Native American in origin, the Coroner is required to contact the NAHC within 24 hours to relinquish jurisdiction.

California Public Resources Code Section 5097.98

California PRC Section 5097.98, as amended by Assembly Bill 2641, provides procedures in the event human remains of Native American origin are discovered during project implementation. PRC Section 5097.98 requires that no further disturbances occur in the immediate vicinity of the discovery, that the discovery is adequately protected according to generally accepted cultural and archaeological standards, and that further activities take into account the possibility of multiple burials. PRC Section 5097.98 further requires the NAHC, upon notification by a County Coroner, designate and notify a Most Likely Descendant (MLD) regarding the discovery of Native American human remains. Once the MLD has been granted access to the site by the landowner and inspected the discovery, the MLD then has 48 hours to provide recommendations to the landowner for the treatment of the human remains and any associated grave goods.

In the event that no descendant is identified, or the descendant fails to make a recommendation for disposition, or if the land owner rejects the recommendation of the descendant, the landowner may, with appropriate dignity, reinter the remains and burial items on the property in a location that will not be subject to further disturbance.

California Government Code Sections 6254(r) and 6254.10

These sections of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Section 6254.10 specifically exempts from disclosure requests for "records that relate to archaeological site information and reports, maintained by, or in the possession of the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a state or local agency."

Local

County of Orange

General Plan, VI. Resources Element

The Orange County General Plan identifies the goals, objectives, and policies relevant to cultural resources (Orange County General Plan, VI. Resources Element). Cultural historic resources are defined as buildings, structures, objects, sites, and districts of significance in history, archaeology, architectural history, and culture. The County maintains a list of certified archaeological professionals who are qualified to work on projects within the County's jurisdiction (i.e., unincorporated areas). The following policies are applicable to the proposed project.

Historic Resources Policies

1. To identify historic resources through literature and records research and/or onsite surveys.
2. To evaluate historic resources through comparative analysis or through subsurface or materials testing.
3. To preserve significant historic resources by one or a combination of the following alternatives, as agreed upon by RDMD and the project sponsor:
    a. Adaptive reuse of historic resource.
    b. Maintaining the historic resource in an undisturbed condition.
    c. Moving the historic resource and arranging for its treatment.
    d. Salvage and conservation of significant elements of the historic resources.
    e. Documentation (i.e., research narrative, graphics, photography) of the historic resource prior to destruction.

Archaeological Resources Policies

1. To identify archaeological resources through literature and records research and surface surveys.
2. To evaluate archaeological resources through subsurface testing to determine significance and extent.

3. To observe and collect archaeological resources during the grading of a project.
4. To preserve archaeological resources by:
   a. Maintaining them in an undisturbed condition, or
   b. Excavating and salvaging materials and information in a scientific manner

City of Irvine

General Plan, Cultural Resources Element, Element E

The project site is located within the City of Irvine's Sphere of Influence. The City of Irvine General Plan identifies the goals, objectives, and policies relevant to cultural resources.

> **Goal:** Ensure the proper disposition of historical, archaeological, and paleontological resources to minimize adverse impacts, and to develop an increased understanding and appreciation for the community's historic and prehistoric heritage, and that of the region.
>
> > **Objective E-1: Historical, Archaeological, Paleontological Surveys:** Identify and obtain information on the existence and significance of historical, archaeological, and paleontological sites and encourage land use planning which incorporates this information.

The following policies support Objective E-1:

> **Policy (a):** Require appropriate surveys and necessary site investigations in conjunction with the earliest environmental document prepared for a project, in accordance with California Environmental Quality Act (CEQA) and the City's CEQA procedures.
>
> **Policy (b):** Require surveys, prior to discretionary approval, for areas where the possibility of encountering sites exists. Additional specific site investigations may also be required in order to obtain sufficient information to determine the site's significance. The project sponsor shall fund this level of investigation.
>
> **Policy (c):** Require a written report be submitted to the City following a survey or investigation describing the findings and making recommendations as to the site's significance, future disposition, and the amount of further investigation which should be undertaken. Copies of site survey records and reports shall be filed with the appropriate clearinghouse.
>
> **Policy (d):** Encourage, if appropriate, removal of all materials collected during the survey/investigation to local museums, universities, or other depositories providing access for public review or scientific research.
>
> **Policy (e):** Funding of Archaeological Excavations: Use the following in the case of archaeological salvage excavations: 75 percent project sponsor; 25 percent City or other public or quasipublic agency or organization. The costs of other mitigation measures may also be shared by the landowner or developer, the City, and other agencies or organizations.
>
> **Policy (f):** Maintain information on areas surveyed, numbers of sites located, their status and the names and addresses of individuals or organizations knowledgeable of the sites.

Policy (g): Maintain specific locations of unprotected sites as confidential information to avoid vandalism and the resultant irretrievable loss of the historic and prehistoric record of the community.

Policy (h): Determine the proper disposition of each historical site prior to approval of zoning or discretionary development applications. Disposition determinations shall be based upon a detailed historical report, including an inventory form, a written evaluation, and slides documenting the building and its location. This information shall be reviewed by staff and the approval authority for discretionary development cases. Each historical report shall be filed at the Irvine Historical Museum and the City of Irvine Community Development Department.

Policy (i): Buffer and protect the integrity of an historic site and/or resources contained therein, if the Planning Commission, during review of a discretionary development case, determines preservation is required.

Objective E-2: Hazard Occurrence: Evaluate surveyed sites for their present and potential cultural, educational, recreational, and scientific value to the community and the region, and determine their proper disposition prior to the approval of any project which could adversely affect them.

The following policies support Objective E-2:

Policy (a): Ensure that sites determined to be significant are protected through the City's planning policies, ordinances, approval conditions, and mitigation measures.

Policy (b): Encourage the nomination of significant historical sites to the National Registry of Historic Places.

Policy (c): Include sites which are appropriate for educational or recreational purposes as an integral part of either public or community facilities or as part of the Citywide bikeway, pedestrian, and equestrian trail systems. Encourage agencies, organizations, and individuals to develop interpretive and educational programs in order to properly utilize the site for the benefit of the entire community.

Policy (e): Determine the methods and means of preservation on a case-by-case basis according to a site's importance and disposition methods available. These may include public or private acquisition or one of the following, provided extreme care is exercised not to adversely affect the site:

- Including the site within greenbelts, parks, open space spines, preservation areas or other open space.
- Covering surface or sub-surface sites by adequate fill, pavement, or buildings.
- Using the site for nondestructive public interest or educational purposes, such as museums, interpretive centers, or outdoor classrooms.
- Moving buildings for preservation as part of a consolidated historic site.
- Using significant historic buildings in a preserved state as a part of their functional capacity (e.g., a building preserved and used as an office, restaurant, or home).

Policy (f): Encourage site preservation through economic incentives such as increased building densities, reduced taxes, credit toward park dedication, or reduction of other amenity requirements. Where incentives are not sufficient, the land owner shall be directly compensated by the City or other public or quasi-public agencies or organizations for land preserved as an archaeological, paleontological, or historical site. The costs of site preservation may be the principal responsibility of the City, other public, or quasi-public agencies, or other organizations.

Policy (g): Ensure that adverse impacts of a proposed project on cultural resources are mitigated in accordance with CEQA, as well as other appropriate City policies and procedures, where preservation of a significant site is not practical.

3.4.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from Appendix G of the CEQA Guidelines are used as thresholds of significance to determine the impacts of the proposed project as related to cultural resources. The proposed project would have a significant impact if it would:

1. Cause a substantial adverse change in the significance of a historical resource pursuant to CEQA Guidelines Section 15064.5.
2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5.
3. Disturb any human remains, including those interred outside of dedicated cemeteries.
4. Result in a cumulatively considerable impact to cultural resources.

Methodology

The following discussion is based primarily on studies conducted as part of the cultural resources assessment prepared for the project (ESA 2019).

Records Search

A records search for the proposed project was conducted on October 2, 2018 at the California Historical Resources Information System (CHRIS), South Central Coastal Information Center (SCCIC) housed at California State University, Fullerton. The records search included a review of all recorded archaeological resources and previous studies within the proposed project site and a ½-mile radius, and historic architectural resources within a ¼-mile of the project site. In addition, the California Points of Historical Interest, the California Historical Landmarks, the California Register, the National Register, the Archaeological Determinations of Eligibility (ADOE), and the California State Historic Resources Inventory (HRI), were reviewed.

The records search indicates that 33 cultural resources studies have been conducted within a ½-mile radius of the proposed project site. The entire ½-mile records search radius has been included in previous cultural resources assessments, and of the 33 previous studies, nine archaeological surveys and one other study (a peer review) have overlapped portions of the proposed project site, essentially covering its entirety.

The records search also indicates that 11 cultural resources have been previously recorded within the ½-mile radius of the proposed project site. Of these, four prehistoric archaeological sites (CA-ORA-601, -1237, -1246 and - 1400) are located within the proposed project site. These are described under *Resource Descriptions* below.

Sacred Lands File Search

The NAHC maintains a confidential Sacred Lands File (SLF) which contains sites of traditional, cultural, or religious value to the Native American community. The NAHC was contacted on May 21, 2018 to request a search of the SLF. The NAHC responded to the request in a letter dated May 23, 2018, indicating negative results.

In compliance with AB 52, on May 24, 2019 IRWD submitted outreach letters to the tribes on their AB 52 Master List. Contacted tribes included the Gabrieleño Band of Mission Indians – Kizh Nation, the Juaneño Band of Mission Indians – Acjachemen Nation, and the Torres-Martinez Desert Cahuilla Indians. The letters included a description of the proposed project and an invitation to consult under AB 52. Two responses were received.

By letter dated June 6, 2019, Mr. Michael Mirelez, Cultural Resources Coordinator for the Torres-Marinez Desert Cahuilla Indians, indicated that they would defer to tribes closer to the proposed project area.

Via email and letter, Mr. Andrew Salas, Chairman of the Gabrieleño Band of Mission Indians – Kizh Nation, indicated that the tribe wished to engage in consultation. On June 27, 2019, the District conducted consultation via telephone with the tribe. Mr. Salas provided historic maps, documents, and other reference materials confirming the tribe’s association with the proposed project area. He also discussed tribal ancestry in the broader vicinity of the proposed project, and indicated that the proposed project area falls along a prominent travel route for the tribe. Given the sensitivity of the proposed project area to the tribe, Mr. Salas requested Native American monitoring during ground disturbing activities. (See Section 3.13 for further discussion of the tribal consultation for this project.)

Historic Maps and Aerial Photographs

Historic maps and aerial photographs were examined to provide historical information about land uses of the proposed project area and to contribute to an assessment of the proposed project area’s archaeological sensitivity. Available topographic maps include the 1901 Southern California No. 1 map (1:250,000 scale), the 1942 Santiago Peak 15-minute quadrangle, and the 1949 El Toro 7.5- minute quadrangle. Aerial photographs were available for the years 1946, 1949, 1952, 1963, 1967, 1972, 1980 (historicaerials.com, 2018), and 2018 (Google Earth, 2018).

The 1901 topographic map depicts the project site as undeveloped and as located within the Rancho Lomas de Santiago. As depicted on the map, the nearest historical water source is Santiago Creek, located about 3.65 miles northeast of the proposed project site. The 1942 topographic map shows that dirt roads traverse the east, south and west sides of the proposed project site. An unnamed drainage is also shown as following along the east portion of the project site along a dirt road.

The 1946 aerial photograph shows the proposed project site as located within mountainous terrain, and a canyon (predating the reservoir) is apparent within the middle portion of the proposed project site, following a north- south direction. A portion of the proposed project site is also depicted as developed and disturbed. For instance, the southwest portion of the proposed project site is depicted as containing about 10 structures/buildings. A dirt road and the Highline Canal are also shown in the southwest portion of the proposed project site, following a meandering path towards the southeast and stopping at the mid-south portion of the proposed project site. The canal appears to go underground for approximately 800 feet to the east, but then the canal and dirt road are observed again on the southeast portion of the proposed project site. By this time, the southernmost slopes of the proposed project site also appear as graded and partially terraced.

The 1949 topographic map depicts the Syphon Reservoir in the middle portion of the proposed project site and the previously observed canal and dirt road south of the reservoir. The 1952 aerial photograph depicts the Syphon Reservoir along with a dam. By 1952, the previously observed structures on the southwest portion of the proposed project site appear to have been demolished and only remnants of three structures (possibly concrete pads) are seen. The 1963, 1967, and 1972 aerial photographs continue to depict the proposed project site as it was shown in the 1952 aerial photograph, with the exception of one structure located in the southwest portion of the proposed project site. The 1972 aerial photograph also depicts several structures southeast of the dam. The 1980 aerial photograph shows the northern portion of the proposed project site as graded and terraced, and partially used as an agricultural field. A small structure is also depicted southeast of the dam, next to a line of trees. The 2018 aerial imagery shows the proposed project site as generally unchanged from the 1980 aerial photograph.

Survey

A cultural resource survey of the proposed project site was conducted on November 6, 7, and 14 of 2018. The survey was designed to identify historic architectural resources and archaeological resources within the proposed project site, including previously documented resources. Areas with visible ground surface were subject to pedestrian survey using transect intervals spaced no more than 15 meters (approximately 50 feet) apart. Slopes greater than 25 percent were subject to a reconnaissance-level survey where feasible. Portions of the proposed project site with thick marsh vegetation were subject to an opportunistic survey strategy, wherein trails and clearings were intensively inspected.

Approximately 60 percent of the proposed project site was surveyed. The remaining 40 percent was not surveyed due to constraints imposed by steep and inaccessible slopes or standing water within the reservoir. Approximately 50 percent of the surveyed site was largely vegetated with coastal sage scrub community and tall grasses. As a result, ground surface visibility in these areas ranged from 30 to 70 percent. Approximately 10 percent of the proposed project site, which includes an open space area immediately south and east of the dam, the dam itself, and various dirt roads had approximately 50 to 100 percent ground surface visibility.

As a result of the survey, the four previously recorded archaeological resources (CA-ORA-601, -1237, -1246, and -1400) within the proposed project site were revisited, though only two were relocated. It appears that both CA-ORA-601 and -1246 have been destroyed. In addition, one prehistoric isolate (ISO-HC-001), one historic-period archaeological resource (designated as the Latrine Site), and three historic architectural resources (designated as IRWD- cottage, a segment of the Highline Canal/P-30-176748, and the Syphon Reservoir and associated facilities) were identified and recorded within the proposed project site.

Resource Descriptions

A total of nine resources have been identified within the proposed project site, although two of these could not be relocated during the survey and are presumed destroyed. The resources are described below and summarized in **Table 3.4-1.**

TABLE 3.4-1
CULTURAL RESOURCES DOCUMENTED WITHIN THE PROJECT SITE

Primary No. (P-30-)	Permanent Trinomial (CA-ORA-)	Temporary Identifier	Resource Description	Newly Recorded/ Updated	National and California Register Eligibility
000601	601	—	Prehistoric site: flake scatter.	Not relocated	N/A
001237	1237	—	Prehistoric site: flake scatter.	Updated	Not evaluated
001246	1246	—	Prehistoric: cluster of nine manos and one possible meta-volcanic core.	Not relocated	N/A
001400	1400	—	Prehistoric site: sparse flake scatter and groundstone implements	Updated	Not eligible for either
—	—	ISO-HC-001	Prehistoric isolate: basalt handstone	Newly recorded	Not eligible for either
—	—	Latrine Site	Historic-period archaeological site: latrine area with five toilet seats on a cement block, two incomplete concrete foundation, a circular cement feature (possibly a well), and a sparse refuse scatter.	Newly recorded	Not evaluated
—	—	IRWD-Cottage	Historic-period built resource: a small building with stucco exterior and corrugated metal roofing.	Newly recorded	Not eligible for either
176748	—	Highland Canal segment	Historic-period built resource: a 1-mile-long segment of the Highline Canal located partially within the project site.	Updated	Not eligible for either
—	—	Syphon Reservoir and Facilities	Historic-period built resource: Syphon Reservoir and associated facilities.	Newly recorded	Not eligible for either

CA-ORA-601/P-30-000601

Resource CA-ORA-601/P-30-000601 is a prehistoric archaeological site that was originally recorded in 1974 as located immediately south of the Syphon Reservoir and consisting of a flake scatter containing seven chert flakes, two basalt flakes, and one quartzite flake. In a 1982 assessment, only one non-cortical white chert flake was observed and it was concluded that the site may have been destroyed by construction. ESA did not identify any surface remnants of CA-ORA-601 during the pedestrian survey. It is likely that the resource has been destroyed by the construction of an immediately adjacent modern concrete ditch and a sports complex to the south. Because the site could not be relocated, it has not been formally evaluated for listing in the National Register or California Register, nor has a discretionary determination of eligibility been made.

CA-ORA-1237/P-30-001237

Resource CA-ORA-1237/P-30-001237 is a prehistoric archaeological site recorded in 1990 as consisting of a light scatter of lithic debris and tools. The archaeological site record for this resource indicates that the items found at the site include cores, core fragments, debitage (material produced during the process of lithic reduction), hammerstones, one chopper, one biface fragment, and one unifacially modified tool. The form also indicates that site integrity was poor due to terracing for orange groves, excavation for irrigation pipes, and improvements to Sand Canyon Avenue. ESA revisited site CA-ORA-1237 during the pedestrian survey and only two artifacts were observed. The site is located on a heavily vegetated slope that was previously terraced, likely creating disturbance to the resource. The site has not been formally evaluated for listing in the National Register or California Register and a discretionary determination of eligibility has not been made.

CA-ORA-1246/P-30-001246

Resource CA-ORA-1246/P-30-001240 is a prehistoric archaeological site recorded in 1990 as consisting of a cluster of nine manos and one possible meta-volcanic core. No artifacts associated with CA-ORA-1246 were observed during the current survey. It is likely that the site has been disturbed and eroded by off road vehicles that have crossed the site. Because the site could not be relocated, it has not been formally evaluated for listing in the National Register or California Register, nor has a discretionary determination of eligibility been made.

CA-ORA-1400/P-30-001400

Resource CA-ORA-1400/P-30-001400 is a prehistoric archaeological site recorded in 1994. The site is described as consisting of two loci on a hilltop and along a hillslope. The site measures approximately 400 meters long by 50 meters wide and among the artifacts encountered are flaked cores, tools, and debitage, a fragmentary grinding slab, several handstones, and various pieces of rock showing striations and grinding polish. The archaeological site record indicates that site integrity is very poor due to previous disturbances such as terracing, bulldozing, installation of irrigation pipes, and the construction of a dirt road for orange groves. In addition, it was noted that a high density of naturally occurring cobbles exist at the site, raising the possibility that some pieces identified as artifacts may have been created by bulldozers. During the 1994 study, a 1-by-1-meter archaeological test unit was placed in the area of densest concentration and the excavation of two 10-centimeter levels was conducted, yielding only one piece of chert debitage. Given disturbance and lack of integrity, the resource was determined ineligible for the National Register by consensus through Section 106. The current survey identified a high density of naturally occurring cobbles, and major disturbances (terraces and a dirt road crossing the site) within the CA-ORA-1400 site boundaries. A high density of artifacts was also observed at the highest point of the ridge. The site appears to be in the same condition as previously documented, and for the same reasons it was determined ineligible for the National Register, it is also recommended as ineligible for the California Register. Additionally, a discretionary determination of eligibility has not been made.

ISO-HC-001

This newly documented resource is a prehistoric isolate that was recorded in the northeast portion of the proposed project site. It consists of a basalt handstone measuring 6.2 centimeters (cm) in length by 3.7 cm in width. The area of the resource appeared to show signs of recent fire, and has been impacted by the construction of SR 133. As an isolated occurrence, the resources is not eligible for listing in either the National Register or the California Register, nor has a discretionary determination of eligibility been made.

Latrine Site

This newly documented historic-period archaeological resource, designated as "Latrine Site," was identified in the southwestern portion of the proposed project site. The resource consists of a latrine area with five toilet seats on a cement block (measuring 23 feet long by 17 feet wide), two incomplete concrete foundation features with rebar and wood reinforcement on the sides, a circular cement feature (possibly a well) measuring 8 feet in diameter, a scatter of unidentifiable metal and seven glass bottles scattered around. The bottles appear to date between 1945 and 1950, based on the maker's marks. It is likely that this resource is associated with structures depicted in a 1946 aerial photograph. The site has not been formally evaluated for listing in the either National Register or California Register, nor has a discretionary determination of eligibility been made.

IRWD-Cottage

The newly documented resource identified as IRWD-Cottage consists of a small building with stucco exterior and corrugated metal roofing, and is depicted in a 1952 aerial photograph. It is located approximately 500 feet southwest of the reservoir. The resource measures approximately 45 feet long by 33 feet wide, and it is rectangular in plan. The resource has a gabled roof and two small windows: one located in the upper front and another one on the upper back facade. While conducting the field investigation, a number of significant alterations were noted. These include a covered porch addition to the primary façade, transparent corrugated plastic panels installed atop the roof to serve as skylights, repairs to the stucco exterior walls and modifications resulting from a number of recent changes to weatherize the structure including metal sheeting patches and wood panels to block exterior openings. As a result of these alterations, which have significantly impacted the integrity of the resources, it was recommended as ineligible for listing in both the National Register and the California Register. Additionally, a discretionary determination of eligibility has not been made.

Highline Canal/P-30-176748

An approximately 1-mile-long segment of the Highline Canal was identified within the proposed project site, and continuing south of the Syphon Reservoir. A different segment of the Highline Canal (P-30-176748), encompassing approximately 10 linear miles, was previously recorded outside and approximately 0.20 miles northwest of the proposed project site. The primary record form for the previously recorded segment indicates that the Highline Canal was constructed in 1933 with associated features (such as diversion gates, debris traps, flume remains, and conduits) and extended from Santiago Reservoir (Irvine Lake) to Laguna Canyon. The resource is known to have carried water by gravity flow to the reservoirs and the agricultural fields of the Irvine Ranch. However, during the 1940s, a large segment of the canal was destroyed when the El Toro Marine Base was constructed. The primary record form also indicates that, while the previously recorded segment of the Highline Canal is a good example of a gravity-fed water conveyance system, it does not retain "integrity of design, association, location, setting or materials" and as a result, the resource is ineligible for the National Register, California Register, or Local designation through survey evaluation. The current pedestrian survey revealed that the 1-mile-long segment of the Highline Canal within the proposed project site is in very poor condition (showing signs of disrepair and degradation). As such, this portion of the Highline Canal is also recommended as ineligible for listing in both the National Register and California Register. Additionally, a discretionary determination of eligibility has not been made.

Syphon Reservoir and Associated Facilities

The Syphon Reservoir and its associated facilities was also documented as part of the cultural resources' assessment for the proposed project. Since its initial development in the 1930s, the reservoir was used to store irrigation water and distribute it to two citrus packing plants along the former Santa Fe Railway spur line in the center of the Irvine Ranch. However, the irrigation service came to an end around 1970. In 2010, IRWD acquired the "Reservoir Property," including the dam, reservoir, and other facilities (consisting of the Highline Canal, pipelines, pump stations, and vaults) along with recreational rights over the reservoir. The reservoir now operates as a small seasonal storage facility for recycled water with a capacity of 535 acre-feet (174 million gallons) (IRWD 2009).

Associated with the Syphon Reservoir is the earthen dam wall that constitutes the southwest perimeter of the basin, as well as portions of a dock. According to available aerial images, the dock appears to have been installed between 1963 and 1967 at the southern corner of the reservoir while the original dam wall was constructed during the initial construction of the reservoir between 1948 and 1949. Both elements appear to have been altered since first being installed. As depicted in available aerials and noted during the field investigation, numerous attempts to improve the dam wall are evident. This includes terracing along the inner embankment and installing access roads atop the wall, both done within the last decade. Further efforts appear to have been made since the 1980 aerial photograph to broaden the width of the dam wall to reinforce its retention strength. With regard to the dock, only remnants of the original structure currently remain. Most of this built environment feature has been replaced with contemporary materials to allow for better access to small recreation vessels used at the reservoir. As a result, the Syphon Reservoir and related built environment features have, without exception, been subject to significant alterations, and the resources have been recommended as ineligible for listing in both the National Register and California Register. Additionally, a discretionary determination of eligibility has not been made.

Impact Analysis

Impacts on cultural resources could result from ground-disturbing activities and/or damage, destruction, or alteration of historic structures. Ground-disturbing activities include project-related excavation, grading, trenching, vegetation clearance, the operation of heavy equipment, or other surface and sub-surface disturbance that could damage or destroy surficial or buried cultural resources including prehistoric or historic-period archaeological resources or human burials. The evaluation of the project's potential effects on significant cultural resources per thresholds included in the CEQA Guidelines is included below.

Historic Resource

Impact 3.4-1: The proposed project could cause a substantial adverse change in the significance of a historical resource pursuant to CEQA Guidelines Section 15064.5.

Construction

A total of nine resources were identified within the proposed project site as a result of the cultural resources assessment. These include four prehistoric archaeological sites (CA-ORA-601, -1237, -1246, and -1400), an isolated prehistoric mano (ISO-HC-001), a historic-period archaeological site consisting of an artifact scatter and foundation remnants (the Latrine Site), and three historic period built architectural resources (a segment of P-30-176748/Highline Canal, a small stucco building designated IRWD-Cottage, and the Syphon Dam Reservoir and Facilities).

Five of the resources (CA-ORA-601, -1237, -1246, ISO-HC-001, and the Latrine Site), while documented within the proposed project area, occur along the margins of the proposed project site. Two of these resources (CA-ORA-601 and -1246) appear to have been destroyed. Isolated artifacts, given their lack of context and association, generally are not considered eligible for listing in the California Register; therefore, ISO-HC-001 does not qualify as a historical resource. The remaining two resources (CA-ORA-1237 and the Latrine Site) have not been evaluated for eligibility for listing in the California Register. For the purposes of this proposed project, the resources are considered historical resources, and impacts to these resources could constitute a significant impact on the environment. Site CA-ORA-1237 occurs along the northern boundary of the proposed project site, in close proximity to proposed grading and contouring, which will involve ground disturbance. The Latrine site occurs in the western portion of the proposed project site, near a proposed recreational trail. With implementation of **Mitigation Measure CR-1**, however, which provides procedures for avoidance of the two unevaluated resources, impacts would be less than significant.

The remaining four resources (CA-ORA-1400, a segment of P-30-176748/Highline Canal, the IRWD-Cottage, and the Syphon Reservoir and Facilities) likely will be impacted by the proposed project. However, through a program of surface inventory and subsurface testing, prehistoric archaeological site CA-ORA-1400 was previously determined ineligible for listing in the National Register due to a lack of integrity. For the same reason, it does not qualify for listing in the California Register. A previously recorded segment of resource P-30-176748 (the Highline Canal) located outside the project boundary and outside IRWD property was previously determined ineligible for the National Register and California Register because the segment does not retain integrity. The segment of P-30-176748 documented within the proposed project boundary on IRWD property is likewise in poor condition, and also has been recommended not eligible for listing in the California Register. Finally, both the IRWD-Cottage and the Syphon Reservoir dam and associated facilities have been subject to significant alterations that have severely compromised their integrity. Consequently, both resources have been determined ineligible for listing in the California Register. Since none of the four resources that will be impacted by the proposed project qualify for listing in the California Register, none are historical resource as defined in CEQA Guidelines Section 15064.5, and impacts to the resources would not be significant. Finally, an analysis of indirect impacts to adjacent historical resources was conducted and the proposed project would not result in an indirect impact to historical resources. Impacts would be less than significant to known resources.

The presence of both historic period and prehistoric archaeological sites within, and within the vicinity of, the proposed project area indicates that the area is sensitive for archaeological resources. If unknown archaeological resources are encountered during the proposed project's implementation, and if such resources are determined to be historical resources as defined in CEQA Guidelines Section 15064.5, impacts to the resources would be considered significant. **Mitigation Measures CR-2** through **CR-4**, which require construction worker sensitivity training, cultural resources monitoring, and treatment of unanticipated discoveries, would ensure that impacts are reduced to a less-than-significant level.

Operation

While potential impacts to cultural resources are most likely to occur during the proposed project's construction, operation and maintenance activities, including activities that involve ground disturbance, do have a low potential to encounter previously undocumented archaeological resources. Mitigation Measure CR-4, which requires appropriate treatment of unanticipated discoveries, would ensure that any resources encountered during maintenance are not significantly impacted. As a result, impacts during operation would be reduced to a less-than-significant level.

Mitigation Measures

CR-1: Avoidance of Unevaluated Resources. Two resources (CA-ORA-1237 and the Latrine Site) are considered historical resources for purposes of this project. Both resources occur within close proximity to proposed project activities. Prior to work in the vicinity of the resources (i.e., within 100 feet), Environmentally Sensitive Areas consisting of protective fencing or flagging shall be established around the boundary of each resource, including a 50-foot buffer. The establishment of the Environmentally Sensitive Areas and installation of required fencing or flagging shall be carried out under the supervision of a Qualified Archaeologist, defined as an archaeologist meeting the Secretary of the Interior's standards for archaeology (USDI 2008), or an archaeologist working under the direction of the Qualified Archaeologist. Environmentally Sensitive Areas should be clearly marked in the field and on design plans with exclusion markers to ensure avoidance during project-related ground disturbance. The protective fencing or flagging should not identify the Environmentally Sensitive Areas as cultural resource areas to discourage unauthorized disturbance or collection of artifacts. Ground disturbing activities in the vicinity of the Environmentally Sensitive Areas should be monitored, as described in Mitigation Measure CR-3.

CR-2: Worker Sensitivity Training. Prior to the start of construction activities, all construction personnel should be trained to identify the types of cultural resources that may be encountered during project implementation. These include both prehistoric and historic period archaeological resources. In addition to cultural resources recognition, the training should convey procedures to follow in the event of a potential cultural resources discovery, including notification procedures. The training should be provided by the Qualified Archaeologist or an archaeologist working under their supervision.

CR-3: Construction Monitoring. An archaeological monitor (working under the direct supervision of the Qualified Archaeologist) shall observe all ground-disturbing activities, including but not limited to brush clearance, vegetation removal, grubbing, grading, and excavation, in undisturbed areas of the project site. In addition, the Qualified Archaeologist, in coordination with IRWD, may reduce or discontinue monitoring if it is determined that the possibility of encountering buried archaeological deposits is low based on observations of soil stratigraphy or other factors. Archaeological monitoring shall be conducted by an archaeologist familiar with the types of archaeological resources that could be encountered within the project site. The archaeological monitor, in consultation with IRWD, shall be empowered to halt or redirect ground-disturbing activities away from the vicinity of a discovery until the Qualified Archaeologist has evaluated the discovery, consulted with IRWD, and determined appropriate treatment (as prescribed in CR-4). The archaeological monitor shall keep daily logs detailing the types of activities and soils observed, and any discoveries. After monitoring has been completed, the Qualified Archaeologist shall prepare a monitoring report that details the results of monitoring. The report shall be submitted to IRWD and any Native American groups who request a copy. The Qualified Archaeologist shall submit a copy of the final report to the California Historic Resources Information System (CHRIS) South Central Coastal Information Center (SCCIC).

In addition, prior to the commencement of earthwork activities, IRWD shall provide written notification to the Native American representatives from the Gabrieleno Band of Mission Indians - Kizh Nation indicating the date and time of the commencement of earthwork activities. The representatives from the Gabrieleno Band of Mission Indians - Kizh Nation ("tribal representative") shall be provided reasonable access to the project site in a manner that does not interfere with the earthwork activities. Tribal representatives, at their own expense, and in a manner that does not interfere with earthwork activities, shall be allowed to monitor subsurface ground-disturbing construction activities. The monitoring may consist of either direct observation of the earthwork activities or the examination of the excavated soils prior to disposal for evidence of cultural resources. If any cultural resources are identified during the monitoring and evidence is presented that the discovery proves to be potentially significant under CEQA, as determined by IRWD's consulting Qualified Archaeologist, additional measures such as data recovery excavation, avoidance of the area of the find, documentation, testing, data recovery, reburial, archival review and/or transfer to the appropriate museum or educational institution, or other appropriate actions may be warranted as recommended by IRWD's consulting Qualified Archeologist in consultation with the tribal representative.

CR-4: Protocols for Unanticipated Discoveries. If cultural resources are encountered during project implementation, all activity within 50 feet of the find should cease until the find can be evaluated by the Qualified Archaeologist. If the Qualified Archaeologist determines that the resources may be significant, he or she will notify IRWD and together with IRWD, shall develop an appropriate treatment plan for the resource. IRWD should consult with the Native American monitor or other appropriate Native American representatives in determining appropriate treatment for unearthed cultural resources if the resources are prehistoric or Native American in nature. Under CEQA, preservation in place is the preferred manner of mitigating impacts to archaeological sites. However, if avoidance is infeasible, other appropriate measures will be instituted, which could include, among other options, detailed documentation, or data recovery excavation. Work may proceed on other parts of the project area while mitigation for cultural resources is being carried out.

Significance Determination

Less than Significant Impact with Mitigation

Archaeological Resource

Impact 3.4-2: The proposed project could cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5.

Construction

Six archaeological resources were identified within the proposed project site, including four previously documented archaeological sites, one prehistoric isolate and one historic-period archaeological site. As discussed above, two of the previously documented sites (CA-ORA-601 and -1246) could not be relocated and are presumed destroyed. CA-ORA-1400 was previously determined ineligible for the National Register and the California Register, and is not a significant archaeological resource pursuant to CEQA Guidelines Section15064.5. As an isolated occurrence, ISO-HC-001 also is not a significant archaeological resource. Two resources (CA-ORA-1237 and the Latrine Site) have not been evaluated for listing in the California Register and could qualify as archaeological resources pursuant to Section15064.5. Both occur in close proximity to proposed project activities. However, with implementation of Mitigation Measure CR-1, both resources would be protected by Environmentally Sensitive Area fencing and avoided.

The presence of both historic period and prehistoric archaeological sites within and within the vicinity of the proposed project area indicates that the area is sensitive for archaeological resources. If unknown archaeological resources are encountered during project implementation, and if such resources are determined to be archaeological resources as defined in CEQA Guidelines Section 15064.5, impacts to the resources would be considered significant. Mitigation Measures CR-2 through CR-4 would ensure that any impacts are reduced to a less-than-significant level.

Operation

While potential impacts to cultural resources are most likely to occur during the proposed project's construction, operation and maintenance activities, including activities that involve ground disturbance, do have a low potential to encounter previously undocumented archaeological resources. Mitigation Measure CR-4, which requires appropriate treatment of unanticipated discoveries, would ensure that any resources encountered during maintenance are not significantly impacted. As a result, impacts during operation would be reduced to a less-than-significant level.

Mitigation Measures

Implement Mitigation Measures CR-1 through CR-4

Significance Determination

Less than Significant Impact with Mitigation

Human Remains

Impact 3.4-3: The proposed project could disturb human remains, including those interred outside of formal cemeteries.

Construction

No human remains were identified in the proposed project area as a result of the archival research or survey, and it is anticipated that the proposed project would have no impact on human remains. That said, the area is known to have been used by prehistoric Native Americans. In the unlikely event that human remains are uncovered during ground disturbing activities, appropriate state law would apply. Specifically, California Health and Safety Code (HSC) Section 7050.5 requires that in the event human remains are discovered, the County Coroner be contacted to determine the nature of the remains. In the event the remains are determined to be Native American in origin, the Coroner is required to contact the NAHC within 24 hours to relinquish jurisdiction.

Further, California PRC Section 5097.98, as amended by Assembly Bill 2641, provides procedures in the event human remains of Native American origin are discovered during project implementation. PRC Section 5097.98 requires that no further disturbances occur in the immediate vicinity of the discovery, that the discovery is adequately protected according to generally accepted cultural and archaeological standards, and that further activities take into account the possibility of multiple burials. PRC Section 5097.98 further requires the NAHC, upon notification by a County Coroner, designate and notify a MLD regarding the discovery of Native American human remains. Once the MLD has been granted access to the site by the landowner and inspected the discovery, the MLD then has 48 hours to provide recommendations to the landowner for the treatment of the human remains and any associated grave goods. With adherence to these regulations, any impacts to human remains would be reduced to a less-than-significant level.

Operation

As with construction, operation and maintenance activities are not expected to encounter human remains. However, if human remains are encountered during operations and maintenance activities, compliance with state law, including HSC Section 7050.5, PRC Section 5097.98, and Assembly Bill 2641, as noted above, would ensure that impacts are reduced to a less-than-significant level.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Cumulative Impacts

Impact 3.3-4: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to cultural resources.

The cumulative projects to be considered in the analysis of cumulative impacts are listed in Table 3-2 and illustrated on Figure 3-1 in Section 3 of this Draft EIR. The geographic area of analysis of cumulative impacts for cultural resources includes the area bounded by those projects listed in Table 3-1 and generally corresponds to the portion of Orange County along the front of the Santiago Hills in the vicinity of the proposed project, as well as adjacent mountains and lowlands to the east and west, respectively. This geographic scope of analysis is appropriate because the archaeological and historical resources within this area are expected to be similar to those that occur on the proposed project site because of their proximity, and because the similar environments, landforms, and hydrology would result in similar land-use and thus, site types. The projects listed in Table 3-2 include a range of project types, including residential and commercial development, and park construction and improvements, that could contain cultural resources. Of particular note is the proposed Gateway Community Park, which is to the west and directly adjacent to the project. Cumulative impacts to cultural resources could occur if other related projects, in conjunction with the proposed project, had or would have impacts on cultural resources that, when considered together, would be significant.

Construction and Operation

Construction and operation of the proposed project, in combination with other projects in the area, has the potential to contribute to a cumulatively significant cultural resources impact due to the potential loss of historical and archaeological resources unique to the region. A total of nine resources were identified within the proposed project site as a result of the cultural resources assessment, including six archaeological resources and three historic period-built resources. However, these resources were either found ineligible for listing in the California Register or will be avoided by project construction and operation. While there is potential to encounter unknown resources during ground-disturbing activities, mitigation measures are included in this EIR to reduce potentially significant project impacts to both known and unknown cultural resources during construction, which would reduce the project's incremental contribution cumulative impacts. Mitigation Measure CR-1 requires flagging and avoidance of the two unevaluated resources. Mitigation Measures CR-2 requires worker sensitivity traducing prior to the start of construction. Mitigation Measures CR-3 and CR-4 require archaeological and Native American monitoring and treatment of unanticipated discoveries of cultural resources, respectively. Implementation of these four mitigation measures would reduce potential impacts to historical and archaeological resources to a less-than-significant level. Although the proposed project's construction has the potential to disturb human remains, this potential is low, and state laws dictate appropriate treatment of any unearthed human remains. As such, there will be a less-than-significant impact to human remains.

With implementation of Mitigation Measures CR-1 through CR-4 as described above, the proposed project would not result in significant impacts to cultural resources. Given the required mitigation for the proposed project, and required adherence to state and local laws for other projects in the cumulative region, cumulative impacts to cultural resources would be less than significant.

Mitigation Measures

Implement Mitigation Measures CR-1 through CR-4

Significance Determination

Less than Significant Impact with Mitigation

3.4.4 References

Archer, Gavin. 2008. Test Excavations and Evaluation of Archaeological Discoveries PA 6-12 and PA 6-13 and Discoveries Treatment Plan, Neighborhood 3, Planning Area 6, City of Irvine.

Bean, L.J., and C.R. Smith. 1978. Gabrielino, in *California*, edited by R.F. Heizer, pp. 538–549 Handbook of North American Indians, Vol. 8, W. C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Byrd, Brian F., and Mark L. Raab. 2007. "Prehistory of the Southern Bight: Models for a New Millennium", in *California Prehistory: Colonization, Culture, and Complexit*y, edited by Terry L. Jones and Kathryn A. Klar, pp. 215–227.

ESA. 2019. *Cultural Resources Assessment Report for the Syphon Reservoir Improvement Project (Confidential), County of Orange, California*, January 2019.

Gallegos, Dennis. 2002. Southern California in Transition: Late Holocene Occupation of Southern San Diego County, in *Catalysts to Complexity: Late Holocene Societies on the California Coast*, edited by Jon M. Erlandson and Terry L. Jones, pp. 27–40. Perspectives in California Archaeology Vol. 6, Cotsen Institute of Archaeology, University of California, Los Angeles.

Horne, Melinda C., and Dennis P. McDougall. 2003. *Cultural Resources study for the City of Riverside General Plan 2025 Update Program EIR, prepared for Cotton Bridges and Associates Urban and Environmental Consultants, on behalf of the City of Riverside Planning Department*, prepared by Applied Earthworks, Inc.

Irvine Ranch Water District. 2009. Conveyance Agreement for the Syphon Canyon Dam and Reservoir (P.R. No. 30341), 201 pages. Document on file at the IRWD.

Kroeber, A.L. 1925. *Handbook of the Indians of California*. Dover Publications, Inc., New York, 1925, reprinted 1976.

Meadows, Don C. 1965. The First European Contact with the Indians. *Pacific Coast Archaeological Society Quarterly 1(3)*, reprinted by the Orange County Historical Society.

Moratto, Michael J. 1984. *California Archaeology*. Academic Press, Inc., Orlando, FL.

Nelson, Carl R. P.E. 2009. Fellow American Society of Civil Engineers. A History of Water Resources Development on the Irvine Ranch, Orange County, California.

US Department of the Interior, National Park Service. 2008. Secretary of the Interior's Standards and Guidelines, Archaeology and Historic Preservation. Available at: http://www.nps.gov/history/local-law/arch_stnds_0.htm. Accessed May 2018.

Warren, Claude N. 1968. Cultural Traditions and Ecological Adaptation on the Southern California Coast. *Archaic Prehistory in the Western United States*, edited by Cynthia Irwin-Williams. Eastern New Mexico University Contributions in *Anthropology* 1(3):1–14.

This page intentionally left blank

3.5 Energy

This section evaluates the potential for impacts related to energy emitted by construction and operation of the proposed project. This section includes: a description of the existing electricity and energy conditions regionally and in and around the proposed project site; a summary of applicable regulations related to energy; and an evaluation of the potential impacts of the proposed project related to energy, including cumulative impacts.

3.5.1 Environmental Setting

Electricity

Electricity, as a consumptive utility, is a man-made resource. The production of electricity requires the consumption or conversion of energy resources, including water, wind, oil, gas, coal, solar, geothermal, and nuclear resources, into energy. The delivery of electricity involves a number of system components for distribution and use. The electricity generated is distributed through a network of transmission and distribution lines commonly called a power grid.

Energy capacity, or electrical power, is generally measured in watts (W), while energy use is measured in watt-hours (Wh). For example, if a light bulb has a capacity rating of 100 W, the energy required to keep the bulb on for 1 hour would be 100 Wh. If ten 100 W bulbs were on for 1 hour, the energy required would be 1,000 Wh or 1 kilowatt-hour (kWh). On a utility scale, the capacity of a generator is typically rated in megawatts (MW), which is 1 million watts, while energy usage is measured in megawatt-hours (MWh) or gigawatt-hours (GWh), which is one billion watt-hours.

Southern California Edison (SCE) provides electrical services to approximately 15 million people, 15 counties including the County of Orange and the proposed project site, 180 incorporated cities including the City of Irvine, 5,000 large businesses, and 280,000 small businesses throughout its 50,000-square-mile service area (SCE 2020). SCE produces and purchases energy from a mix of conventional and renewable generating sources.

SCE generates power from a variety of energy sources, including large hydropower (greater than 30 MW), coal, gas, nuclear sources, and renewable resources, such as wind, solar, small hydropower (less than 30 MW), and geothermal sources. Approximately 36 percent of the SCE 2018 electricity purchases were from renewable sources, which is similar to the 31 percent statewide percentage of electricity purchases from renewable sources (SCE 2019a). The annual electricity sale to customers in 2018 was approximately 84,654,000 MWh (SCE 2019b). See **Table 3.5-1** for a summary of SCE 2018 electricity use.

TABLE 3.5-1
EXISTING ANNUAL REGIONAL ENERGY USE

Source	Amount
Electricity (SCE)[a]	84,654,000 MWh
Natural Gas (SoCalGas)[b]	991,659,000 MMBtu
Gasoline (Orange County)[c]	1,402,000,000 gallons
Diesel (Orange County)[c]	114,600,000 gallons

SOURCES:
[a] SCE 2019b.
[b] California Gas and Electric Utilities 2018.
[c] CEC 2018a.

Natural Gas

Natural gas is a combustible mixture of simple hydrocarbon compounds (primarily methane) that is used as a fuel source. Natural gas consumed in California is obtained from naturally occurring reservoirs and delivered through high-pressure transmission pipelines. Natural gas provides almost one-third of the total energy requirements in California. Natural gas is measured in terms of both cubic feet (cf) or British thermal units (Btu).

The proposed project site does not have any natural gas service and would not begin service as part of the project. However, the surrounding area is served by the Southern California Gas Company (SoCalGas), which is the principal distributor of natural gas in Southern California, serving residential, commercial, and industrial markets. SoCalGas serves approximately 21.6 million customers in more than 500 communities encompassing approximately 24,000 square miles throughout central and southern California, from the City of Visalia to the US/Mexican border (SoCalGas 2020).

SoCalGas, along with five other California utility providers, released the *2018 California Gas Report*, presenting a forecast of natural gas supplies and requirements for California through the year 2035. This report predicts gas demand for all sectors (residential, commercial, industrial, energy generation and wholesale exports) and presents best estimates, as well as scenarios for hot and cold years. Overall, SoCalGas predicts a decrease in natural gas demand in future years due to a decrease in per capita usage, energy efficiency policies, and the transition of the State to renewable energy displacing fossil fuels including natural gas (California Gas and Electric Utilities 2018).

SoCalGas receives gas supplies from several sedimentary basins in the western United States (US) and Canada, including supply basins located in New Mexico (San Juan Basin), west Texas (Permian Basin), the Rocky Mountains, and western Canada as well as local California supplies (California Gas and Electric Utilities 2018). Sources of natural gas in the southwestern U.S. will continue to supply most of the SoCalGas natural gas demand. The Rocky Mountain supply is available but is used as an alternative supplementary supply source, and Canadian sources provide only a small share of SoCalGas supplies due to the high cost of transport (California Gas and Electric Utilities 2018). Gas supply available to SoCalGas from California sources averaged

2,625 million cf per day or 2,717 million Btu (MMBtu) in 2017, the most recent year for which data are available (California Gas and Electric Utilities 2018). This equates to an annual average of 892,060 million cf per year or 992 million MMBtu per year. See Table 3.5-1 for a summary of the SoCalGas 2017 natural gas use.

Transportation Energy

According to the California Energy Commission (CEC), transportation accounted for nearly 40 percent of total energy consumption in California during 2018 (CEC 2019a). In 2018, 13.5 billion gallons of gasoline and 1.6 billion gallons of diesel fuel were sold in California (CEC 2018a).

The State is now working on developing flexible strategies to reduce petroleum use. Over the last decade, California has implemented several policies, rules, and regulations to improve vehicle efficiency, increase the development and use of alternative fuels, reduce air pollutants and greenhouse gas emissions (GHGs) from the transportation sector, and reduce vehicle miles traveled (VMT). Accordingly, gasoline consumption in California has declined. The CEC predicts that the demand for gasoline will continue to decline over the next 10 years, and there will be an increase in the use of alternative fuels (CEC 2018b). According to fuel sales data from the CEC, fuel consumption in Orange County was approximately 1.4 billion gallons of gasoline and 114.6 million gallons of diesel fuel in 2018 (CEC 2018a). See Table 3.5-1 for a summary of Statewide fossil fuel consumption in 2018.

Proposed Project Site

The proposed project site is comprised of approximately 123 acres of land. The proposed project site is an active recycled water reservoir with a dechlorination facility and underground infrastructure to fill and drain the reservoir which are operated by offsite pumps. The majority of the site is undeveloped land with a riparian habitat/wetlands and scrub brush. The dechlorination facility actively consumes electricity but there is no connection of the site to natural gas, potable water, wastewater or solid waste infrastructure. Currently the existing facility consumes 217,273 kWh of electricity annually.

3.5.2 Regulatory Framework

Federal

Energy Policy Act of 1992

The Energy Policy Act (EPAct) of 1992 was passed to reduce U.S. dependence on foreign petroleum and improve air quality. EPAct includes several provisions intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain Federal, State, and local government and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. Financial incentives are also included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the EPAct to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 includes provisions for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a Federal purchase requirement for renewable energy.

On-Road Vehicle Rules

Heavy-Duty Vehicles

Fuel efficiency standards for medium- and heavy-duty trucks have been jointly developed by USEPA and NHTSA. The Phase 1 heavy-duty truck standards apply to combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles for model years 2014 through 2018, and result in a reduction in fuel consumption from 6 to 23 percent over the 2010 baseline, depending on the vehicle type (USEPA 2011). USEPA and NHTSA have also adopted the Phase 2 heavy-duty truck standards, which cover model years 2021 through 2027 and require the phase-in of a 5 to 25 percent reduction in fuel consumption over the 2017 baseline depending on the compliance year and vehicle type (USEPA 2016).

Light-Duty Vehicles

Established by the U.S. Congress in 1975, the Corporate Average Fuel Economy (CAFE) standards reduce energy consumption by increasing the fuel economy of cars and light trucks. The National Highway Traffic Safety Administration (NHTSA) and United States Environmental Protection Agency (USEPA) jointly administer the CAFE standards. The U.S. Congress has specified that CAFE standards must be set at the "maximum feasible level" with consideration given to: (1) technological feasibility; (2) economic practicality; (3) effect of other standards on fuel economy; and (4) need for the nation to conserve energy (NHSTA 2020). In August 2018, the USEPA and NHTSA proposed the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule that would, if adopted, maintain the CAFE standards applicable in model year 2020 for model years 2021 through 2026. The estimated CAFE standards for model year 2020 is 43.7 mpg and 31.3 mpg for light trucks, projecting an overall industry average of 37 mpg. See Section 3.7 *Greenhouse Gas Emissions*, of this Draft EIR for additional details regarding the SAFE Vehicles Rule.

State

California Global Warming Solutions Act of 2006

In 2006, Governor Schwarzenegger signed Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006 (codified in the California Health and Safety Code (HSC), Division 25.5), which focused on reducing GHG emissions in California to 1990 levels by 2020. Under HSC Division 25.5, California Air Resources Board (CARB) has the primary responsibility for reducing the GHG emissions in California; however, AB 32 also tasked the CEC and CPUC with providing information, analysis, and recommendations to CARB regarding strategies to reduce GHG emissions in the energy sector.

In 2016, Governor Brown signed SB 32 and its companion bill AB 197. SB 32 and AB 197 amend HSC Division 25.5 and establish a new climate pollution reduction target of 40 percent below 1990 levels by 2030 and include provisions to ensure that the benefits of state climate policies reach into disadvantaged communities. Please see Section 3.7 Greenhouse Gas Emissions of this Draft EIR for additional details regarding these statutes.

On-Road and Off-Road Vehicle and Equipment Rules

Heavy-Duty Vehicles and Equipment

Several measures have been adopted by the State to control emissions from heavy-duty vehicles and equipment. While the goals of these measures are primarily to reduce public health impacts from diesel emissions, compliance with the regulation has shown an increase in energy savings in the form of reduced fuel consumption from more fuel-efficient engines (Cummins 2014).

In 2004, CARB adopted an Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling to reduce public exposure to diesel particulate matter emissions (Title 13 CCR section 2485). The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure prohibits diesel-fueled commercial vehicles from idling for more than 5 minutes at any given location. While the goal of this measure is primarily to reduce public health impacts from diesel emissions, compliance with the regulation also results in energy savings in the form of reduced fuel consumption from unnecessary idling.

In addition to limiting exhaust from idling trucks, in 2008 CARB approved the Truck and Bus regulation to reduce NO_X, PM10, and PM2.5 emissions from existing diesel vehicles operating in California (13 CCR section 2025). The phased regulation aims to reduce emissions by requiring installation of diesel soot filters and encouraging the retirement, replacement, or retrofit of older engines with newer emission-controlled models. The phasing of this regulation has full implementation by 2023.

CARB also promulgated emission standards for off-road diesel construction equipment of greater than 25 horsepower (hp) such as bulldozers, loaders, backhoes and forklifts, as well as many other self-propelled off-road diesel vehicles. The In-Use Off-Road Diesel-Fueled Fleets regulation adopted by CARB on July 26, 2007, aims to reduce emissions by installation of diesel soot filters and encouraging the retirement, replacement, or repower of older, dirtier engines with newer emission-controlled models (13 CCR section 2449). The compliance schedule requires full implementation by 2023 in all equipment for large and medium fleets and by 2028 for small fleets.

Light-Duty Vehicles

The transportation sector accounts for more than half of carbon dioxide (CO_2) emissions in California. AB 1493 (commonly referred to as Pavley regulations), enacted on July 22, 2002, requires CARB to set GHG emission standards for new passenger vehicles, light duty trucks, and other vehicles manufactured in and after 2009 whose primary use is non-commercial personal transportation. Phase I of the legislation established standards for model years 2009–2016 and Phase II established standards for model years 2017-2025 (CARB 2020; USEPA 2012). Refer to Section 3.7 Greenhouse Gas Emissions of this Draft EIR for additional details regarding this regulation.

Integrated Energy Policy Report

Senate Bill (SB) 1389 (Public Resources Code [PRC] sections 25300–25323) requires the CEC to prepare a biennial integrated energy policy report that assesses major energy trends and issues facing the electricity, natural gas, and transportation fuel sectors in California, and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the State economy; and protect public health and safety (PRC section 25301(a)).

Renewables Portfolio Standards

The State of California adopted standards to increase the percentage of electricity that retail sellers, including investor-owned utilities and community choice aggregators, must provide from renewable resources.[1] The standards are referred to as the Renewables Portfolio Standards (RPS). The legislation requires utilities to increase the percentage of electricity obtained from renewable sources to 33 percent by 2020 and 50 percent by 2030.

On September 10, 2018, Governor Jerry Brown signed SB 100, which further increased the California RPS and requires retail sellers and local publicly owned electric utilities to procure eligible renewable electricity for 44 percent of retail sales by December 31, 2024; 52 percent by December 31, 2027; and 60 percent by December 31, 2030. SB 100 also provides that CARB should plan for 100 percent eligible renewable energy resources and zero-carbon resources by December 31, 2045.

The CPUC and the CEC jointly implement the RPS program. The responsibilities of the CPUC include: (1) determining annual procurement targets and enforcing compliance; (2) reviewing and approving renewable energy procurement plan of each investor-owned utility; (3) reviewing contracts for RPS-eligible energy; and (4) establishing the standard terms and conditions used in contracts for eligible renewable energy (CPUC 2020b). Refer to Section 3.7 Greenhouse Gas Emissions of this Draft EIR for additional details regarding this program.

California Building Standards Code (Title 24, Parts 6 and 11)

The California Building Energy Efficiency Standards for Nonresidential Buildings (California Code of Regulations [CCR], Title 24, Part 6) were adopted to ensure that building construction and system design and installation achieve energy efficiency and preserve outdoor and indoor environmental quality. The current California Building Energy Efficiency Standards (Title 24 standards) are the 2019 Title 24 standards, which became effective on January 1, 2020 (CEC 2019b). The 2019 Title 24 standards include requirements for solar photovoltaic systems in all new homes, requirements for newly constructed healthcare facilities which were previously not included, the encouragement of demand response and light-emitting diode (LED) technology for both residential and nonresidential buildings, and the use of more efficient air filters to trap hazardous particulates (CEC 2019b).The California Green Building Standards Code (CCR, Title 24, Part 11), commonly referred to as the CALGreen Code, became effective on January 1, 2017. The 2016 CALGreen Code includes mandatory measures for non-residential development related to site development, energy efficiency, water efficiency and conservation; material

[1] SB 1078 (Chapter 526, Statutes of 2002); SB 107 (Chapter 464, Statutes of 2006); Executive Order S-14-08.

conservation and resource efficiency; and environmental quality (CBSC 2017). Most mandatory measure changes, when compared to the previously applicable 2013 CALGreen Code, were related to the definitions and to the clarification or addition of referenced manuals, handbooks, and standards. For non-residential mandatory measures, Table 5.106.5.3.3 of the CALGreen Code, identifying the number of required EV charging spaces has been revised in its entirety. Refer to Section 3.7 Greenhouse Gas Emissions of this Draft EIR for additional details regarding these standards.

2017 Climate Change Scoping Plan Update

In response to SB 32 and the 2030 GHG reduction target, CARB approved California's 2017 Climate Change Scoping Plan Update (2017 Scoping Plan Update) in December 2017 (CARB 2017). The 2017 Scoping Plan Update outlines the proposed framework of action for achieving the 2030 GHG target of 40 percent reduction in GHG emissions relative to 1990 levels (CARB 2017). The 2017 Scoping Plan Update identifies key sectors of the state's implementation strategy, which includes improvements in low-carbon energy, industry, transportation sustainability, natural and working lands, waste management, and water. Through a combination of data synthesis and modeling, CARB determined that the target statewide 2030 emissions limit is 260 $MMTCO_2e$, and that further commitments will need to be made to achieve an additional reduction of 50 $MMTCO_2e$ beyond current policies and programs. The cornerstone of the 2017 Scoping Plan Update is an expansion of the Cap-and-Trade Program (discussed further below) to meet the aggressive 2030 GHG emissions goal and ensure achievement of the 2030 limit set forth by E.O. B-30-15.

The 2017 Scoping Plan Update's strategy for meeting the state's 2030 GHG target incorporates the full range of legislative actions and state-developed plans that have relevance to the year 2030, including the following, described elsewhere in this section:

- Extending the low-carbon fuel standard (LCFS) beyond 2020 and increasing the carbon intensity reduction requirement to 18 percent by 2030;
- SB 350, which increases the Renewables Portfolio Standard (RPS) to 50 percent by 2030 and requires the CEC to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by 2030. These targets may be achieved through energy efficiency savings and demand reductions from a variety of programs, including but not limited to appliance and building energy efficiency standards and a comprehensive program to achieve greater energy efficiency standards in existing buildings;
- The 2016 Mobile Source Strategy is estimated to reduce emissions from mobile sources including an 80 percent reduction in smog-forming emissions and a 45 percent reduction in diesel particulate matter from 2016 levels in the Air Basin, a 45 percent reduction in statewide GHG emissions (from both on-road and off-road mobile sources) and a 50 percent reduction in statewide consumption of petroleum-based fuels;
- The Sustainable Freight Action Plan to improve freight efficiency and transition to zero emission freight handling technologies (described in more detail below);

- SB 1383, which requires a 50 percent reduction in anthropogenic black carbon and a 40 percent reduction in hydrofluorocarbon and methane emissions below 2013 levels by 2030; and
- AB 398, which extends the state Cap-and-Trade Program through 2030.

In the 2017 Scoping Plan Update, CARB recommends statewide targets of no more than six MT CO_2e per capita by 2030 and no more than two metric tons CO_2e per capita by 2050. CARB acknowledges that because the statewide per capita targets are based on the statewide GHG emissions inventory that includes all emissions sectors in the state (including large industrial sources covered under the state's cap and trade program), they are not applicable for use at the local level. Rather, it is appropriate for local jurisdictions to derive evidence-based local per-capita goals based on local emissions sectors and growth projections.

To demonstrate how a local jurisdiction can achieve their long-term GHG goals at the community plan level, CARB recommends developing a geographically specific GHG reduction plan (i.e., climate action plan) consistent with the requirements of CEQA Guidelines section 15183.5(b). A so-called "CEQA-qualified" GHG reduction plan, once adopted, can provide local governments with a streamlining tool for project-level environmental review of GHG emissions, provided there are adequate performance metrics for determining project consistency with the plan. Absent conformity with such a plan, CARB recommends "that projects incorporate design features and GHG reduction measures, to the degree feasible, to minimize GHG emissions. Achieving no net additional increase in GHG emissions, resulting in no contribution to GHG impacts, is an appropriate overall objective for new development (CARB 2017)."

Local

County of Orange General Plan

Local jurisdictions, such as the County of Orange, have the authority and responsibility to reduce energy consumption through their land use decision-making authority. The County's General Plan Resource Element sets forth the goals, objectives, and policies which guide the County in its implementation of its air quality improvement programs and strategies.

The Resource Element establishes the following goal pertaining to project energy use:

> **Goal 3**: Maximize the conservation of energy resources in all future land use and transportation planning decisions.

City of Irvine General Plan

The City of Irvine is responsible for the assessment and mitigation of pollutant emissions resulting from its land use decisions. The City's General Plan Energy Element sets forth the objectives and policies which guide the City in its implementation of its energy improvement programs and strategies. The Energy Element establishes the following objectives pertaining to the proposed project energy use:

> **Goal I-1**: Maximize energy efficiency through land use and transportation planning.

3.5.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from Appendix G of the CEQA Guidelines are used as thresholds of significance to determine the impacts of the project as related to energy. The proposed project would have a significant impact if it would:

1. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.
2. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.
3. Result in cumulatively considerable impacts to energy.

Methodology

The discussion below presents the methodology used to analyze the potential energy usage of the proposed project, including electricity and transportation fuels during construction and operational phases. Specific assumptions and data sources needed to quantify energy consumption during both construction and operation are presented. The methods and scenarios used for the energy calculations are the same as those used for the GHG calculations, as summarized in the Methodology section in Section 3.7 Greenhouse Gas Emissions of this Draft EIR and detailed in the Air Quality and Greenhouse Gas Technical Report provided as **Appendix B** of this Draft EIR.

Impact Analysis

Energy Consumption

Impact 3.5-1: The proposed project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.

Construction

Construction energy consumption would result from transportation fuels (e.g., diesel, gasoline, and compressed natural gas [CNG]) used for haul trucks, heavy-duty construction equipment, construction workers traveling to and from the proposed project site, electricity consumed to power the construction trailers (lights, electronic equipment, and heating and cooling) and exterior uses such as lights, conveyance of water for dust control, and any electrically-driven construction equipment.

Construction activities could vary substantially from day to day, depending on the specific type of construction activity and the number of workers and vendors that would travel to the proposed project site. This analysis considered these factors and provides the estimated maximum construction energy consumption for the purposes of evaluating the associated impacts on energy resources.

Construction fuel use was forecasted by assuming a conservative estimate of construction activities and applying mobile source emission factors. Construction of the proposed project would occur over approximately 41 months, from late 2022 through early 2026 (i.e., assuming all construction occurs at the earliest feasible date). If, for various site planning, financial, or other reasons, the onset of construction is delayed to a later date than assumed in the analysis, construction impacts to energy consumption would be similar to or less than those analyzed below, because more energy-efficient and cleaner burning construction equipment and vehicle fleet mix would be expected in the future. This is due to the In-Use Off-Road Diesel-Fueled Fleets Regulation implemented by CARB that requires construction equipment fleet operators to phase-in less polluting heavy-duty equipment and trucks over time (CARB 2010).

Electricity

Electricity use during construction would be short-term, the majority of which would be limited to working hours and used for necessary construction-related activities. Electricity would be used for electrically driven construction devices such as air compressors, pumps and other equipment, and the operation of the construction trailer. Electricity for equipment operating remotely on the proposed project site would use a portable generator to power the equipment. Electricity for the temporary construction office would be accessed from the existing electrical grid via temporary connections to provide temporary power and would be disconnected when construction activities cease. Construction would not result in a substantial use of energy or the need to increase infrastructure or supply. Therefore, the proposed project's construction would not result in the wasteful, inefficient, or unnecessary consumption of electricity resources and impacts would be less than significant.

Natural Gas

Natural gas would not be consumed during construction of the proposed project because construction offices would not be heated with natural gas, and construction equipment and vehicles would be primarily powered by either diesel, gasoline, or electricity. Therefore, project construction would result in no impacts to natural gas resources.

Transportation Fuels

Transportation fuels would be consumed for transportation of construction workers and materials to and from the proposed project site, and operation of construction equipment on the proposed project site throughout the construction phase.

Fuel consumption from on-site heavy-duty construction equipment was calculated based on the equipment mix estimated by IRWD and usage factors provided in the CalEEMod® construction calculations; summaries are included in Appendix B of this Draft EIR.

The energy usage required for construction of the proposed project was estimated based on the number and type of construction equipment that would be used during construction by assuming a conservative estimate of construction activities (i.e., maximum daily equipment usage levels). Energy for construction workers commuting trips was estimated based on the predicted number of workers for the various phases of construction and the estimated VMT based on the conservative values in the CalEEMod and EMFAC2017 models.

The estimated fuel economy for heavy-duty construction equipment was based on fuel consumption factors from the CARB OFFROAD emissions model, which is a state-approved model for estimating emissions from off-road heavy-duty equipment. The estimated fuel economy for haul trucks, vendor trucks, concrete trucks, and worker commute vehicles was based on fuel consumption factors from the CARB EMFAC2017 emissions model, which is a state-approved model for estimating emissions from on-road vehicles and trucks.

The estimated project fuel consumption and comparison to existing (2018) county usage are provided in **Table 3.5-2**. As shown, the limited construction time period results in a minimal amount of fuel consumption as compared to typical County usage. Furthermore, construction equipment and trucks would be required to comply with applicable provisions of regulations to improve fuel efficiency, including the Phase 1 and Phase 2 heavy-duty truck standards. Therefore, construction of the proposed project would not result in the wasteful, inefficient, or unnecessary consumption of transportation fuel resources and impacts would be less than significant.

TABLE 3.5-2
ESTIMATED PROJECT FUEL CONSUMPTION

	Total Project Fuel Consumption (gallons)	
	Diesel	**Gasoline**
Total Project	838,360	59,088
Annual Average	279,453	19,696
County Usage	114,600,000	1,402,000,000
% County Usage	0.244%	<0.001%

NOTE:
[a] CEC. 2018a
SOURCE: Refer to Appendix B

Operation

Once construction is completed, operation of the proposed enlarged Syphon Reservoir would be controlled remotely by existing employees; no additional employees are required onsite daily for operation of Syphon Reservoir. Maintenance activities for the upkeep of the new dam and reservoir are anticipated to be similar to existing conditions, with daily safety/security checks, and water quality sampling performed by existing IRWD employees. The proposed project is anticipated to add passive recreational uses in the form of a walking trail that would be used by residents of adjacent communities. There is no available parking onsite, therefore recreation users would access the site on foot and would not result in additional vehicle trips that would create additional demand for transportation energy. During operation of the proposed project, electricity would be consumed for the operation of the Treatment Facility, which includes electricity for building lighting and electric-powered pumps and other equipment. Building lighting would be energy-efficient (i.e., light-emitting diode [LED]) and the pumps and other equipment installed would be new and designed to meet applicable current energy standards for such equipment.

Operation of the proposed project would also involve use of existing offsite pumps at Eastwood Recycled Water Pump Station. The Eastwood pump station is currently under construction and can accommodate the proposed project. Installation of the equipment would be coordinated as a separate "equipping project" in parallel to the construction of the proposed Syphon Reservoir improvements. The existing Highline Canal would be abandoned in place and no longer used to deliver recycled water to Syphon Reservoir from Rattlesnake Reservoir. Under normal operating conditions, all flow in and out of Syphon Reservoir would be conveyed through the Eastwood Recycled Water Pump Station through the same 36-inch recycled water pipeline, for connection to IRWD's recycled waters distribution system. The Treatment Facilities and use of the existing Eastwood Recycled Water Pump Station would result in the consumption of approximately 1,300,000 kWh of electricity annually for a net increase of 1,082,727 kWh relative to existing electricity consumption. The new total net operating electricity consumption represents approximately 0.006 percent of the county and 0.002 percent of SCE consumption for 2018. No natural gas would be used during operational activities. Given the minimal energy consumption of the proposed project and that the project would be designed with energy efficient lighting and equipment, the proposed project would not result in a substantial increase in energy consumption and would not result in the wasteful, inefficient, or unnecessary consumption of electricity resources; impacts would be less than significant.

Furthermore, the objectives of the proposed project include reducing the need to purchase supplemental imported untreated water from MWD by storing recycled water that is already being produced at the Michelson WRP. Conveying imported untreated water from the State Water Project (SWP) and the Colorado River to Orange County requires a tremendous amount of energy for pumping. Replacing imported water with locally generated recycled water reduces the overall energy associated with importing water since there would be less energy needed for conveyance. Approximately 1,890 kWh per acre foot is required for water supply and conveyance in the IRWD service area due to importing water from outside of the region from the SWP and Colorado River (IRWD 2019). Without the proposed project, approximately 4,500 AF of untreated water would be imported through MWD, resulting in approximately 8,505,000 kWh/year of electricity consumption district-wide. Treatment and transport of approximately 4,500 AF of locally-produced recycled water would result in approximately 4,806,000 kWh/year of district-wide electricity consumption, which is an approximate savings of 3,699,000 kWh annually. By providing IRWD customers with recycled water that is stored by the proposed project, electricity demand for water supply and conveyance of imported water would be reduced.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Consistency with Energy Plans

Impact 3.5-2: The proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

The proposed project would be designed in a manner that is consistent with relevant energy conservation plans, such as Integrated Energy Policy Report, and the California Building Standards, designed to encourage development that results in the efficient use of water resources. The proposed project would increase the capacity of the reservoir, thereby providing a local, consistent supply of recycled water for the IRWD service area. This would reduce the energy consumption needed to provide water to IRWD's recycled water customers as described above under Impact 3.5-1.

The 2017 Climate Change Scoping Plan recognizes the nexus between water and energy consumption. The water-energy nexus provides opportunities for reducing energy demand and reducing emissions of greenhouse gases. The 2017 Climate Change Scoping Plan, states that "recycled water has the potential to reduce GHGs if it replaces, and not merely serves as an alternative to, an existing, higher-carbon water supply" (CARB 2017). Given the water-energy nexus, this means recycled water has the potential to reduce energy consumption if it replaces more energy-intensive water supplies. As discussed under Impact 3.5-1, replacing imported water with recycled water stored under the proposed project would reduce the electricity used for water supply and conveyance by approximately 3,699,000 kWh annually. Thus, the proposed project would be consistent with the Scoping Plan's strategy to reduce water-related energy consumption. As a result, the proposed project would not conflict with or obstruct a State or local plan for energy efficiency. The impact would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Cumulative Impacts

Impact 3.5-3: Concurrent construction and operation of the project and related projects in the geographic scope would not result in cumulative impacts to energy.

Electricity

The geographic context for the cumulative analysis of electricity is the SCE service area. Growth within this service area is anticipated to increase the demand for electricity and the need for infrastructure, such as new or expanded facilities.

Future development would result in the increased use of electricity resources. However, SCE has determined that the use of such resources would be minor compared to existing supply and infrastructure within the SCE service area and would be consistent with growth expectations (CEC 2018c). Furthermore, other cumulative developments would be required to incorporate energy conservation features in order to comply with applicable mandatory regulations including CALGreen Code, State energy standards under Title 24, and incorporate mitigation measures, as necessary. The proposed project would reduce energy consumption needed to distribute water to IRWD's recycled water customers by replacing some imported water with a local supply. As discussed under Impact 3.5-1, replacing imported water with recycled water stored under the proposed project would reduce the electricity used for water supply and conveyance by approximately 3,699,000 kWh annually. Therefore, the proposed project's contribution to cumulative electricity impact would be less than significant.

Natural Gas

The geographic context for the cumulative analysis of natural gas is the SoCalGas service area. Growth within this service area is anticipated to increase the demand for natural gas and the need for infrastructure, such as new or expanded facilities. However, the proposed project would not require natural gas during construction or operational activities Therefore the proposed project would result in no cumulative impacts to natural gas**.**

Transportation Energy

The geographic context for the cumulative analysis of transportation energy is the SCAG region. Growth within this region is anticipated to increase the demand for transportation and the need for infrastructure, such as new or expanded facilities. Construction of the proposed project would result in a temporary increase in VMT within the area; however, this short-term increase would last for only 36 to 41 months. Subsequent to the completion of construction, there would be no new vehicle trips to the proposed project site. Therefore, the proposed project's contribution to cumulative transportation energy impacts would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

3.5.4 References

California Air Resources Board (CARB). 2020. *California's Greenhouse Gas Vehicle Emission Standards under Assembly Bill 1493 of 2002 (Pavley)*. Available at http://www.arb.ca.gov/cc/ccms/ccms.htm. Accessed June 2020.

CARB. 2010. *In-Use Off-Road Diesel-Fueled Fleets Regulation*, December 2010, revised October 2016.

CARB. 2017. *California's 2017 Climate Change Scoping Plan: The strategy for achieving California's 2030 greenhouse gas target*, November. Available at www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.

California Building Standards Commission (CBSC). 2017. *Guide to the 2016 California Green Building Standards Code Nonresidential*, January.

California Energy Commission (CEC). 2015. 2016 Building Energy Efficiency Standards. Available at http://www.energy.ca.gov/title24/2016standards/. Accessed May 2019.

CEC. 2018a. *California Retail Fuel Outlet Annual Reporting (CEC-A15) Results*. Available at https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-retail-fuel-outlet-annual-reporting. Accessed June 2020.

CEC. 2018b. *2017 Integrated Energy Policy Report*, February, p. 213.

CEC. 2018c. *California Energy Demand 2018–2030 Revised Forecast*, January 2018.

CEC. 2019a. California Energy Consumption by End-Use Sector, 2018. Available at https://www.eia.gov/state/?sid=CA#tabs-2.

CEC. 2019b. 2019 Building Energy Efficiency Standards. Available at http://www.energy.ca.gov/title24/2019standards/. Accessed June 2020.

California Gas and Electric Utilities. 2018. *2018 California Gas Report*. Available at https://www.socalgas.com/regulatory/documents/cgr/2018_California_Gas_Report.pdf. Accessed June 2020.

California Public Utilities Commission (CPUC). 2020a. California Public Utilities Commission. Available at http://www.cpuc.ca.gov/. Accessed June 2020.

CPUC. 2020b. RPS Program Overview. Available at http://www.cpuc.ca.gov/RPS_Overview/. Accessed June 2020.

Cummins, Inc. 2014. *Cummins Tier-4-Final Field Test Showed 10% Lower Fuel Consumption*, March 5, 2014.

Irvine Ranch Water District (IRWD). 2019. *Embedded Energy Plan Final Report*, December. Available at https://www.irwd.com/images/pdf/doing-business/energy-programs/1.%20Embedded%20Energy%20Plan%20-%20Final%20Report.pdf. Accessed June 2020.

National Highway Transportation Safety Administration (NHTSA). 2020. Corporate Average Fuel Economy. Available at https://www.nhtsa.gov/laws-regulations/corporate-average-fuel-economy. Accessed June 2020.

Southern California Edison (SCE). 2019a. 2018 Power Content Label, July. Available at https://www.sce.com/sites/default/files/inline-files/2018SCEPCL.pdf. Accessed May 2020.

SCE. 2019b. *2019 Annual Report*. Available at https://www.edison.com/content/dam/eix/documents/investors/corporate-governance/eix-sce-2019-annual-report.pdf. Accessed June 2020

SCE. n.d. About Us >Who We Are. Available at https://www.sce.com/about-us/who-we-are. Accessed June 2020.

SoCalGas. 2020. Company Profile. Available at https://www.socalgas.com/about-us/company-profile. Accessed June 2020.

U.S. Environmental Protection Agency (USEPA). 2011. Fact Sheet: EPA and NHTSA Adopt First-Ever Program to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles, August 2011.

USEPA. 2012. *EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017–2025 Cars and Light Trucks*, August 2012.

USEPA. 2016. Federal Register/Vol. 81, No. 206/Tuesday, Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, October 25.

3.6 Geology and Soils

This section addresses the geology, soils, and paleontological resources impacts associated with construction and operation of the proposed project. This section includes: a description of the existing geology, soils, and paleontological resource conditions at the proposed project site; a summary of applicable regulations related to geology and soil hazards, and paleontological resources; and an evaluation of the potential impacts of the proposed project related to the geologic and soil conditions and the paleontological resources on the proposed project site and in the surrounding area, including cumulative impacts. Potential hazards from flooding associated with the construction and operation of the proposed project, including dam safety issues, are discussed in Section 3.9, *Hydrology and Water Quality*.

To inform the project design, the geotechnical investigations listed below have been conducted to investigate site conditions and identify potential geotechnical issues and provide recommendations to address those issues. The information provided in the listed reports are the primary source of information for this section.

- AECOM. 2020a. *Existing Lakebed Sediment Environmental Sampling Results, Irvine Ranch Water District, Syphon Reservoir Improvement Project, IRWD Project 03808*, April 21.
- AECOM. 2020b. *Site-Specific Seismic Hazard Analysis, Syphon Reservoir Improvement Project, Orange County, CA*, May 7.
- AECOM. 2020c. *Geotechnical Data Report, Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA*, May 11.
- AECOM. 2020d. *Local Fault Considerations for Proposed Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA*, May 7.
- AECOM. 2020e. *Preliminary Geotechnical Interpretive Report, Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA*, July 2.
- GEI. 2012. *Syphon Reservoir Expansion, Engineering Feasibility Study, Engineering Summary Report*, August.
- GEI. 2016. *Syphon Reservoir, Dry Lakebed Geotechnical Exploration*, June 13.
- HDR. 2018. *Draft Final Technical Memorandum, Technical Review and Validation of Feasibility Study Documents, Syphon Reservoir Project*, July 27.

3.6.1 Environmental Setting

Topography and Drainage

The proposed project site lies within a shallow valley, commonly referred to as Syphon Canyon, located between Bee and Hicks Canyons (GEI 2012). The canyon is situated along the southwestern flank of the Loma Ridge in the Santiago Hills portion of the Santa Ana Mountains. The canyon and the surrounding terrain drains onto the Tustin Plain, an alluvial plain that extends southwest from the Santa Ana Mountains to the San Joaquin Hills. The Tustin Plain is located at the eastern edge of the large sedimentary basin that incorporates most of the flat-lying areas of Orange and Los Angeles Counties.

The existing dam and reservoir are located within a bowl-shaped area, surrounded by State Route 133 along the southeast side, Portola Parkway along the southwest side, and the Bee Canyon Access Road along the northwest and north side, as shown on **Figure 3.6-1**. Moving from northeast to southwest in the general direction of drainage, elevations range from:

- 675 feet above mean sea level (amsl), based on North American Vertical Datum of 1988 [NAVD88]) on a knoll at the northeast corner of the bowl near where Bee Canyon Access Road and State Route (SR)133 come together to
- A little less than 350 feet amsl at the bottom of the existing reservoir to
- 387.7 feet amsl on the crest of the existing dam to
- Approximately 332 feet amsl at the strainer/disinfection facilities at the base of the dam to
- 319 feet amsl where the inlet and outlet pipelines drop to under Portola Parkway.

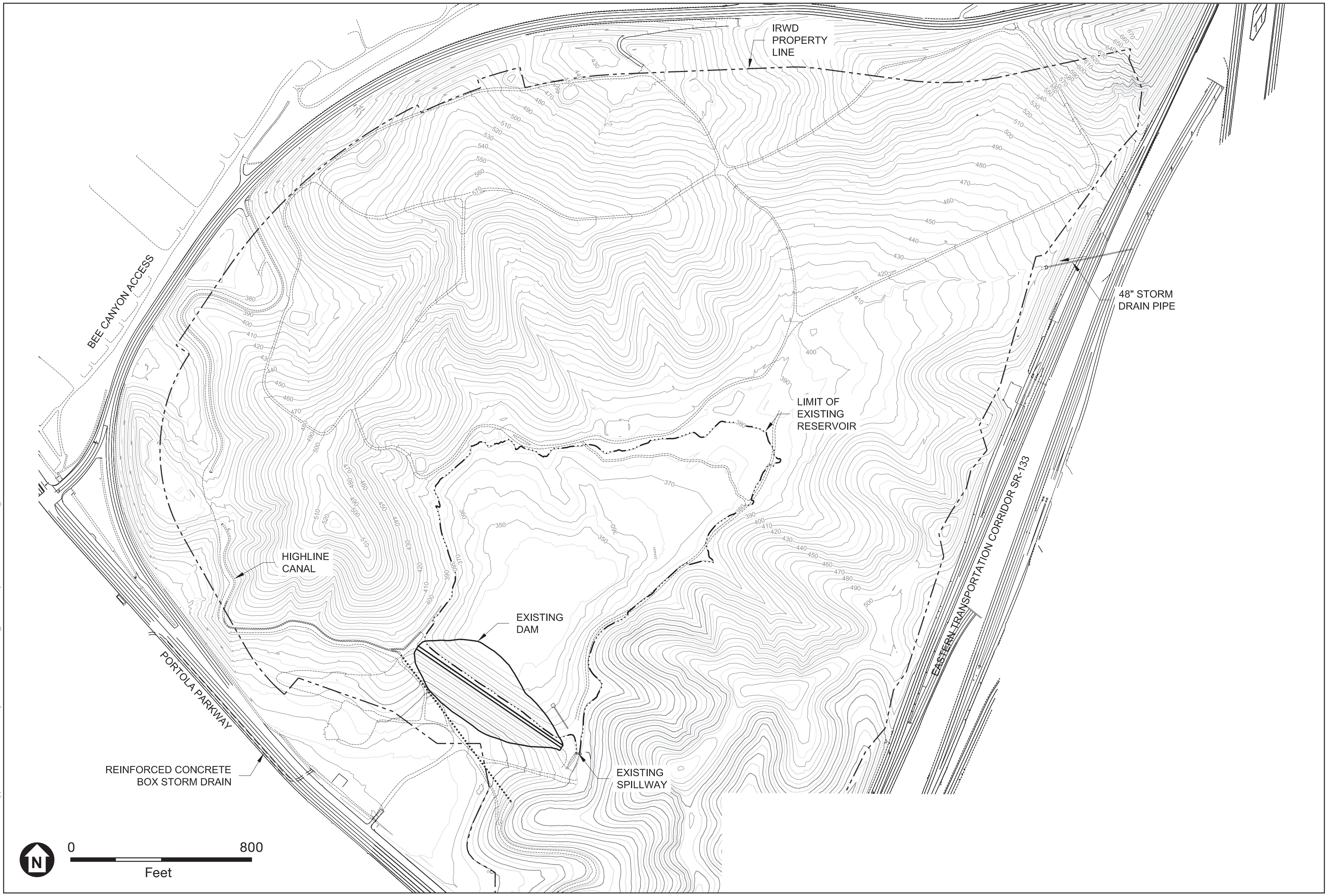
The existing embankment dam is a homogeneous earthfill dam that is 59 feet high and 843 feet long (HDR 2019). The existing spillway is located at the left (southeast) abutment of the dam, and a concrete lined channel extends a portion of the way to the downstream toe of the dam. The existing outlet consists of a 15-inch reinforced concrete pipe located beneath the dam and within its right (northwest) abutment. Historically, Syphon Reservoir was filled via gravity flows from Rattlesnake Reservoir (located about 1.3 miles to the north) through the Highline Canal that crosses the Syphon Reservoir dam near its right (northwest) abutment, as shown on Figure 3.6-1.

Natural drainage is from the sides of the bowl down into the reservoir. Water drawn from the reservoir enters the strainer/disinfection facilities for treatment at the foot of the dam and is then routed into IRWD's recycled water distribution pipeline. The dam has an overflow spillway on the southeastern end. Based on a review of performance records of the dam and reservoir, overflow discharge through the spillway has never occurred.

Regional Geology

The proposed project site lies within the geologically complex and seismically active region of California referred to as the Peninsular Ranges geomorphic province (CGS 2002a).[1] The province is characterized by a series of ranges separated by northwest trending valleys, subparallel to faults branching from the San Andreas Fault. The trend of topography is similar to the Coast Ranges (i.e., generally north-northwest to south-southeast ranges and valleys), but the geology is more like the Sierra Nevada, with granitic rock intruding the older metamorphic rocks. The Peninsular Ranges extend into lower California and are bound on the east by the Colorado Desert. The Los Angeles Basin and the island group (Santa Catalina, Santa Barbara, and the distinctly terraced San Clemente and San Nicolas Islands), together with the surrounding continental shelf (cut by deep submarine fault troughs), are included in this province.

1 A geomorphic province is an area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces.



SOURCE: GEI Consultants, 2012

Figure 3.6-1
Site Plan of Existing Conditions

Local Geology and Soils

The geologic units at the proposed project site consist of road fill, lake bottom deposits, dam embankment, Quaternary[2] alluvium and slopewash, the Tertiary Vaqueros/Sespe Formations (Tvs) and Silverado Formation (Tsi), and the Cretaceous[3] Williams Formation (at depth), as illustrated on **Figure 3.6-2** and **Figure 3.6-3** (AECOM 2020d). Alluvium, slopewash, and reservoir bottom sediments cover some of the underlying bedrock formations, mostly down the northeast–southwest axis of the canyon. The geologic units are summarized below from surface deposits to the bedrock formations. Additional information about surface soils can be found in Section 3.3, *Biological Resources*.

Road Fill

Engineered road fill is present along the eastern edge and northwestern side of the geologic map (AECOM 2020c, 2020e). The road fill on the eastern edge forms the abutments of a bridge that is part of the southbound State Route 133 toll road. The road fill at the northwestern side fills a low drainage area along Bee Canyon Road.

Lake Bottom Sediments

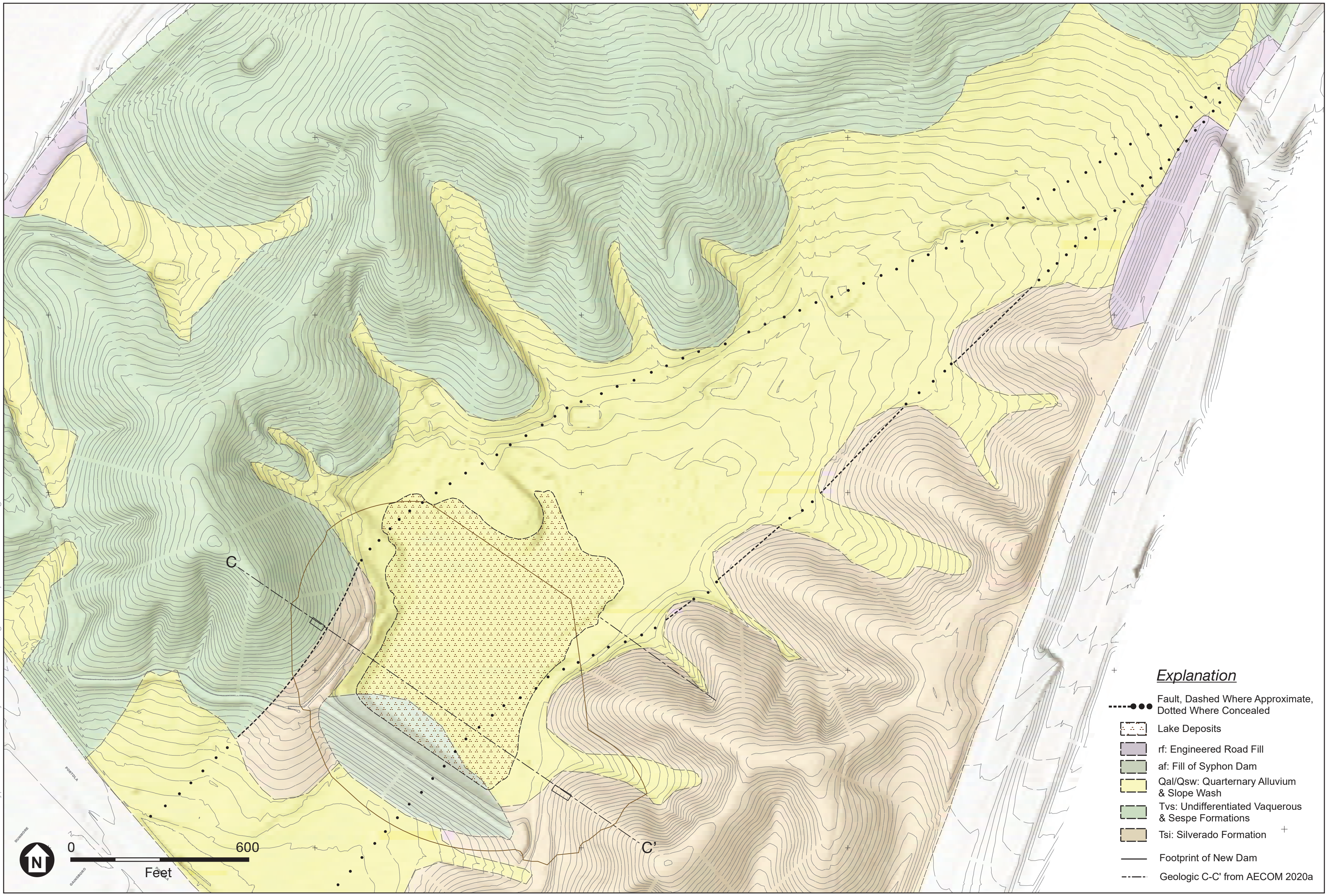
Geotechnical investigations of reservoir bottom sediments were conducted in 2015 and 2019 (GEI 2016; AECOM 2020a). The thickness of the reservoir bottom sediments ranges from zero at the edge of the reservoir (when full) to a maximum of 20 feet adjacent to the dam (AECOM 2020c). Most of the measured sediment thicknesses were less than five feet (GEI 2016). Geotechnical testing of selected samples indicate the lakebed sediments comprise sandy lean clay, sandy fat clay, and clayey sand, with some gravel present in places (AECOM 2020a). Roots, fibrous organic material, and shells were noted in some places. Alluvium or bedrock was encountered below the lakebed sediments. The total volume of lakebed sediments is estimated to be about 80,000 cubic yards. The geotechnical engineer noted that the vegetation and organic material in the lakebed sediments make them unsuitable for use as engineered fill (AECOM 2020a). Fat clays are susceptible to shrinking and swelling (expansion) with drying and wetting events, as discussed further below.

Dam Embankment Materials

The existing Syphon Dam is a homogenous earth dam without internal drainage layers (GEI 2012, 2016; AECOM 2020c). The dam was constructed in 1949 using onsite materials typically consisting of clayey sand with lesser amounts of sandy lean clay (AECOM 2020e).[4] The embankment material was compacted in lifts, but compaction test records are not available. The dam materials are up to 65 feet thick when including the cutoff trench. The embankment material typically has low to moderate plasticity.

---

2 Quaternary time is from the present to 1.6 million years ago.
3 Cretaceous time is from 66 million to 145 million years ago.
4 Lean clay is not expansive (i.e., subject to shrink-swell with drying and wetting); fat clay is expansive.



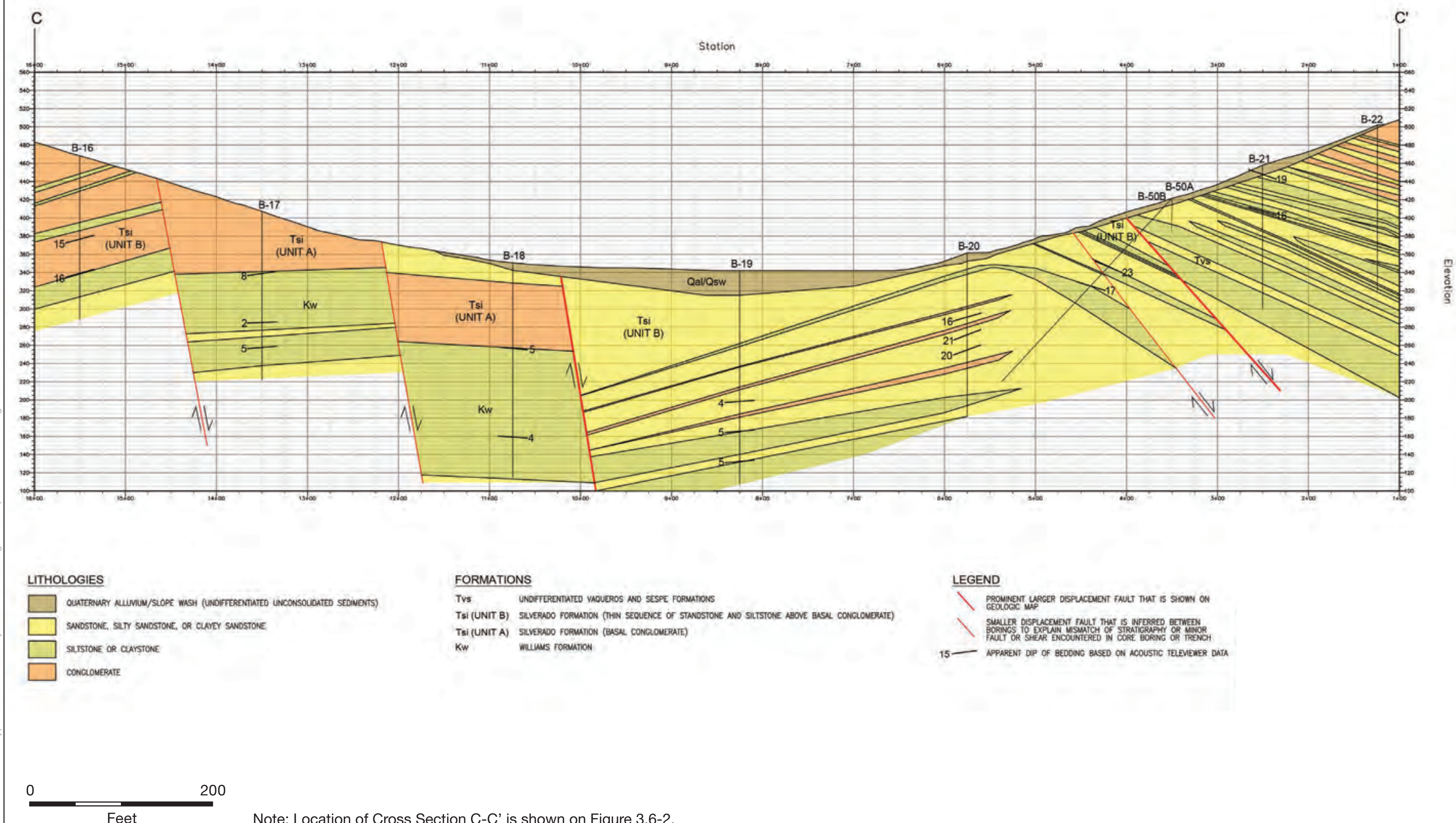
D170445.00 - IRWD Syphon Reservoir Recycled Water Storage\05 Graphics-GIS-Modeling

SOURCE: AECOM, 2020a

Syphon Reservoir Improvement Project

Figure 3.6-2
Geologic Map

ESA



Note: Location of Cross Section C-C' is shown on Figure 3.6-2.

SOURCE: AECOM, 2020a

Figure 3.6-3
Geologic Cross Section C-C

Slopewash (Colluvium) and Alluvium

Most of the proposed project site is covered with slopewash (colluvium[5]) and/or alluvium (GEI 2012 2016; AECOM 2020c 2020e). Slopewash is present on the hillsides above the canyon bottom and under the reservoir bottom sediments. The slopewash is typically less than a foot thick on the upper portions of hillsides and thickens towards the canyon bottom where it transitions into alluvium up to approximately 35 feet thick in the canyon bottom areas near the existing dam.

The slopewash consists of interlayered silt, sand, and clay, typically with trace amounts of gravel. The gravel content typically increases where these soils develop on, or accumulate downslope from, conglomeratic layers contained within the formational materials discussed below. The plastic silts, clays, and clayey sands typically have low to high plasticity, and are stiff to very stiff. The sandy and non-plastic silty layers are typically loose to medium dense.

The alluvium consists of interlayered silt, sand, and clay with trace amounts of gravel and cobbles. Geotechnical laboratory testing classified the sampled materials as predominately low plasticity clayey sands with some sandy lean (low plasticity) clays with less abundant layers of silty sands, clayey gravels, and clayey and silty sands with gravel (AECOM 2020e). Some areas have materials susceptible to liquefaction. However, the dam would be excavated down to and seated in the underlying bedrock such that the new dam will be founded on bedrock to mitigate the potential for liquefaction.

Bedrock Formations

The inactive Center Valley Fault, discussed further below, crosses the proposed project site and the existing dam northeast to southwest, as shown on Figure 3.6-2 (AECOM 2020d). The fault has resulted in the Vaquerso/Sespe Formation being on the northwest side of the fault and the Silverado Formation being on the southeast side. The formations are summarized below.

Vaqueros and Sespe Formations

These two formations were formed 37 to 16 million years ago (mya), and are characterized by sediments deposited at the same time in adjacent environments – the Vaqueros being the marine and the Sespe being the nonmarine equivalents (GEI 2012, 2016: AECOM 2020e). These formations are recognized as being interbedded in the site area. Previous investigators have estimated the contact at different locations in the local area, and onsite field investigations performed to date have not delineated the contact location between the Vaqueros and Sespe Formations. Hence, the two formations have been given a dual classification for the purposes of the geotechnical investigations, as was done for previous regional studies, and are referred to as the Vaqueros/Sespe Formation (Tvs).

In general, the Vaqueros Formation typically consists of marine sandstone with siltstone and shale interbeds, and is moderately to locally well-indurated (hardened) where calcareous (i.e.,

5 Slopewash and colluvium are general names for loose, unconsolidated sediments that have been deposited at the base of hillslopes by either rainwash, sheetwash, slow continuous downslope creep, or a variable combination of these processes.

calcium carbonate) cementation is present. Some of the siltstone and shale interbeds are described as soft. The Sespe Formation consists of non-marine sandstone, claystone, siltstone, and conglomerate that are typically poorly to moderately indurated with local, well indurated, coarse-grained layers.

Silverado Formation

The Silverado Formation was formed 66 to 56 mya, and is thus older than the Vaqueros/Sespe Formation (GEI 2012, 2016: AECOM 2020e). The Silverado Formation typically consists of non-marine clayey to silty sandstone, siltstone, and a distinctive basal conglomerate. A thick conglomerate bed is interpreted as forming the left (southeast) abutment of the existing dam and is exposed in the cut bank above the graded pad southeast of the dam crest. The Silverado Formation is poorly to moderately indurated, although in select localities it can be well indurated.

Williams Formation

The upper Cretaceous age Williams Formation is exposed at the surface in the bedrock hills that are southeast of the project site (AECOM 2020d, e). The Williams Formation is a marine deposit encountered in several project borings beneath the Silverado Formation dominantly comprised of fine-grained clayey sandstone interbedded with less common medium- to coarse-grained sandstones.

Seismicity and Faults

This section characterizes the region's existing faults, describes historical earthquakes, estimates of the likelihood of future earthquakes, and describes probable groundshaking effects.

Earthquake Terminology and Concepts

Earthquake Mechanisms and Fault Activity

Faults are planar features within the earth's crust that have formed to release strain caused by the dynamic movements of the earth's major tectonic plates. An earthquake on a fault is produced when these strains overcome the inherent strength of the earth's crust, and the rock ruptures. The rupture causes seismic waves that propagate through the earth's crust, producing the groundshaking effect known as an earthquake. The rupture also causes variable amounts of slip along the fault, which may or may not be visible at the earth's surface.

Geologists commonly use the age of offset rocks as evidence of fault activity—the younger the displaced rocks, the more recently earthquakes have occurred. To evaluate the likelihood that a fault would produce an earthquake, geologists examine the magnitude and frequency of recorded earthquakes and evidence of past displacement along a fault. The California Geological Survey (CGS) defines an active fault as one that has had surface displacement within Holocene time (within the last 11,000 years; the U.S. Geological Survey (USGS) uses within the last 15,000 years). A Quaternary fault is defined as a fault that has shown evidence of surface displacement during the Quaternary period (the last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not mean that a fault lacking evidence of surface displacement is necessarily inactive. The term "sufficiently active" is also used to describe a fault if there is some evidence that Holocene displacement has occurred on one or more of its segments or branches (CGS 2007).

The existing Syphon Dam is under the regulatory jurisdiction of the Division of Safety of Dams (DSOD). To provide a higher degree of protection from earthquake-induced dam failure, the DSOD classifications with regard to fault activity are as follows (DSOD 2018):

- **Active seismic sources** – A fault having ruptured within the last 35,000 years.
- **Conditionally active seismic sources** – A fault having ruptured in the Quaternary (up to 1.6 million years before present), but its displacement history during the last 35,000 years is unknown.
- **Inactive seismic sources** – Fault inactivity is demonstrated by a fault trace that is consistently overlain by unbroken geologic material older than 35,000 years. A fault that has no indication of Quaternary activity is presumed to be inactive, except in regions of sparse Quaternary cover.

Earthquake Magnitude

When an earthquake occurs along a fault, its size can be determined by measuring the energy released during the event (CGS 2002b). A network of seismographs records the amplitude and frequency of the seismic waves that an earthquake generates. The Richter magnitude (ML) of an earthquake represents the highest amplitude measured by the seismograph at a distance of 100 kilometers from the epicenter. Richter magnitudes vary logarithmically with each whole-number step, representing a tenfold increase in the amplitude of the recorded seismic waves and 32 times the amount of energy released. While Richter magnitude was historically the primary measure of earthquake magnitude, seismologists now use Moment Magnitude (Mw) as the preferred way to express the size of an earthquake. The Mw scale is related to the physical characteristics of a fault, including the rigidity of the rock, the size of fault rupture, and the style of movement or displacement across the fault. Although the formulae of the scales are different, they both contain a similar continuum of magnitude values, except that Mw can reliably measure larger earthquakes and do so from greater distances.

Peak Ground Acceleration and Spectral Acceleration

Common measures of ground motion at any particular site during an earthquake is the peak ground acceleration (PGA) and spectral acceleration (SA). The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 980 centimeters per second squared. In terms of automobile acceleration, one "g" of acceleration is equivalent to the motion of a car traveling 328 feet from rest in 4.5 seconds. For comparison purposes, the maximum PGA value recorded during the 1994 Northridge earthquake in the vicinity of the epicenter exceeded 1 g in several areas. Unlike measures of magnitude, which provide a single measure of earthquake energy, PGA varies from place to place and is dependent on the distance from the epicenter and the character of the underlying geology (e.g., hard bedrock, soft sediments, or artificial fills). The SA is also measured in g. However, SA describes the maximum acceleration in an earthquake on an object (in this case, the dam), as modeled by a particle on a massless vertical rod having the same natural period of vibration as the building or structure.

Modified Mercalli Intensity Scale

The Modified Mercalli Intensity Scale assigns an intensity value based on the observed effects of ground shaking produced by an earthquake. Unlike measures of earthquake magnitude and PGA, the Modified Mercalli Intensity Scale is qualitative in nature in that it is based on actual observed effects rather than measured values. Similar to PGA, Modified Mercalli values for an earthquake at any one place can vary depending on the earthquake's magnitude, the distance from its epicenter, the focus of its energy, and the type of geologic material. The Modified Mercalli values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X can cause moderate to significant structural damage. Because the Modified Mercalli scale is a measure of ground shaking effects, intensity values can be correlated to a range of average PGA values, as shown in **Table 3.6-1**.

Active Faults and Seismicity

Regionally, the proposed project site lies within a crustal block between active northwest-southeast-trending faults, the Elsinore Fault Zone to northeast and the Newport-Inglewood Fault Zone to the southwest, as shown on **Figure 3.6-4**. Numerous smaller faults displace the late Cretaceous through early Miocene[6] sedimentary deposits that characterize the Loma Ridge. The sedimentary formations in the project site area include the relatively younger Vaqueros and Sespe Formations, and the relatively older Silverado Formation. These sediments were folded into a broad north-to-northwest-trending syncline[7] with local variations caused by localized faulting and smaller folds.

The proposed project area is located in a seismically active region of California that contains both active (Holocene age) and potentially active (Quaternary age) faults. Throughout the proposed project region, there is the potential for damage resulting from movement along any one of a number of active faults, seismic shaking, and seismically induced ground failures (e.g., liquefaction). The Working Group on California Earthquake Probabilities (WGCEP), comprised of the USGS, the CGS, and the Southern California Earthquake Center, evaluates the probability of one or more earthquakes of Mw 6.7 or higher occurring in the state of California over the next 30 years (WGCEP 2015a). It is estimated that the Los Angeles region as a whole has a 60 percent chance of experiencing an earthquake of Mw 6.7 or higher over the next 30 years. Several active faults have been mapped close to the proposed project area as shown on Figure 3.6-4 and listed below on **Table 3.6-2**.

6 Late Cretaceous through early Miocene time is 84 to 16 million years ago
7 A syncline is a trough or fold of stratified rock in which the strata slope upward from the axis.

TABLE 3.6-1
MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Ground Acceleration[a]
I	Not felt	< 0.0017 g
II	Felt by people sitting or on upper floors of buildings	0.0017 to 0.014 g
III	Felt by almost all indoors. Hanging objects swing. Vibration like passing of light trucks. May not be recognized as an earthquake.	0.0017 to 0.014 g
IV	Vibration felt like passing of heavy trucks. Stopped cars rock. Hanging objects swing. Windows, dishes, doors rattle. Glasses clink. In the upper range of IV, wooden walls and frames creak.	0.014 to 0.039 g
V (Light)	Felt outdoors. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing. Pictures move. Pendulum clocks stop.	0.035 to 0.092 g
VI (Moderate)	Felt by all. People walk unsteadily. Many frightened. Windows crack. Dishes, glassware, knickknacks, and books fall off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster, adobe buildings, and some poorly built masonry buildings cracked. Trees and bushes shake visibly.	0.092 to 0.18 g
VII (Strong)	Difficult to stand or walk. Noticed by drivers of cars. Furniture broken. Damage to poorly built masonry buildings. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices, unbraced parapets and porches. Some cracks in better masonry buildings. Waves on ponds.	0.18 to 0.34 g
VIII (Very Strong)	Steering of cars affected. Extensive damage to unreinforced masonry buildings, including partial collapse. Fall of some masonry walls. Twisting, falling of chimneys and monuments. Wood-frame houses moved on foundations if not bolted; loose partition walls thrown out. Tree branches broken.	0.34 to 0.65 g
IX (Violent)	General panic. Damage to masonry buildings ranges from collapse to serious damage unless modern design. Wood-frame structures rack, and, if not bolted, shifted off foundations. Underground pipes broken.	0.65 to 1.24 g
X (Very Violent)	Poorly built structures destroyed with their foundations. Even some well-built wooden structures and bridges heavily damaged and needing replacement. Water thrown on banks of canals, rivers, lakes, etc.	> 1.24 g
XI (Very Violent)	Few, if any, masonry structures remain standing. Bridges destroyed. Rails bent greatly. Underground pipelines completely out of service.	> 1.24 g
XII (Very Violent)	Damage nearly total. Practically all works of construction are damaged greatly or destroyed. Large rock masses displaced. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown into the air.	> 1.24 g

NOTES:
[a] Value is expressed as a fraction of the acceleration due to gravity (g). Gravity (g) is 9.8 meters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

SOURCES: ABAG 2016; CGS 2002a.

TABLE 3.6-2
ACTIVE FAULT PARAMETERS

Fault or Fault Zone	Distance to and Direction from Site (Kilometers)	Maximum Moment Magnitude (Mw)	Peak Ground Acceleration (PGA) (g)	Probability of 6.7 Mw Earthquake over the Next 30 years
San Joaquin Hills Blind Thrust Fault	4.1 southwest	7.1	0.69	0.44
Chino Fault	15.8 north	6.8	0.37	1.39
Elsinore Fault Zone	17.8 northeast	7.9	0.44	3.19
Newport-Inglewood Fault Zone	21.0 southwest	7.5	0.36	0.92
Puente Hills Thrust Fault	24.6 north	6.9	0.30	0.95
San Jacinto Fault Zone	57.0 east	7.9	0.21	5.46
San Andreas Fault Zone	66.2 northeast	8.2	0.22	19.95

SOURCES: GEI 2012; WGCEP 2015b

Inactive Central Valley Fault

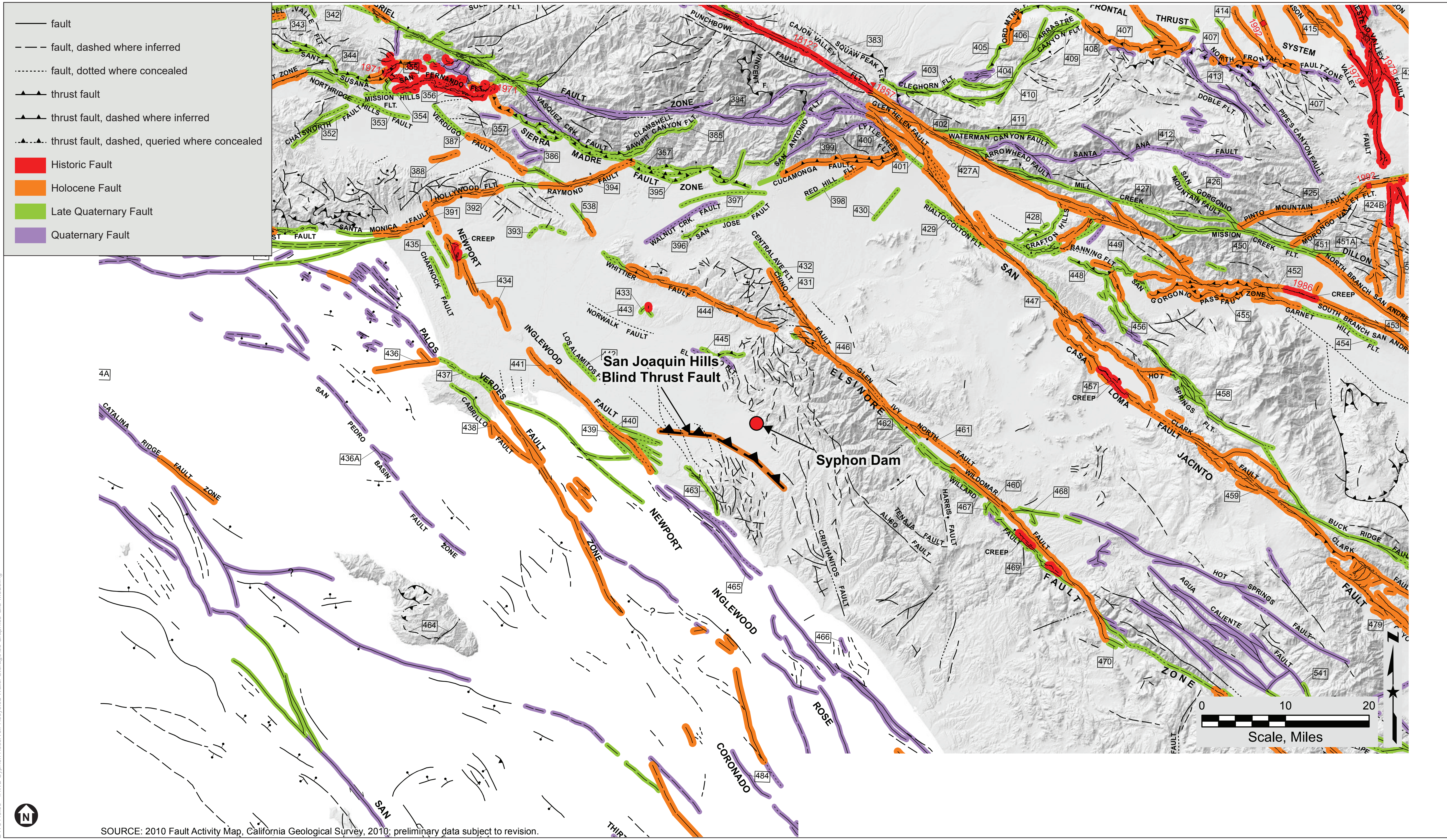
The Central Valley Fault is a regional U-shape fault with two main splays that extend northeast to southwest along the axis of the canyon and under the existing Syphon Dam, as shown on Figure 3.6-2 and Figure 3.6-3 (AECOM 2020d). The fault splays are concealed by the lake bottom sediments, alluvium, and slopewash/colluvium soils in the drainage. At the proposed project site, the down-to-the-southeast displacement (i.e., the southeast side has dropped relative to the northwest side) has resulted in different-aged geologic formations on the opposing ridges (i.e., the younger Vaqueros/Sespe Formation on the northwest side and the older Silverado Formation on the southeast side). The fault study concluded that the Central Valley Fault has not moved within Quaternary time (the last 1.6 million years) and has no potential for future movement. Based on the DSOD criteria of 35,000 years, this fault is considered inactive.

Geologic Hazards

Based on the geologic data reviewed during preparation of this Draft EIR, the potential geologic hazards at the proposed project site include erosion and expansive soil. These geologic hazards are discussed below. Liquefaction and lateral spreading, while possible without seismic shaking, are more commonly triggered by a seismic event, as discussed further below in seismic hazards.

Erosion and Landslides

The term landslide refers to the downward movement of large masses of rocks, soil, mud, and/or organic debris. Areas with steep slopes are particularly susceptible to landslide hazards. Most landslides are caused by one or more factors that act together to destabilize the slope. The primary driving force of slope failure is the influence of gravity acting on weakened materials that make up a sloping area of land. While some landslides occur slowly over time (e.g., land movement on the order of a few meters or yards per month), the most destructive landslides happen suddenly after a triggering event, such as heavy rainfall or an earthquake. Landslides can be triggered by human activities that weaken the stability of a slope. These actions may include excavation of the toe of a slope removing a restraining force to slope failure, the addition of water at the head of a slope increasing the weight of the materials within the upper slope area and adding a lubricant (i.e., water) to the materials, by construction activities that disturb soil conditions and create unstable slopes, and/or by water leaks or breaks in pipelines or pumps.



SOURCE: 2010 Fault Activity Map, California Geological Survey, 2010; preliminary data subject to revision.

SOURCE: GEI Consultants, 2012

Figure 3.6-4
Regional Faults

ESA

This page intentionally left blank

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, and the action of water and wind. Excessive soil erosion can eventually damage infrastructure. In general, granular soils with relatively low cohesion and soils located on steep topography have a higher potential for erosion.

The CGS mapped several possible landslides shown on **Figure 3.6-5** (CGS 2001). However, the CGS considered them to be dormant/mature features, indicating a low potential to be reactivated. In addition, the onsite geotechnical investigations concluded that the morphology and geology of the slopes at the proposed project site suggest that there are no large deep seated landslides or unstable slopes that could potentially threaten proposed project facilities (GEI 2012, AECOM 2020e). Landslides were not observed at the current dam, the ridges that the current dam is seated into, or within the reservoir footprint. The only landslide the CGS indicated could be as thick as 10 to 50 feet is the one located just above the "Syphon Reservoir" label on Figure 3.6-5. The onsite investigations concluded that the evidence for a landslide at this location is very subtle and inconclusive. Road cuts for the SR-133 road along the southeast side of the proposed project site did not map landslides.

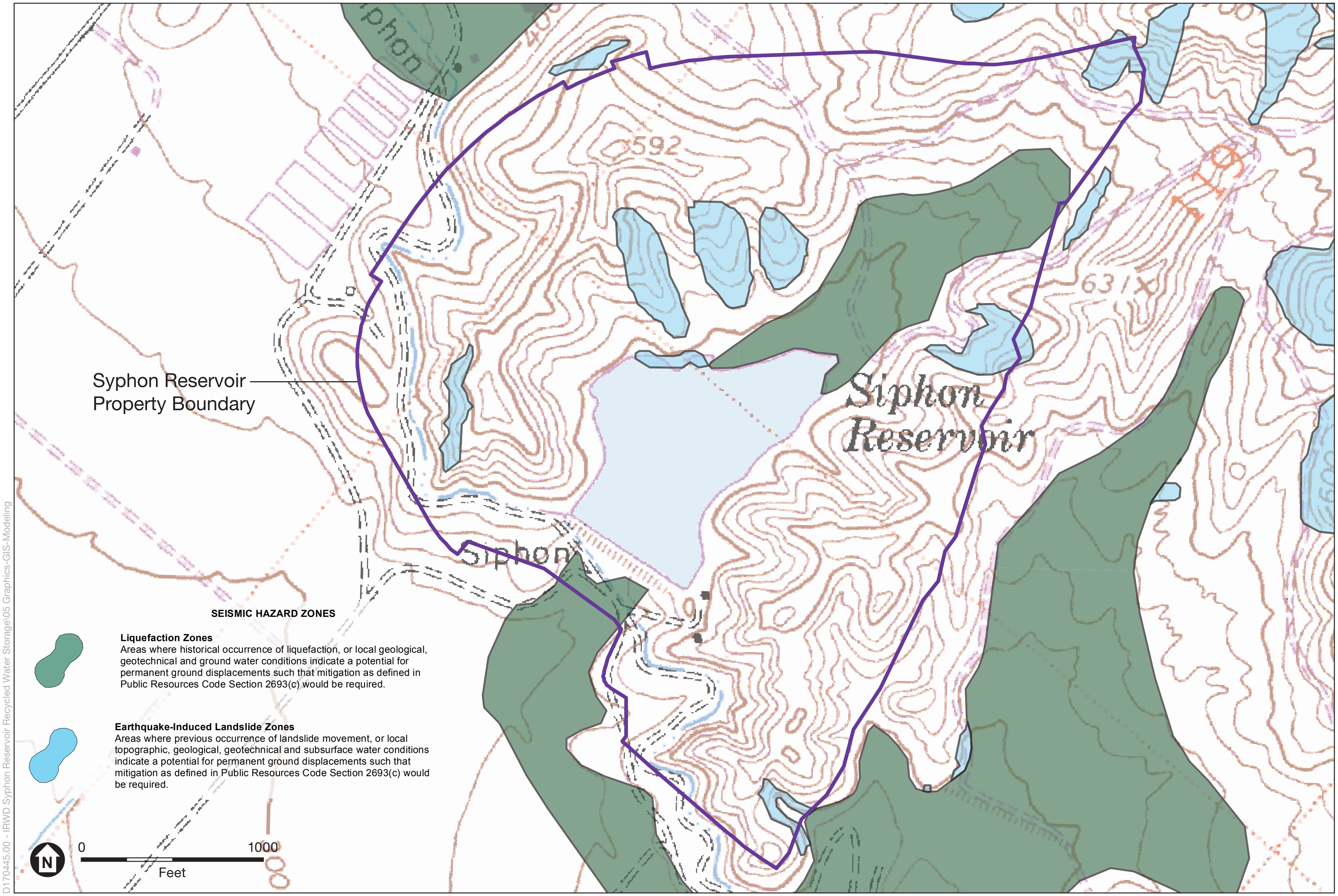
Expansive Soils

Expansive soils contain significant amounts of clay particles that have the ability to give up water (shrink) or take on water (swell). When these soils swell, the change in volume can exert significant pressures on loads that are placed on them and can result in structural distress and/or damage. Often, grading, site preparations, and backfill operations associated with subsurface structures can eliminate the potential for expansion.

As previously described, the alluvium, slopewash, and colluvium have a low to moderate plasticity, which would be less susceptible to expansion. The bedrock formation are mostly rock and would have no susceptibility to expansion. The lake bottom sediments are predominantly fat clays, which have a higher susceptibility to expansion.

Subsidence and Collapse

When oil and/or groundwater is extracted from the subsurface, subsidence of the overlying land surface can occur. Collapse is also typically associated with shallow groundwater withdrawal. Subsidence is usually associated with severe, long-term withdrawal in excess of recharge that eventually leads to overdraft of the aquifer. As oil and/or groundwater is pumped out, water and/or oil is removed from the soil pore spaces leading to a reduction in soil strength. The subsurface conditions more conducive to subsidence include clay or organic-rich soils. Sand- and gravel-rich soils are less prone to subsidence because the larger grains comprise a skeleton less dependent on water pressure for support. The subsidence can result in damage to infrastructure such as buildings or pipelines, or can result in a decrease in the volume of available aquifer storage. The proposed project does not include the extraction of oil or groundwater.



SOURCE: California Geological Survey, 2001

Syphon Reservoir Improvement Project

Figure 3.6-5
Landslide and Liquefaction Zones

ESA

Seismic Hazards

Seismic hazards are generally classified into two categories: primary seismic hazards (surface fault rupture and groundshaking) and secondary seismic hazards (liquefaction and other types of seismically induced ground failure, along with seismically induced landslides).

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude, sense, and nature of fault rupture can vary for different faults or even along different strands of the same fault. The highest potential for surface faulting is along existing fault traces that have had Holocene displacement. As previously discussed, no known active faults have been mapped through the proposed project site.

Seismic Ground Shaking

As discussed above, it is estimated that a major earthquake has a 60 percent chance of affecting the Los Angeles region in the next 30 years and would produce strong ground shaking throughout the region, including Orange County and the proposed project site. Earthquakes on active or potentially active faults, depending on magnitude and distance from the project area, could produce a range of ground shaking intensities at the project area. Historically, earthquakes have caused strong ground shaking and damage in the Los Angeles Basin. For example, the Mw 6.4 Long Beach earthquake in March 1933 produced very damaging ground shaking from Long Beach to the industrial section south of Los Angeles (Hauksson and Gross 1991). The intensity of shaking at different locations within the area can generally be expected to decrease with distance from an earthquake source.

The primary tool that seismologists use to describe the ground shaking hazard in an area is a probabilistic seismic hazard assessment (PSHA). The PSHA for the State of California takes into consideration the range of possible earthquake sources (including such worst-case scenarios as described above) and estimates their characteristic magnitudes to generate a probability map for groundshaking. The PSHA maps depict PGA values that have a 10 percent probability of being exceeded in 50 years (i.e., a 1 in 475 chance of occurring each year).

The groundshaking hazard estimated at the proposed project site using the 2008 USGS Interactive Deaggregations web site for the closest active fault, the San Joaquin Hills Blind Thrust Fault, estimates the highest calculated PGA at 0.69 g (GEI 2012). Based on the Modified Mercalli Intensity Scale (see Table 3.6-1), this PGA would result in an Intensity Value of IX, violent shaking, seismic event.

To further evaluate the ground shaking hazard at the dam, a site-specific PHSA and deterministic seismic hazard analyses (DSHA) was conducted to inform the design of the Syphon Reservoir site (AECOM 2020b). As discussed above, the goal of PSHA is to quantify the rate (or probability) of exceeding various ground-motion levels at a site, given all possible earthquakes. A PSHA considers all possible earthquakes and ground motion levels and computes the probability of each scenario. Each scenario is ranked in order of decreasing severity of shaking and the tabulated results summed up with ground motions above a specified level (i.e., magnitude of earthquake). The project is then designed for a selected ground motion, referred to as the maximum considered earthquake for PSHAs. For this proposed project location, the site-specific PSHA concluded the earthquake hazard for the site is a PGA of 0.53 g with a 2 percent probability of being exceeded in a 50-year period.

The goal of a DSHA is to evaluate the site-specific seismic hazard (i.e., ground motion) based on the maximum hazard from the controlling sources affecting the specific study site. Controlling sources are the nearest active faults capable of producing the largest amount of ground motion. For the proposed project, the DSHA concluded the San Joaquin Hills Fault gives the largest ground motions and spectral accelerations. The DSHA considers the maximum considered earthquake, the distance to the fault, and the variability of the input data. The DSHA results are expressed as the SA, also measured in g, that describes the maximum acceleration in an earthquake on an object (in this case, the dam), as modeled by a particle on a massless vertical rod having the same natural period of vibration as the building or structure. For this proposed project location, the DSHA concluded that the earthquake hazard for the site is a SA of 0.70 g resulting from an earthquake of Mw 6.9 on the San Joaquin Fault at a distance of 6.3 km (4 miles) from the site.

Liquefaction and Lateral Spreading

Liquefaction is the rapid loss of shear strength experienced in saturated, predominantly granular soils below the groundwater level during strong earthquake groundshaking and occurs due to an increase in pore water pressure. Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore-pressure buildup or liquefaction in a shallow underlying deposit during an earthquake (VT 2013). The occurrence of this phenomenon is dependent on many complex factors, including the intensity and duration of groundshaking, particle-size distribution, and density of the soil.

The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations, ground cracking, heaving and cracking of structure slabs due to sand boiling, and buckling of deep foundations due to ground settlement. Dynamic settlement (i.e., pronounced consolidation and settlement from seismic shaking) may also occur in loose, dry sands above the water table, resulting in settlement of and possible damage to overlying structures. In general, a relatively high potential for liquefaction exists in loose, sandy soils that are within 50 feet of the ground surface and are saturated (below the groundwater table). Lateral spreading can move blocks of soil, placing strain on levees and roads that can lead to ground failure.

The geotechnical investigations concluded that most of the proposed project site materials are not susceptible to liquefaction (GEI 2012, AECOM 2020e). More importantly, the design would excavate the alluvium material such that the proposed new dam would be founded on bedrock to mitigate the potential for liquefaction. The excavated alluvium is suitable material for use as embankment fill in the proposed new dam.

Paleontological Resources

The Society of Vertebrate Paleontologist (SVP) has established standard guidelines (SVP 2010) that outline professional protocols and practices for conducting paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Although not regulations per se, most practicing professional vertebrate paleontologists adhere closely to the SVP's assessment, mitigation, and monitoring requirements as specifically provided in its standard guidelines.

Paleontological sensitivity is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. The SVP guidelines define four categories of paleontological sensitivity (potential) for rock units: high, low, undetermined, and no potential.

Paleontological resources are the fossilized remains or impressions of plants and animals, including vertebrates (animals with backbones; mammals, birds, fish, etc.), invertebrates (animals without backbones; starfish, clams, coral, etc.), and microscopic plants and animals (microfossils). They are valuable, nonrenewable, scientific resources used to document the existence of extinct life forms and to reconstruct the environments in which they lived. Fossils can be used to determine the relative ages of the depositional layers in which they occur and of the geologic events that created those deposits. The age, abundance, and distribution of fossils depend on the geologic formation in which they occur and the topography of the area in which they are exposed. The geologic environments within which the plants or animals became fossilized usually were quite different from the present environments in which the geologic formations now exist.

A paleontological resources fossil locality search was conducted by the Natural History Museum of Los Angeles County (LACM) for the 2019 Initial Study/Mitigated Negative Declaration for the Syphon Reservoir Geotechnical Investigations Project at the project site (ESA 2019). The results indicate that while no recorded fossil specimens occur within the proposed project site, multiple specimens do occur nearby and within the same sedimentary deposits that occur within the proposed project site, including the Silverado and Sespe/Vaqueros Formations and the older Quaternary Alluvium. These units have a moderate to high paleontological sensitivity. Excavation in any of these formations may expose significant vertebrate fossils, and impacts to such fossils could constitute a significant impact on the environment.

3.6.2 Regulatory Framework

The proposed project shall be required to comply with the following laws, statutes, regulations, codes, and policies, which are defined as standard conditions for the proposed project.

Federal

Clean Water Act

The federal Clean Water Act (CWA) and subsequent amendments, under the enforcement authority of the U.S. Environmental Protection Agency (USEPA), was enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The purpose of the CWA is to protect and maintain the quality and integrity of the nation's waters by requiring states to develop and implement state water plans and policies. The CWA gave the USEPA the authority to implement pollution control programs such as setting wastewater standards for industry. In California, implementation and enforcement of the National Pollutant Discharge Elimination System (NPDES) program is conducted through the California State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs). The CWA also sets water quality standards for surface waters and established the NPDES program to protect water quality through various sections of the CWA, including Sections 401 through 404 and 303(d) that are implemented and regulated by the SWRCB and the nine RWQCBs. NPDES and Section 402 of the CWA would apply to the proposed project because the project would be required to control discharges of pollutants from point sources, as discussed below.

National Pollutant Discharge Elimination System (NPDES) Permit and Section 402

The NPDES permit system was established under the CWA to regulate municipal and industrial point discharges to surface waters of the U.S. Each NPDES permit for point discharges contains limits on allowable concentrations of pollutants contained in discharges. Section 402 of the CWA contains general requirements regarding NPDES permits.

The CWA was amended in 1987 to require NPDES permits for non-point source (i.e., stormwater) pollutants in discharges. Stormwater sources are diffuse and originate over a wide area rather than from a definable point. The goal of NPDES stormwater regulations is to improve the quality of stormwater discharged to receiving waters to the "maximum extent practicable" through the use of structural and non-structural Best Management Practices (BMPs). BMPs can include the development and implementation of various practices including educational measures (workshops informing public of what impacts results when household chemicals are dumped into storm drains), regulatory measures (local authority of drainage facility design), public policy measures, and structural measures (filter strips, grass swales and detention ponds). In California, the stormwater portion of Section 402 is addressed through the state Construction General Permit, as described further below. Although the project site does not have waters of the U.S. within the project footprint, Section 4-2 applies to this project because runoff from the project site would have the potential to flow downslope to waters of the U.S. during construction if not controlled.

Public Resources Code Sections 5097.5 and 30244

California Public Resources Code (PRC) Sections 5097.5 and 30244 specify state requirements for paleontological resource management. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, defining their removal as a misdemeanor. PRC Sections 5097.5 and 30244 require reasonable mitigation of adverse impacts on paleontological resources from developments on public (state, county, city, district) lands.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to protect structures for human occupancy from the hazard of surface faulting. In accordance with the act, the State Geologist has established regulatory zones—called earthquake fault zones—around the surface traces of active faults, and has published maps showing these zones. Buildings for human occupancy cannot be constructed across surface traces of faults that are determined to be active. Because many active faults are complex and consist of more than one branch that may experience ground surface rupture, earthquake fault zones extend approximately 200 to 500 feet on either side of the mapped fault trace. This act does not apply to the proposed project because no active faults cross the proposed project site and no habitable structures would be constructed.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones, and cities, counties, and other local permitting agencies to regulate certain development projects within these zones. For projects that would locate structures for human occupancy within designated Zones of Required Investigation, the Seismic Hazards Mapping Act requires project applicants to perform a site-specific geotechnical investigation to identify the potential site-specific seismic hazards and corrective measures, as appropriate, prior to receiving building permits. The *CGS Guidelines for Evaluating and Mitigating Seismic Hazards* (Special Publication 117A) provides guidance for evaluating and mitigating seismic hazards (CGS 2008). The CGS is in the process of producing official maps based on USGS topographic quadrangles. To date, the CGS has not completed a delineation for the USGS quadrangle in which project components are proposed. However, as discussed above in Section 3.6.1, *Environmental Setting*, a site-specific fault study has been conducted that indicated there are no active faults passing through the proposed project site (AECOM 2020d).

Division of Safety of Dams

In the state of California, dam safety is regulated by the Division of Safety of Dams (DSOD) under the authority granted by the California Water Code (Parts 1 and 2 of Division 3, *Dam and Reservoirs*). The DSOD provides oversight to the design, construction, and maintenance of over 1,200 jurisdictional sized dams in California, including the Syphon Reservoir Dam. Jurisdictional dams are dams that are more than 6 feet high and impound 50 acre-feet or more of water, or 25 feet or higher and impound more than 15 acre-feet of water. The jurisdictional height of a dam, as determined by DSOD, is the vertical distance measured from the lowest point at the downstream toe of the dam to its maximum storage elevation, which is typically the spillway crest. The DSOD ensures dam safety by:

- Reviewing and approving dam enlargements, repairs, alterations, and removals to ensure that the dam appurtenant structures are designed to meet minimum requirements.
- Performing independent analyses to understand dam and appurtenant structures performance. These analyses can include structural, hydrologic, hydraulic, and geotechnical evaluations.
- Overseeing construction to ensure work is being done in accordance with the approved plans and specifications.
- Inspecting each dam on an annual basis to ensure it is safe, performing as intended, and is not developing issues. Roughly 1/3 of these inspections include in-depth instrumentation reviews of the dam surveillance network data.
- Periodically reviewing the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California.

The structural elements of the proposed project would undergo appropriate and final design-level geotechnical evaluations prior to final design and construction. Implementing the regulatory requirements in the DSOD regulations and ensuring that all structures constructed in compliance with the law is the responsibility of the project engineers and building officials. The design engineer, as a registered professional with the State of California, is required to comply with the DSOD and local codes while applying standard engineering practice and the appropriate standard of care for the particular region in California, which, in the case of the proposed project, is Orange County.[8] The California Professional Engineers Act (Building and Professions Code Sections 6700-6799), and the Codes of Professional Conduct, as administered by the California Board of Professional Engineers and Land Surveyors, provides the basis for regulating and enforcing engineering practice in California. For a dam and reservoir expansion project, the DSOD is responsible for review and approval of the proposed design, and inspections during construction and annually during operations.

NPDES Construction General Permit

Construction associated with the proposed project would disturb more than one acre of land surface that have the potential to affect the quality of stormwater discharges into waters of the U.S. The proposed project would, therefore, be subject to the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ). The Construction General Permit regulates discharges of pollutants in stormwater associated with construction activity to waters of the U.S. from construction sites that disturb one acre or more of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation;

8 A geotechnical engineer (GE) specializes in structural behavior of soil and rocks. GEs conduct soil investigations, determine soil and rock characteristics, provide input to structural engineers, and provide recommendations to address problematic soils.

construction of buildings; and linear underground projects, including installation of water pipelines and other utility lines.

The Construction General Permit requires that construction sites be assigned a Risk Level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the receiving waters risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could potentially be discharged to receiving water bodies and is based on the nature of the construction activities and the location of the site relative to receiving water bodies. The receiving waters risk level reflects the risk to the receiving waters from the sediment discharge. Depending on the risk level, the construction projects could be subject to the following requirements:

- Effluent standards;
- Good site management "housekeeping;"
- Non-stormwater management;
- Erosion and sediment controls;
- Run-on and runoff controls;
- Inspection, maintenance, and repair; or
- Monitoring and reporting requirements.

The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific BMPs designed to prevent sediment and pollutants from contacting stormwater from moving off site into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all BMPs is required under the provisions of the Construction General Permit.

The SWPPP must be prepared before the construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project area. The SWPPP must list BMPs and the placement of those BMPs that the applicant would use to protect stormwater runoff. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, vehicle and equipment washing and fueling. The Construction General Permit also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site following construction).

In the proposed project area, the Construction General Permit is implemented and enforced by the Santa Ana Regional Water Quality Control Board, which administers the stormwater permitting program. Dischargers must electronically submit a notice of intent and permit registration documents to obtain coverage under this Construction General Permit. Dischargers are to notify the Santa Ana Regional Water Quality Control Board of violations or incidents of non-compliance, and submit annual reports identifying deficiencies in the BMPs and explaining how the deficiencies were corrected. The risk assessment and SWPPP must be prepared by a State Qualified SWPPP Developer, and implementation of the SWPPP must be overseen by a State Qualified SWPPP Practitioner. A legally responsible person, who is legally authorized to sign and certify permit registration documents, is responsible for obtaining coverage under the permit.

California Occupational Safety and Health Administration Regulations

Occupational safety standards exist in federal and state laws to minimize worker safety risks from both physical and chemical hazards in the workplace. In California, the California Division of Occupational Safety and Health (Cal/OSHA) and the federal OSHA are the agencies responsible for ensuring worker safety in the workplace.

The OSHA Excavation and Trenching standard (29 CFR 1926.650) covers requirements for excavation and trenching operations, which are among the most hazardous construction activities. OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area. Cal/OSHA is the implementing agency for both state and federal OSHA standards.

Local

County of Orange General Plan

Safety Element

The following goals and policies from the Safety Element of the Orange County General Plan are relevant to the proposed project.

> **Goal 1:** Provide for a safe living and working environment consistent with available resources.
>
> > **Objective 1.1:** To identify natural hazards and determine the relative threat to people and property in Orange County.
>
> **Goal 2:** Minimize the effects of natural safety hazards through implementation of appropriate regulations and standards, which maximize protection of life and property.
>
> > **Objective 2.1:** To create and maintain plans and programs which mitigate the effects of natural hazards.
> >
> > **Objective 2.2:** To support the development and utilization of technologies, which minimize the effects of natural hazards.
> >
> > > **Policy 4:** To implement ordinances, regulations, and procedures which mandate the review, valuation, and restriction of land use due to possible undue geologic threat.
> > >
> > > **Policy 5:** To encourage establishment of seismic design criteria and standards for county facilities (e.g., transmission lines, water and sewage systems, and highways), any structures housing necessary mobile units and support equipment, and other vital resources which would be needed following an earthquake (e.g., "back-up" power generation facilities and water storage).

Resources Element

The following goals and policies from the Resources Element of the Orange County General Plan are relevant to the proposed project.

> **Goal 2:** To encourage through a resource management effort the preservation of the county's cultural and historic heritage.
>
> > **Objective 2.2:** Take all reasonable and proper steps to achieve the preservation of archaeological and paleontological remains, or their recovery and analysis to preserve cultural, scientific, and educational values.
> >
> > ***Paleontological Resources Policies:***
> >
> > 1. To identify paleontological resources through literature and records research and surface surveys.
> > 2. To monitor and salvage paleontological resources during the grading of a project.
> > 3. To preserve paleontological resources by maintaining them in an undisturbed condition.

Orange County Grading Manual and Excavation Code, Section 7-1-801

The Orange County Grading Manual is a compilation of rules, procedures, and interpretations, necessary to carry out the provisions of the Orange County Grading Code. The Orange County Grading Manual is organized to follow the content of subarticles in the Orange County Grading and Excavation Code. The purpose of the Orange County Grading Manual is to assist users of the Orange County Grading Code by supplementing it with detailed information regarding rules, interpretations, standard specifications, procedures, requirements, forms and other information used to control excavation, grading and earthwork construction in unincorporated Orange County. The Manual sets forth rules and regulations to control excavation, grading, and earthwork construction, including fills and embankments, and establishes administrative requirements for issuance of permits and approval of plans and inspection of grading construction in accordance with the requirements for grading and excavation as contained in the California Building Code then in effect as adopted and modified by county ordinance.

Orange County Construction Runoff Guidance Manual

The 2012 Construction Runoff Guidance Manual (Manual) was prepared by Orange County, the cities within the County, and the Orange County Flood Control District, to enable projects to comply with the regulatory requirements for creek, river, stream and coastal water protection during the construction phase of new development and significant redevelopment projects. The Manual describes BMPs typically needed to be implemented at a construction site to ensure compliance with the NPDES Construction General Permit (see above) and local ordinances.

3.6.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from Appendix G of the CEQA Guidelines are used as thresholds of significance to determine the impacts of the proposed project as related to geology and soils. The proposed project would have a significant impact if it would:

1. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
   a) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault.
   b) Strong seismic ground shaking.
   c) Seismic-related ground failure, including liquefaction.
   d) Landslides.
2. Result in substantial soil erosion or the loss of topsoil.
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.
4. Be located on expansive[9] soil creating direct or indirect substantial risks to life or property.
5. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.
6. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.
7. Result in cumulatively considerable impacts to geology and soils.

Methodology

General

This environmental analysis of the potential impacts related to geology, soils, and paleontological resources is based on a review of the results of site-specific geotechnical investigations, feasibility and design reports, a review of literature and database research (geologic, seismic, and soils, and paleontological resources reports and maps), and the Orange County General Plan and County ordinances.

The proposed project would be regulated by the various laws, regulations, and policies summarized above in Section 3.6.2, *Regulatory Framework*. Compliance by the proposed project with applicable federal, state, and local laws and regulations is assumed in this analysis and local and state agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Note that compliance with many of the regulations is a condition of permit approval.

After considering the implementation of the proposed project described in Chapter 2, *Project Description*, and compliance with the required regulatory requirements, the environmental analysis

9 The CBC, based on the International Building Code and the now-defunct Uniform Building Code, no longer includes a Table 18-1-B. Instead, CBC Section 1803.5.3 describes the criteria for analyzing expansive soils.

below identifies if the defined significance thresholds are exceeded. For those impacts considered to be significant, mitigation measures are proposed to the extent feasible to reduce the identified impacts.

Geotechnical Design

The new engineered dam and reservoir would meet or exceed the current safety and design requirements established by the California Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which is the governing state agency associated with this project. IRWD would exceed these current requirements by implementing state-of-the-art Risk-Informed Decision-Making (RIDM) processes that improve dam safety and substantially reduce the risk of dam failure. The design for the expanded reservoir would be based on rigorous standards, risk analysis and site-specific geotechnical investigations. The risk-informed design approach for the Syphon Reservoir Improvement Project would result in a dam design that avoids failures and associated consequences to downstream communities consistent with IRWD's priority of public safety. The design would be peer-reviewed through a rigorous process overseen by an independent Technical Advisory Group (TAG), comprised of nationally recognized industry experts, which may include the disciplines of dam geology/site characterization, seismic analysis, hydrology/hydraulics, dam construction, and potential failure mode analysis and RIDM. The purpose of the TAG is to provide an independent assessment of the design development including, but not limited to, review of design criteria, design details, technical approach, and other aspects of the design engineer's work to confirm the project design is in full compliance with or exceeds governing standards and requirements.

To inform the project design and as summarized in Section 3.6.1, *Environmental Setting*, various geotechnical investigations have been conducted to investigate site conditions and identify potential geotechnical issues (GEI 2012, 2016; HDR 2019; AECOM 2020a through e). To address potential geotechnical issues, the geotechnical investigations conducted to date provided the geotechnical recommendations listed below. Further details are provided in the geotechnical investigations, which include details of borrow material testing, and would be further developed in the final geotechnical design report.

- **Material Selection** – The geotechnical investigations indicate that primarily materials from the proposed site could be used to construct the dam embankment except for the filter, drain, riprap and riprap bedding zones, which require high-quality granular materials with soundness and durability characteristics similar to those required for concrete aggregates. These high-quality granular products would need to be imported from offsite sources. In addition, onsite materials do not appear to be suitable for concrete aggregate, which would also need to be imported from offsite sources if concrete is to be mixed onsite. The materials selected for construction of the proposed new dam would exclude topsoil and lake bottom sediments due to the presence of organic materials that could degrade over time.
- **Dam and Slope Stability** – The proposed new dam would be founded on competent bedrock that would be stronger than the dam itself. Of primary importance is that the existing alluvium below the footprint of the new dam would be removed because of its potential for strength loss during earthquake loading; this would include the sand layer susceptible to liquefaction discussed above in Section 3.6.1, *Environmental Setting, Liquefaction and Lateral Spreading*. In addition, relatively weak surficial materials on the abutments (topsoil, colluvium, and slopewash) would be removed from below the footprint of the dam. The location of the inactive fault below the dam would be overexcavated and replaced with compacted materials. The embankment slopes must be stable and resistant to deformation

under all loading conditions, including design earthquake loading and rapid reservoir drawdown conditions. The proposed new dam would be a homogenous earthfill embankment approximately 136 feet high with a 20-foot wide crest, and upstream and downstream slopes inclined at approximately 4H:1V (horizontal: vertical) and 3H:1V, respectively. The dam would be constructed primarily from onsite clayey sand materials, and some specialty imported materials for the internal seepage control system and slope protection. The total volume of all materials comprising the dam would be roughly 2.3 million cubic yards, with 2.2 million cubic yards derived from onsite materials. Dam materials would be placed in thin horizontal layers, and compacted with heavy equipment to achieve the strength required for dam stability. It should be noted that sizes and dimensions described above are based on feasibility-level evaluations and are subject to change during the design phase.

- **Seepage Control** – Seepage through the proposed new embankment and its abutments and foundation must be controlled so that piping (internal erosion) and sloughing do not occur. The internal seepage control drainage system would likely consist of a steeply inclined chimney drain and a gently sloping blanket drain on the downstream side of the dam. This system would capture seepage that enters the dam, and safely route it to a collection system on the downstream side of the dam.
- **Overtopping Protection** – The embankment must be safe from overtopping by both flood inflow and wave action, as well as from inadvertent “overfilling” of the reservoir from the IRWD recycled water system. The reservoir operations would require that the reservoir level not be allowed to rise above the high operational pool level of 455 amsl, or one foot below the spillway crest. This one foot of freeboard provides a buffer storage space for runoff to the reservoir and brief overfilling of the reservoir from the recycled water system, and also accommodates small increases in reservoir level due to wave action and wind set. In addition, the spillway for the dam would be a channel cut into the left abutment and designed to pass the probable maximum flood. The spillway channel would be lined with reinforced concrete and rip-rap to prevent erosion of the abutment and embankment materials during spillway discharges. Spillway discharges would be routed to the existing storm drain at Portola Parkway through a 48-inch conduit that would connect to the 42-inch emergency discharge conduit described above. This would minimize the potential for spillway flows to travel across the future athletic field area. Valves in the associated conduits would be used to route either reservoir drawdown releases or spillway flows to the storm drain, but not both at the same time.
- **Slope Protection** – The slopes would be made safe from excessive damage from wave action and rain. Protection against surface erosion would consist of rip-rap on the upstream slope and vegetation on the downstream slope.

American Water Works Association Standards for Proposed Pipelines

Pipelines are constructed to various industry standards. The AWWA is a worldwide nonprofit scientific and educational association that, among its many activities, establishes recommended standards for the construction and operation of public water supply systems, including standards for pipe and water treatment facility materials and sizing, installation, and facility operations. While the AWWA’s recommended standards are not enforceable code requirements, they nevertheless can dictate how pipelines for water conveyance are designed and constructed. IRWD has committed to requiring its contractors to incorporate AWWA Standards into the construction of the proposed pipelines.

Impact Analysis

Earthquake Fault Zone

Impact 3.6-1a: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault zone.

Construction and Operation

As discussed above in Section 3.6.1, *Environmental Setting*, no active faults are known to cross the proposed project site. One inactive fault, the Central Valley Fault, is known to cross the proposed project site, passing under the existing and the proposed new dam, as shown on Figure 3.6-2. However, the site-specific fault study concluded this fault has not experienced movement in the last 1.6 million years and has no potential for future movement, which complies with the DSOD requirement of no movement within the last 35,000 years. Therefore, relative to active faults, the impact would be less than significant during both construction and operation.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Strong Seismic Ground Shaking

Impact 3.6-1b: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic groundshaking.

As discussed above in Section 3.6.1*, Environmental Setting*, there is the potential for the occurrence of a large regional earthquake within the operational life of the proposed project. There is a potential for up to violent intensity groundshaking at the proposed project site that would be associated with such an earthquake. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the magnitude, the duration of shaking, and the nature of the geologic materials on which the project components would be constructed. Intense groundshaking and high ground accelerations would affect the entire proposed project site, including the proposed new dam and associated infrastructure.

Construction

Construction activities would be temporary, and thus, are not anticipated to exacerbate the exposure of people or structures to substantial adverse effects involving seismic hazards. No habitable structures would be constructed and the reservoir would be completely drained and empty during construction. In addition, the proposed project would not exacerbate the potential for causing earthquakes because the project does not include the injection or extraction of groundwater or oil. Therefore, relative to seismicity during construction, the proposed project would have a less than significant impact due to strong seismic groundshaking.

Operation

As discussed above in Section 3.6.2, *Regulatory Framework*, the DSOD, the regulatory agency with jurisdiction over dams and reservoirs, requires that the structural elements of the proposed project undergo appropriate design-level geotechnical evaluations prior to final design and construction. IRWD will exceed these requirements by implementing state-of-the-art RIDM processes that improve dam safety. The geotechnical investigations and design plans are to include any necessary recommendations for soils remediation and/or foundation systems necessary to reduce seismic-related hazards to less than significant. As summarized in Section 3.6.1, *Environmental Setting*, geotechnical investigations and feasibility studies have been prepared, which consider the maximum estimated seismic shaking the proposed new dam may experience. In particular, a site-specific seismic hazard analysis has been conducted that included both a Probabilistic Seismic Hazard Analysis (PSHA) and a Deterministic Seismic Hazard Analysis (DSHA) (AECOM 2020b). For this proposed project location, the site-specific PSHA concluded the earthquake hazard for the site is a peak ground acceleration (PGA) of 0.62 g with a 2 percent probability of being exceeded in a 50-year period (i.e. 2,475-year return period). For this proposed project location, the DSHA concluded that the earthquake hazard for the site is a PGA of 0.70 g at the 84^{th}-percentile level resulting from an earthquake of Mw 6.9 on the San Joaquin Hills Fault at a distance of 6.3 km (4 miles) from the site. The DSOD would require the information be used by the design engineers to inform the design of the proposed new dam as a condition of their approval of the project.

Implementing the regulatory requirements of the DSOD that would ensure that the proposed new dam and reservoir are constructed and operated in compliance with DSOD regulatory requirements is the responsibility of the project engineers (i.e., IRWD's project engineers) and building officials, which in this case would be the DSOD. The DSOD regulations describe required standards for the construction and operation of every jurisdictional dam and reservoir throughout California. The standards include earthquake design requirements that determine the structural design requirements. The geotechnical and design engineers, as registered professionals with the State of California, are required to comply with the DSOD requirements, while applying standard engineering practice and the appropriate standard of care. The California Professional Engineers Act (Building and Professions Code Sections 6700–6799), and the Codes of Professional Conduct, as administered by the California Board of Professional Engineers and Land Surveyors, provides the basis for regulating and enforcing engineering practice in California. The DSOD would be responsible for the review and approval of design plans and conducting inspections during construction and operation to ensure compliance with DSOD requirements prior to approval of the construction permit.

As previously discussed, the geotechnical investigations and design plans would include recommendations to address geotechnical issues, including seismic shaking. Additional aspects relative to seismic-related ground failure are discussed in more detail below in Impact 3.6-1c. With compliance with the regulatory requirements and the implementation of geotechnical design recommendations, impacts relative to strong seismic groundshaking during project operations would be less than significant.

Please refer to Section 3.9, *Hydrology and Water Quality*, for an analysis of the impacts relative to seiches and flooding due to dam failure (see Impact 3.9-4).

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Seismic-Related Ground Failure

Impact 3.6-1c: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction.

As discussed above in Section 3.6.1, *Environmental Setting*, and Impact 3.6-1b, there is potential for the occurrence of a large regional earthquake within the operational life of the proposed project. Intense groundshaking and high ground accelerations would affect the entire proposed project site, including existing geologic units susceptible to seismic-related ground failure, including liquefaction. The geotechnical investigations identified critical layers in the alluvium that are loose sand layers and lenses that can potentially lose strength (liquefy) as a result of seismic loading. At the downstream toe of the existing dam, the alluvium is predominantly a loose to medium dense sand between approximately 16 feet and 24 feet deep.

Construction

Construction activities would be temporary, and thus, are not anticipated to exacerbate the exposure of people or structures to substantial adverse effects involving seismic-related ground failure, including liquefaction and lateral spreading. No habitable structures would be constructed and the reservoir would be completely drained and empty during construction. Therefore, relative to seismic-related ground failure, including liquefaction and lateral spreading during construction, the impact would be less than significant.

Operation

As discussed above in Section 3.6.2, *Regulatory Framework*, and Impact 3.6-1b, the DSOD, the regulatory agency with jurisdiction over dams and reservoirs, requires that the structural elements of the proposed project undergo appropriate design-level geotechnical evaluations prior to final design and construction. The required geotechnical investigations and design plans are to include any necessary recommendations for soils remediation and/or foundation systems necessary to reduce seismic-related hazards to less than significant. This would include reducing or eliminating the risk of liquefaction from the previously described liquefaction-susceptible sand layers under the existing and the proposed new dam. As summarized in Section 3.6.1, *Environmental Setting*, geotechnical investigations, feasibility studies, and design plans have been prepared that consider and address the presence of liquefaction-susceptible geologic units. The geotechnical investigations recommended removing the silty and sandy layers beneath the dam that would be susceptible to liquefaction.

As previously explained, implementing the regulatory requirements of the DSOD that would ensure that the dam and reservoir are constructed and operated in compliance with DSOD regulatory requirements is the responsibility of the IRWD project engineers and DSOD. In this case, the DSOD would require that the previously discussed liquefaction-susceptible layers be removed, which would eliminate the risk of liquefaction. The DSOD would be responsible for the review and approval of design plans and conducting inspections during construction to ensure compliance with DSOD requirements that would include the removal of the liquefaction-susceptible layers. With compliance with the regulatory requirements and the implementation of geotechnical design recommendations, impacts relative to seismic-related ground failure, including liquefaction during operations, would be less than significant.

Please refer to Section 3.9, *Hydrology and Water Quality*, for an analysis of the impacts relative to downstream flooding and inundation due to dam failure (see Impact 3.9-4).

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Soil Erosion or Topsoil Loss

Impact 3.6-2: The proposed project would not result in substantial soil erosion or the loss of topsoil.

As discussed above in Section 3.6.2, *Environmental Setting*, the proposed project site includes slopes that could be susceptible to erosion. The Vaqueros and Sespe Formations are rated as generally having very poor slope stability characteristics and are described as landslide-prone (and consequently also erosion prone) units. Several existing potential landslide areas are present, as shown on Figure 3.6-5. The landslides are described as debris flows with thicknesses of ten feet or less. As described in Chapter 2, Section 2.5.7, *Construction of Wetland Area*, topsoil excavated as part of the project would be used to construct the wetland area, and would not be lost.

Construction

Construction of the proposed project would have the potential to result in soil erosion during excavation, grading, and soil stockpiling. Because the overall footprint of construction activities would exceed one acre, the proposed project would be required to comply with the *NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance*

Activities (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ) (Construction General Permit) and the local Orange County stormwater ordinances, which are described above in Section 3.6.2, *Regulatory Framework*. These state and local requirements were developed to ensure that stormwater is managed and erosion is controlled on construction sites. The Construction General Permit requires preparation and implementation of a SWPPP, which requires applications of BMPs to control run-on and runoff from construction work sites. The BMPs would include, but would not be limited to, physical barriers to prevent erosion and sedimentation, construction of sedimentation basins, limitations on work periods during storm events, use of infiltration swales, protection of stockpiled materials, and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction. With compliance with existing regulations, impacts associated with soil erosion during construction would be less than significant.

Operation

To expand the volume of the reservoir and provide materials to construct the proposed new earthen dam, approximately 2.2 million cubic yards of material would be excavated from within the Syphon Canyon. This will result in excavating onsite material on the northwest side of the canyon, which would consist of the Vaqueros and Sespe Formations.

As summarized in Section 3.6.2, *Regulatory Framework, Methodology*, the areas to be excavated would not be above the elevation of 456 amsl, the spillway crest elevation. This elevation was selected to provide 10 feet of freeboard to the top of the dam. In addition, this would avoid backing up water in the existing surface water drainpipe that passes under SR-133 and empties into the reservoir on the east side and would preserve as much of the existing conservation lands at the site as practical to reduce environmental impacts (see Figure 3.6-1).

The feasibility-level criterion used to develop the reservoir grading plan was to incline the cut slopes no steeper than 4H:1V to promote stability of the slopes that will be subjected to wide fluctuations in the reservoir level. The inclinations of the natural hillside slopes surrounding the reservoir are typically 4H:1V, and thus the inclination of cut slopes would be similar to that of the natural slopes. Essentially, the cut slopes would create a downward continuation of the natural hillside slopes to deepen the reservoir in the central canyon area. The floor of the expanded reservoir would be at 330 amsl, the same elevation as the natural ground surface on the downstream side of the dam in the canyon area. One cut slope extends above 456 amsl on the left (southeast) abutment near the dam. This cut is proposed to reduce the localized steepness of this hillside.

With the wide fluctuations in reservoir levels anticipated during operations, the slopes around the proposed new reservoir would undergo repeated cycles of wetting and drying. These fluctuations could result in some erosion and possible landsliding. However, the geotechnical investigations concluded that there are no active landslides within the proposed project site. In addition, the wetting process would be a low energy filling and emptying process of the reservoir and would not involve running water, such as the flow in a higher energy stream. Consequently, the process of filling and emptying the reservoir is not expected to cause erosion. Finally, given that the proposed new reservoir is in a canyon closed off by the presence of the dam, any sediment that does collect inside the reservoir would not be able to escape the canyon and could be removed during periods when the reservoir has low water levels.

Finally, as shown on Figure 2-4, seepage through the proposed new dam would be controlled by a seepage control drainage system consisting of a steeply inclined chimney drain and a gently sloping blanket drain would be constructed on the downstream side of the dam. The purpose of the proposed new drainage system is to safely route seepage through the dam. This system would prevent water from seeping out onto the downstream side of the dam and potentially causing erosion of the dam surface.

In addition, the reservoir (i.e., upstream slope) side of the proposed new dam would be protected from wave action by the placement of rip-rap from the base of the dam to the crest. This would facilitate water level fluctuations along the entire height of the dam. The downstream slope of the proposed new dam would be protected with vegetation to protect the dam from erosion from rainfall runoff. These measures would protect the proposed new dam from erosion.

With compliance with existing regulations, particularly DSOD regulations, and the recommended geotechnical design, impacts associated with soil erosion, as well as landslides, during construction would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Unstable Geologic Units

Impact 3.6-3: The proposed project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

Landslides are analyzed above in Impact 3.6-2, which concluded a less than significant impact. Liquefaction and lateral spreading, more commonly triggered by seismic events, are analyzed above in Impact 3.6-1c, which concluded a less than significant impact. The proposed project does not include the injection or extraction of groundwater or oil, so there would be no impact relative to subsidence or collapse. The potential for subsidence due to settlement of the dam is analyzed below.

Construction

Construction activities associated with the proposed project would be temporary, and thus, are not anticipated to be affected by landslides, lateral spreading, subsidence, liquefaction, subsidence due to settlement, or collapse until after construction is complete. Therefore, relative to unstable geologic or soil units during construction, the impact would be less than significant.

Operation

The materials selected for construction of the proposed new dam would be placed and compacted in lifts, and would exclude organic materials that could degrade over time (e.g., topsoil or lake bottom sediments). The materials would be placed in thin horizontal layers, and compacted with heavy equipment to create a material with the required strength and compressibility characteristics. The process of compaction reduces the potential future subsidence due to settlement of the materials over time. The inclination of the upstream slope of the proposed new dam was selected to be 4H:1V to provide adequate stability during rapid drawdown loading conditions. The inclination of the downstream slope of the proposed new dam was selected to be 3H:1V to provide adequate stability for seismic loading conditions. Seepage through the dam would be controlled by a new proposed seepage control drainage system consisting of a steeply inclined chimney drain and a gently sloping blanket drain, which would be constructed on the downstream side of the new dam, as shown in Figure 2-4. The purpose of the drainage system is to safely route seepage through the new dam, and prevent a phreatic (i.e., water) surface from developing in the downstream slope of the new dam. The embankment fill and the underlying foundation materials have a relatively low permeability. Accordingly, seepage through the new dam, the abutments, and the foundation are anticipated to be low.

The reservoir (i.e., upstream slope) side of the proposed new dam would be protected from wave action by the placement of rip-rap from the base of the new dam to the crest. This would facilitate water level fluctuations along the entire height of the proposed new dam. The downstream slope of the dam would be protected with vegetation to protect the new dam from erosion from rainfall runoff. These measures would protect the stability of the new dam.

To monitor the proposed new dam for settlement or lateral movement, elevation monuments would be established on the dam crest. Open proposed wells and/or piezometers would be installed to monitor piezometric levels (groundwater pressures) in the dam embankment and foundation. A proposed seepage collection system would be installed at a low point at the downstream toe of the new dam to monitor embankment seepage. Seepage through dam materials can lead to settlement by rearranging grains into a closer-packed skeletal structure. New dam security instrumentation systems would be installed, as appropriate.

Finally, the proposed new outlet works of the new dam include provisions to discharge reservoir water to the existing storm drain in Portola Parkway, if necessary, to ensure dam safety. In the event that instability of the dam is observed (e.g., the elevation monuments indicate subsidence or excessive seepage is measured in the monitoring wells), the water levels in the new dam would be drawn down to facilitate repairs. The discharge rate of this system is in compliance with guidelines established by DSOD. The maximum outflow in the event of an emergency would be about 178 cubic feet per second, which would be capable of releasing one-half of the proposed new reservoir's capacity in ten days, with a starting water surface level at the spillway crest elevation. Once emptied, the reservoir would undergo corrective actions.

With compliance with DSOD requirements and the recommended geotechnical design, impacts associated with unstable geologic or soil units during operations, including settlement, would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Expansive Soil

Impact 3.6-4: The proposed project would not be located on expansive soil creating substantial direct or indirect risks to life or property.

Construction

Construction activities associated with the proposed project would be temporary, and thus, are not anticipated to be affected by expansive soils until after construction is complete. In addition, lake bottom sediments, which are known to contain expansive soils, would not be used as materials for construction of the proposed new dam. Therefore, relative to expansive soils during construction, the impact would be less than significant.

Operation

As discussed above in Section 3.6.1, *Environmental Setting*, Expansive Soils, the only soils known to have a high susceptibility to expansion are the lake bottom sediments. The other onsite soils do not have a high susceptibility to expansion. The geotechnical investigations have recommended that the reservoir bottom sediments not be used as construction materials for the proposed new dam. The proposed project would not use expansive soils in the construction of the proposed new dam, and would not create a substantial direct or indirect risk to life or property. Therefore, with the implementation of the geotechnical recommendation and the DSOD regulations requiring implementation of geotechnical recommendations, the impact relative to expansive soils would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Septic Tanks

Impact 3.6-5: The proposed project would not have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

The proposed project would not use septic tanks or other onsite wastewater disposal systems. Therefore, there would be no impact related to the adequacy of soils to support such systems. This significance criterion is not applicable to the proposed project and is not discussed in detail.

Mitigation Measures

None required

Significance Determination

No Impact

Paleontological Resources

Impact 3.6-6: The proposed project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Construction

As discussed above in Section 3.6.1, *Environmental Setting*, in *Paleontological Resources*, the Silverado and Sespe/Vaqueros Formations and the older Quaternary Alluvium have a moderate to high paleontological sensitivity. Excavation in any of these formations may expose significant vertebrate fossils, and impacts to such fossils could constitute a significant impact on the environment. **Mitigation Measures GEO-1** through **GEO-4** would ensure that impacts to paleontological resources are reduced to less than significant levels.

Operation

Once constructed, no new materials would be disturbed, resulting in no impact during operations.

Mitigation Measures

> **GEO-1: Appoint a Qualified Paleontologist**. A qualified paleontologist meeting the Society of Vertebrate Paleontology (SVP) Standards (SVP 2010) (Qualified Paleontologist) shall be retained prior to the start of ground disturbing activities. The Qualified Paleontologist shall provide technical and compliance oversight of all work as it relates to paleontological resources, shall attend the project kick-off meeting and project progress meetings on a regular basis, and shall report to the site in the event potential paleontological resources are encountered.
>
> **GEO-2: Worker Sensitivity Training.** The Qualified Paleontologist shall conduct construction worker paleontological resources sensitivity training prior to the start of ground disturbing activities (including vegetation removal, pavement removal, etc.). This can occur in coordination with Cultural Resources Worker Sensitivity Training (Mitigation Measure CR-1). In the event construction crews are phased, additional trainings shall be conducted for new construction personnel. The training session shall focus on the recognition of the types of paleontological resources that could be encountered within the project site and the procedures to be followed if they are found. Documentation shall be retained demonstrating that all construction personnel attended the training.
>
> **GEO-3: Paleontological Monitoring.** Paleontological resources monitoring shall be conducted for ground disturbing activities occurring in previously undisturbed sediments with high paleontological sensitivity, including any areas containing the Silverado Formation or Sespe/Vaqueros Formation, very old Quaternary Alluvium, and deeper

layers of younger Quaternary Alluvium (which overly sensitive older Quaternary Alluvium). Ground disturbing activities include vegetation removal, grading, excavation, pavement removal, roadway improvements, or other similar activities within these sensitive formations. For undisturbed sediments mapped as the Silverado Formation, Sespe/Vaqueros Formation, or very old Quaternary Alluvium, monitoring of all ground disturbance is initially required. A depth of 5 feet bgs is established as the depth at which high sensitivity and paleontological monitoring should begin in the younger Quaternary Alluvium. The Qualified Paleontologist shall evaluate ground disturbing activities on an intermittent basis and consult with IRWD on whether the depth or frequency of required monitoring should be revised or may cease.

Paleontological resources monitoring shall be performed by a qualified paleontological monitor (meeting the standards of the SVP 2010) under the direction of the Qualified Paleontologist, and in conjunction with IRWD. Monitors shall have the authority to temporarily halt or divert work away from exposed fossils in order to recover the fossil specimens. Any significant fossils collected during project-related excavations shall be salvaged and prepared to the point of identification following the standards of the SVP (2010). Monitors shall prepare daily logs detailing the types of activities and soils observed, and any discoveries. The Qualified Paleontologist shall prepare a final monitoring and mitigation report to document the results of the monitoring effort. Any salvaged fossils shall be offered for donation to an accredited repository with a scientific interest in the materials. If no accredited repository accepts the donation, then the fossils may be donated to a local museum, historical society, school, or other institution for educational purposes.

GEO-4: Fossil Discovery. If personnel or workers discover any potential fossils during project implementation, regardless of the depth of work or location, work at the discovery location shall cease in a 50-foot radius of the discovery until the Qualified Paleontologist has assessed the discovery, consulted with IRWD, and made recommendations as to the appropriate treatment. If the find is deemed significant, the qualified paleontologist shall salvage the resource following the standards of the SVP (2010). Any salvaged fossils shall be offered for donation to an accredited repository with a scientific interest in the materials. If no accredited repository accepts the donation, then the fossils may be donated to a local museum, historical society, school, or other institution for educational purposes.

Significance Determination

Less than Significant Impact with Mitigation

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts. As previously discussed, the proposed project would have no impact with respect to septic tanks and alternate wastewater disposal systems. Accordingly, the proposed project could not contribute to cumulative impacts related to this topic and is not discussed further.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative geologic impacts encompasses and is limited to the proposed project site and its immediately adjacent area. This is because impacts relative to geologic hazards are generally site-specific. For example, the effect of erosion would tend to be limited to the localized area of a project and could only be cumulative if erosion occurred as the result of two or more adjacent projects that spatially overlapped.

The timeframe during which the proposed project could contribute to cumulative geologic hazards includes both the construction and operations phases. For the proposed project, the operations phase is permanent. However, similar to the geographic limitations discussed above, it should be noted that impacts relative to geologic hazards are generally time-specific. Geologic hazards could only be cumulative if two or more geologic hazards occurred at the same time, as well as overlapping at the same location.

Impact 3.6-7: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to geology, soils, and paleontological resources.

Cumulative Impacts during Project Construction

Significant cumulative impacts related to geologic hazard could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more of the cumulative projects identified in Table 3-2 to substantially increase risk that people or the environment would be exposed to geologic hazards. The only cumulative projects that could be geographically adjacent or overlap components of the proposed project would be cumulative project Number 3, Gateway Community Park, and Number 9, Truck Route Roadway Rehabilitation, shown on Figure 3-1. Cumulative project Number 3 would involve the construction of a new community park adjacent to the north side of the proposed project. Cumulative project Number 9 would involve the rehabilitation and paving of streets including Portola Parkway just west of the proposed project.

If the proposed project and the cumulative projects are constructed at the same time, the erosion effects could be cumulatively significant. However, the state Construction General Permit would require each proposed project to prepare and implement a SWPPP. The SWPPPs would describe BMPs to control runoff and prevent erosion for each project. Through compliance with this requirement, the potential for erosion impacts would be reduced. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state, and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels and would not be cumulatively considerable; this impact would be less than significant.

Seismically-induced groundshaking, landslides, and liquefiable soils could cause structural or utility damage, leaks, or ruptures. State and local building regulations and standards, described in Section 3.6.2, *Regulatory Framework*, have been established to address and reduce the potential for such impacts to occur. The proposed project and cumulative projects would be required to comply with applicable provisions of these laws and regulations. Through compliance with these requirements, the potential for impacts would be reduced. As explained in the Regulatory Framework, the purpose of the CBC and local ordinances (or the DSOD in the case of the proposed project) is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within their jurisdictions. By design, it is intended to reduce the cumulative risks from buildings and structures. Therefore, based on compliance with regulatory requirements and implementation of mitigation measures to ensure appropriate design, the incremental impacts of the proposed project combined with impacts of other cumulative projects in the area would not cause a significant cumulative impact related to seismically-induced groundshaking, erosion and loss of topsoil, landslides, or liquefiable soils. The proposed project's contribution to cumulative effects would not be cumulatively considerable, and this impact would be less than significant.

As discussed above in Section 3.6.1, *Environmental Setting, Paleontological Resources*, the local area does have geologic units that have paleontological resources. The proposed project and local cumulative projects that excavate down to the Silverado and Sespe/Vaqueros Formations and the older Quaternary Alluvium may encounter paleontological resources. To mitigate for this potential impact, Impact 3.6.5 includes the implementation of Mitigation Measures GEO-1 through GEO-4. Cumulative projects that would encounter these geologic units would also be required to implement similar mitigation measures. With implementation of these mitigation measures, impacts to the proposed project's contribution to cumulative effects would not be cumulatively considerable, and this impact would be less than significant with mitigation.

Cumulative Impacts during Project Operations

Seismically induced groundshaking, liquefaction and lateral spreading, and liquefiable soils could cause structural damage or pipeline leaks or ruptures. State and local building regulations and standards, described in the Regulatory Framework, have been established to address and reduce the potential for such impacts to occur. The proposed project and cumulative projects would be required to comply with applicable provisions of these laws and regulations. Through compliance with these requirements, the potential for impacts would be reduced. As explained in the Regulatory Framework, the purpose of the CBC and local ordinances (or the DSOD in the case of the proposed project) is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within their jurisdictions. By design, it is intended to reduce the cumulative risks from buildings and structures. Therefore, based on compliance with these requirements, the incremental impacts of the proposed project combined with impacts of other projects in the area would not cause a significant cumulative impact related to seismically induced groundshaking, liquefaction and lateral spreading, or liquefiable soils and the proposed project's contribution to cumulative effects would not be cumulatively considerable and this impact would be less than significant.

Mitigation Measures

Implement Mitigation Measures GEO-1 through GEO-4

Significance Determination

Less than Significant Impact with Mitigation

3.6.4 References

AECOM. 2020a. *Existing Lakebed Sediment Environmental Sampling Results, Irvine Ranch Water District, Syphon Reservoir Improvement Project, IRWD Project 03808*, April 21.

AECOM. 2020b. *Site-Specific Seismic Hazard Analysis, Syphon Reservoir Improvement Project, Orange County, CA*, May 7.

AECOM. 2020c. *Geotechnical Data Report, Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA*, May 11.

AECOM. 2020d. *Local Fault Considerations for Proposed Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA,* May 7.

AECOM. 2020e. *Preliminary Geotechnical Interpretive Report, Syphon Reservoir Improvement Project, IRWD Project 03808, Orange County, CA*, July 2.

Association of Bay Area Governments (ABAG). 2016a. Adapted from *Modified Mercalli Intensity Scale (MMI),* Available online at: resilience.abag.ca.gov/shaking/mmi/. Accessed May 8, 2016.

Association of Bay Area Governments. 2016b. *See What Thrust Faults Can Do*, Available online at: resilience.abag.ca.gov/students/fieldtrip-mtdiablo/. Accessed November 11, 2016.

California Geological Survey (CGS). 2001. *Earthquake Zones of Required Investigation, Lake Forest Quadrangle*, January

California Geological Survey (CGS). 2002a. *California Geomorphic Provinces,* CGS Note 36

California Geological Survey (CGS). 2002b. *How Earthquakes and Their Effects Are Measured*, Note 32.

California Geological Survey (CGS). 2007. *Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, Special Publication 42, Interim Revision 2007*.

California Geological Survey (CGS). 2008a. *PSHA Ground Motion Interpolator*, 2008.

California Geological Survey (CGS). 2008b. *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, Special Publication 117A, October 7.

Division of Safety of Dams (DSOD). 2018. *Division of Safety of Dams Inspection and Reevaluation Protocols*, September 28.

GEI. 2012. *Syphon Reservoir Expansion, Engineering Feasibility Study, Engineering Summary Report*, August.

GEI. 2016. *Syphon Reservoir, Dry Lakebed Geotechnical Exploration*, June 13.

Hauksson, Egill, and Susanna Gross. 1991. Source Parameters of the 1933 Long Beach Earthquake. *Bulletin of the Seismological Society of America*, Vol. 81, pp. 81–98, February.

HDR. 2018. *Draft Final Technical Memorandum, Technical Review and Validation of Feasibility Study Documents, Syphon Reservoir Project*, July 27.

HDR. 2019a. *Geotechnical Investigation Work Plan, Syphon Reservoir Improvements Project, Irvine, California*, February 14

Lawson, Andrew C. 1908. *The California Earthquake of April 18, 1906, Report of the State Earthquake Investigation Commission.*

Society of Vertebrate Paleontology (SVP). 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*, 2010.

Virginia Polytechnic Institute and State University (Virginia Tech [VT]). 2013. *Liquefaction-Induced Lateral Spreading*.

Working Group on California Earthquake Probabilities (WGCEP). 2008a. *Forecasting California's earthquakes; what can we expect in the next 30 years?*: U.S. Geological Survey, Fact Sheet 2008-3027.

Working Group on California Earthquake Probabilities (WGCEP). 2008b. *The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2)*: U.S. Geological Survey Open-File Report 2007-1437 and California Geological Survey Special Report 203.

Working Group on California Earthquake Probabilities. 2015a. *UCERF3: A new earthquake forecast for California's complex fault system*: U.S. Geological Survey Fact Sheet 2015–3009, March.

Working Group on California Earthquake Probabilities. 2015b. *The Third California Earthquake Rupture Forecast (UCERF3), Output from Google Earth file with fault probabilities*.

3.7 Greenhouse Gas Emissions

This section provides a discussion of existing climate conditions and global climate change, existing regulations pertaining to global climate change, and potential greenhouse gas (GHG) emissions resulting from construction and operation of the proposed project, including cumulative impacts. Details regarding the GHG assumptions and calculations are provided in the Air Quality and Greenhouse Gas Technical Report prepared by ESA for this proposed project and included as **Appendix B** of this Draft EIR.

3.7.1 Environmental Setting

Greenhouse Gas Fundamentals

Greenhouse Gases

Global climate change refers to changes in average climatic conditions on Earth as a whole, including changes in temperature, wind patterns, precipitation and storms. Historical records indicate that global climate changes have occurred in the past due to natural phenomena; however, current data increasingly indicate that the current global conditions differ from past climate changes in rate and magnitude. Global climate change attributable to anthropogenic (human) GHG emissions is currently one of the most important and widely debated scientific, economic and political issues in the United States and the world. The extent to which increased concentrations of GHGs have caused or will cause climate change and the appropriate actions to limit and/or respond to climate change is the subject of significant and rapidly evolving regulatory efforts at the federal and state levels of government.

GHGs are compounds in the Earth's atmosphere that play a critical role in determining temperature near the Earth's surface. More specifically, these gases allow high-frequency shortwave solar radiation to enter the Earth's atmosphere, but retain some of the low frequency infrared energy that otherwise is radiated back from the Earth towards space, resulting in a warming of the atmosphere.

Not all GHGs possess the same capacity to induce atmospheric warming; as a result, the warming contribution of a GHG is commonly quantified in the common unit of carbon dioxide equivalent (CO_2e) over a 100-year period, by applying the appropriate global warming potential (GWP) value.[1] By using the applicable GWP for each GHG, Project-related emissions can be tabulated in the common unit of metric tons per year CO_2e. GWP ratios are provided by the Intergovernmental Panel on Climate Change (IPCC). Historically, GHG emission inventories were calculated using the GWPs from the IPCC's Second Assessment Report (SAR), published in 1996. The IPCC has since updated the GWP values based on the latest science in its Fourth Assessment Report (IPCC AR4) and Fifth Assessment Report (IPCC AR5), published in 2007 and 2014, respectively (IPCC 2007; IPCC 2014). California Air Resources Board (CARB) uses

1 GWPs and associated CO_2e values were developed by the IPCC, and published in its Second Assessment Report (SAR) in 1996. Historically, GHG emission inventories have been calculated using the GWPs from the IPCC's SAR. The IPCC updated the GWP values based on the latest science in its AR4. The CARB reports GHG emission inventories for California using the GWP values from the IPCC AR4.

the AR4 GWPs in the statewide GHG emissions inventory, in the current Climate Change Scoping Plan, and in the current version of the California Emissions Estimator Model (CalEEMod®) that is used to calculate CO_2e values for construction as well as operations for existing and proposed project build-out conditions. Compounds that are regulated as GHGs are discussed below (CARB 2019; CARB 2017a; CAPCOA 2017).

Carbon Dioxide (CO_2): CO_2 is the most abundant anthropogenic GHG in the atmosphere and is primarily generated from fossil fuel combustion from stationary and mobile sources. CO_2 is the reference gas (GWP of 1) for determining the GWPs of other GHGs. CO_2 accounted for approximately 83 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Methane (CH_4): CH_4 is emitted from biogenic sources (i.e., resulting from the activity of living organisms), incomplete combustion in forest fires, anaerobic decomposition of organic matter in landfills, manure management, and leaks in natural gas pipelines. The GWP of CH_4 is 25 in the IPCC AR4. CH_4 accounted for approximately 9 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Nitrous Oxide (N_2O): N_2O produced by human-related sources including agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. The GWP of N_2O is 298 in the IPCC AR4. N_2O emissions accounted for approximately 3 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Hydrofluorocarbons(HFCs): HFCs are fluorinated compounds consisting of hydrogen, carbon, and fluorine. They are typically used as refrigerants in both stationary refrigeration and mobile air conditioning systems. The GWPs of HFCs range from 124 for HFC-152a to 14,800 for HFC-23 in the IPCC AR4. HFCs and PFCs (see below) combined accounted for approximately 5 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Perfluorocarbons (PFCs): PFCs are fluorinated compounds consisting of carbon and fluorine. They are primarily created as a byproduct of aluminum production and semiconductor manufacturing. The GWPs of PFCs range from 7,390 to 17,700 in the IPCC AR4.

Sulfur Hexafluoride (SF_6): SF_6 is a fluorinated compound consisting of sulfur and fluoride. It is a colorless, odorless, nontoxic, nonflammable gas. It is most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity. SF_6 has a GWP of 22,800 in the IPCC AR4. SF_6 emissions accounted for less than 1 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Effects of Climate Change

The scientific community's understanding of the fundamental processes responsible for global climate change has improved over the past decade, and its predictive capabilities are advancing. However, there remain scientific uncertainties in, for example, predictions of local effects of climate change, occurrence, frequency, and magnitude of extreme weather events, effects of aerosols, changes in clouds, shifts in the intensity and distribution of precipitation, and changes in oceanic circulation. Due to the complexity of and inability to accurately model Earth's climate system, the uncertainty surrounding climate change may never be completely eliminated. Nonetheless, the IPCC's AR5 states that it is extremely likely that the dominant cause of the observed warming since the mid-20th century is the anthropogenic increase in GHG concentrations (IPCC 2014). A report from the National Academy of Sciences concluded that 97 to 98 percent of the climate researchers most actively publishing in the field support the tenets of the IPCC in that climate change is very likely caused by human (i.e., anthropogenic) activity (Anderegg 2010).

The IPCC's AR4, found that the potential impacts in California due to global climate change include: loss in snow pack; sea-level rise; more extreme heat days per year; more high ozone days; more extreme forest fires; more severe droughts punctuated by extreme precipitation events; increased erosion of California's coastlines and sea water intrusion into the Sacramento and San Joaquin Deltas and associated levee systems; and increased pest infestation (OPR 2018). The Fourth Assessment's findings are consistent with climate change studies published by the California Natural Resources Agency (CNRA) since 2009, starting with the *California Climate Adaptation Strategy* as a response to the Governor's Executive Order S-13-2008. In 2014, the CNRA rebranded the first update of the 2009 adaptation strategy as the *Safeguarding California Plan* (CNRA 2009; CNRA 2014). The 2018 update to *Safeguarding California Plan* identifies hundreds of ongoing actions and next steps state agencies are taking to safeguard Californians from climate impacts within a framework of 81 policy principles and recommendations (CNRA 2018).

In 2016, the CNRA released *Safeguarding California: Implementation Action Plans* in accordance with Executive Order B-30-15, identifying a lead agency to lead adaptation efforts in each sector. In accordance with the 2009 *California Climate Adaptation Strategy*, the California Energy Commission (CEC) was directed to develop a website on climate change scenarios and impacts that would be beneficial for local decision makers. The website, known as Cal-Adapt, became operational in 2011 (Cal-adapt 2020). The information provided on the Cal-Adapt website represents a projection of potential future climate scenarios comprised of local average values for temperature, sea-level rise, snowpack and other data representative of a variety of models and scenarios, including potential social and economic factors. A more detailed description of the effects of climate change can be found in Appendix B of this Draft EIR.

Global Emissions Inventory

Global GHG estimates are based on country inventories developed as part of programs of the United Nations Framework Convention on Climate Change (UNFCCC). Worldwide man-made emissions of GHGs were approximately 49 billion metric tons CO_2e in 2010, including ongoing emissions from industrial and agricultural sources and emissions from land use changes (e.g., deforestation). Emissions of CO_2, primarily from fossil fuel use and industrial processes, account for 76 percent of total GHG (CO_2e) emissions. Methane emissions account for 16 percent and N_2O emissions for 6.2 percent. For comparison, worldwide emissions of GHGs in 1970 were 27 billion metric tons of CO_2e per year (IPCC 2014).

United States Emissions Inventory

In 2018, the United States emitted about 6,677 million metric tons (MMT) of CO_2e, with 75.4 percent of those emissions coming from fossil fuel combustion. Of the major sectors nationwide, transportation accounts for the highest amount of GHG emissions (approximately 28 percent), followed by electricity (27 percent), industry (22 percent), agriculture (10 percent), commercial and residential buildings (12 percent) (. Between 1990 and 2018, total US GHG emissions rose by 3.7 percent, but emissions have generally decreased since peaking in 2005. GHG emissions in 2018 are approximately 10 percent below 2005 levels. Since 1990, US emissions have increased at an average annual rate of 0.2 percent, however have been decreasing at an average annual rate of 0.7 percent since 2005 (USEPA 2020).

California Greenhouse Gas Emissions Inventory

CARB compiles GHG inventories for the state. Based on the 2017 GHG inventory data (i.e., the latest year for which data are available from CARB), California emitted 424 $MMTCO_2e$ including emissions resulting from imported electrical power (CARB 2019). CARB's 2017 statewide inventory indicated that California's net GHG emissions in 2017 were 7 $MMTCO_2e$ below 1990 levels, which is the 2020 GHG reduction target codified in AB 32. The overall trends in the inventory demonstrate that the carbon intensity of California's economy is declining and has decreased by 41 percent from 2001 peak emissions while increasing the gross domestic product (GDP) by 52 percent (CARB 2019).[2] The GDP grew 3.6 percent in 2017 while emissions per GDP declined by 4.5 percent compared to 2016. **Table 3.7-1** identifies and quantifies statewide anthropogenic GHG emissions and sinks (e.g., carbon sequestration due to forest growth) in 1990 and 2017. As shown in the table, the transportation sector is the largest contributor to statewide GHG emissions at approximately 40 percent (CARB 2019).

Existing Site Emissions

The existing Syphon Reservoir activities result in minimal mobile source emissions from maintenance trips. The number of maintenance trips are not anticipated to change with the proposed improvements to the reservoir, therefore existing emissions were not modeled and the proposed project's GHG emissions would be considered net new emissions. The existing operations on the site result in annual electrical consumption of 217,273 kilowatt hours (kWh) annually. Because the current facility at the site would be removed, the electricity would no longer be consumed. Emissions associated with the existing electrical consumption onsite were not quantified, instead net new electrical consumption was analyzed.

2 Carbon intensity of California's economy is the amount of carbon pollution per million dollars of gross domestic product.

TABLE 3.7-1
STATE OF CALIFORNIA GREENHOUSE GAS EMISSIONS

Category	Total 1990 Emissions Using IPCC SAR ($MMTCO_2e$)	Percent of Total 1990 Emissions	Total 2017 Emissions Using IPCC AR4 ($MMTCO_2e$)	Percent of Total 2017 Emissions
Transportation	150.7	35%	169.9	40%
Electric Power	110.6	26%	62.4	15%
Commercial Use	14.4	3%	15.1	4%
Residential	29.7	7%	26.0	6%
Industrial	103.0	24%	89.4	21%
Recycling and Waste[a]	–	–	8.9	2%
High GWP/Non-Specified[b]	1.3	<1%	20.0	5%
Agriculture/Forestry	23.6	6%	32.4	8%
Forestry Sinks	-6.7	-2%	—[c]	—
Net Total (IPCC SAR)	**426.6**	**100%[e]**	—	—
Net Total (IPCC AR4)[d]	**431**	**100%[e]**	**424.1**	**100%[e]**

NOTES:
[a] Included in other categories for the 1990 emissions inventory.
[b] High GWP gases are not specifically called out in the 1990 emissions inventory.
[c] Revised methodology under development (not reported for 2012).
[d] CARB revised the state's 1990 level GHG emissions using GWPs from the IPCC AR4.
[e] Total of individual percentages may not add up to 100% due to rounding
SOURCES: CARB 2017b; CARB 2019.

3.7.2 Regulatory Framework

Federal

This section provides a summary of pertinent federal, State, and local statutes, regulations, plans, and policies that have been adopted that address GHG.

Clean Air Act

The 1963 CAA was the first federal legislation regarding air pollution control and has been amended numerous times in subsequent years, with the most recent amendments occurring in 1990. At the federal level, USEPA is responsible for implementation of certain portions of the CAA including mobile source requirements.

In *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497 (2007), twelve states and cities, including California, together with several environmental organizations, sued to require the USEPA to regulate GHGs as pollutants under the CAA. The United States Supreme Court ruled that GHGs fit within the CAA's definition of a pollutant and the USEPA had the authority to regulate GHGs.

On December 7, 2009, the USEPA Administrator signed two distinct findings regarding GHGs under CAA section 202(a):

- **Endangerment Finding:** The current and projected concentrations of the six key GHGs—CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6—in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare.

These findings did not, by themselves, impose any requirements on industry or other entities. However, these actions were a prerequisite for implementing GHG emissions standards for motor vehicles.

On-Road Vehicle Rules

Heavy-Duty Vehicles

GHG emissions and fuel efficiency standards for medium- and heavy-duty trucks have been jointly developed by the USEPA and the National Highway Traffic Safety Administration (NHTSA). For vocational vehicles, which consist of a variety of work vehicles including dump trucks, the Phase 1 Heavy-Duty Vehicle Greenhouse Gas Regulation started with model year 2014 and the standard requires up to a 10 percent reduction in CO_2 emissions by model year 2017 over the 2010 baseline. The Phase 2 standards start in model year 2021 and require the phase-in of a 12 to 24 percent reduction in CO_2 emission reduction from vocational vehicles by model year 2027 over the 2017 baseline.

Light-Duty Vehicles

In August 2018, the USEPA and NHTSA proposed the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule that would, if adopted, maintain the CAFE and CO_2 standards applicable in model year 2020 for model years 2021 through 2026. The estimated CAFE and CO_2 standards for model year 2020 are 43.7 mpg and 204 grams of CO_2 per mile for passenger cars and 31.3 mpg and 284 grams of CO_2 per mile for light trucks, projecting an overall industry average of 37 mpg, as compared to 46.7 mpg under the standards issued in 2012. In September 2019, the USEPA published the final rule in the Federal Register (Federal Register, Vol. 84, No. 188, Friday, September 27, 2019, Rules and Regulations, 51310-51363). The USEPA also published the final rule for the One National Program on Federal Preemption of State Fuel Economy Standards that finalizes critical parts of the SAFE Vehicles Rule and makes clear that federal law preempts state and local tailpipe GHG emissions standards as well as zero emission vehicle (ZEV) mandates. In November 2019, California and 23 other states, environmental groups, and the cities of Los Angeles and New York, filed a petition with the U.S. Court of Appeals for the District of Columbia Circuit, for the EPA to reconsider the published rule. On March 31, 2020, USEPA and NHTSA issued the SAFE Vehicles Rule, setting fuel economy and carbon dioxide standards that increase 1.5 percent in stringency each year from model years 2021 through 2026 (see 85 Federal Register 24174). On February 8, 2021, the United States Court of Appeals for the District of Columbia Circuit issued an order granting the Biden Administration's motion to stay litigation over Part 1 of SAFE Rule. Consistent with President Biden's executive order on Protecting Public

Health and the Environment and Restoring Science to Tackle the Climate Crisis, USEPA and NHTSA are now evaluating whether and how to replace the SAFE Rule.

State

California Greenhouse Gas Reduction Targets

Through executive order, California governors have established long-term GHG reduction goals for the state.

Executive Order S-3-05

On June 1, 2005, Governor Schwarzenegger announced Executive Order S-3-05, which established the following GHG emission reduction targets:

- By 2010, California shall reduce GHG emissions to 2000 levels;
- By 2020, California shall reduce GHG emissions to 1990 levels; and
- By 2050, California shall reduce GHG emissions to 80 percent below 1990 levels.

Executive Order B-30-15

On April 29, 2015, Governor Brown issued Executive Order B-30-15, in which, the Governor:

- Established a new interim statewide reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030;
- Ordered all state agencies with jurisdiction over sources of GHG emissions to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 reduction targets; and
- Directed CARB to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of carbon dioxide equivalent.

California Health and Safety Code, Division 25.5 – California Global Warming Solutions Act of 2006 (AB 32)

Following the issuance of Executive Order S-3-05, in 2006, the California State Legislature adopted the California Global Warming Solutions Act of 2006 (passed as Assembly Bill [AB] 32 and codified in the California Health and Safety Code [HSC], Division 25.5), which focuses on reducing GHG emissions in California to 1990 levels by 2020. HSC Division 25.5 defines GHGs as CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 and represents the first enforceable statewide program to limit emissions of these GHGs from all major industries with penalties for noncompliance. The law further requires that reduction measures be technologically feasible and cost effective.

Under HSC Division 25.5, CARB has the primary responsibility for reducing GHG emissions. CARB is required to adopt rules and regulations directing state actions that would achieve GHG emissions reductions equivalent to 1990 statewide levels by 2020.

Senate Bill 32

In 2016, Senate Bill (SB) 32 and its companion bill AB 197, augmented AB 32 and amended HSC Division 25.5, establishing a new climate pollution reduction target of 40 percent below

1990 levels by 2030 and including provisions to ensure the benefits of state climate policies reach into disadvantaged communities.

2008 and 2014 Climate Change Scoping Plans

A specific requirement of AB 32 was the preparation of a Climate Change Scoping Plan for achieving the maximum technologically feasible and cost-effective GHG emission reduction by 2020. CARB developed and approved the initial Scoping Plan in 2008, outlining the regulations, market-based approaches, voluntary measures, policies, and other emission reduction programs that would be needed to meet the 2020 statewide GHG emission limit and initiate the transformations needed to achieve the state's long-range climate objectives (CARB 2008).

The First Update to the Scoping Plan was approved by CARB in May 2014 and built upon the initial Scoping Plan with new strategies and recommendations. In 2014, CARB revised the target using the GWP values from the IPCC AR4 and determined that the 1990 GHG emissions inventory and 2020 GHG emissions limit is 431 million metric tons of carbon dioxide equivalents ($MMTCO_2e$). CARB also updated the state's 2020 emissions estimate to account for the effect of the 2007–2009 economic recession, new estimates for future fuel and energy demand, and the reductions required by regulation that were adopted for motor vehicles and renewable energy (CARB 2014).

2017 Climate Change Scoping Plan Update

In response to SB 32 and the 2030 GHG reduction target, CARB approved the 2017 Climate Change Scoping Plan Update (2017 Scoping Plan Update) in December 2017 (CARB 2017a). The 2017 Scoping Plan Update outlines the proposed framework of action for achieving the 2030 GHG target of 40 percent reduction in GHG emissions relative to 1990 levels (CARB 2017a). The 2017 Scoping Plan Update identifies key sectors of the state's implementation strategy, which includes improvements in low-carbon energy, industry, transportation sustainability, natural and working lands, waste management, and water. Through a combination of data synthesis and modeling, CARB determined that the target statewide 2030 emissions limit is 260 $MMTCO_2e$, and that further commitments will need to be made to achieve an additional reduction of 50 $MMTCO_2e$ beyond current policies and programs. The cornerstone of the 2017 Scoping Plan Update is an expansion of the Cap-and-Trade Program (discussed further below) to meet the aggressive 2030 GHG emissions goal and ensure achievement of the 2030 limit set forth by E.O. B-30-15.

The 2017 Scoping Plan Update's strategy for meeting the state's 2030 GHG target incorporates the full range of legislative actions and state-developed plans that have relevance to the year 2030, including the following, described elsewhere in this section:

- Extending the low-carbon fuel standard (LCFS) beyond 2020 and increasing the carbon intensity reduction requirement to 18 percent by 2030;
- SB 350, which increases the Renewables Portfolio Standard (RPS) to 50 percent by 2030 and requires the CEC to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by 2030. These targets may be achieved through energy efficiency savings and demand reductions from a variety of

programs, including but not limited to appliance and building energy efficiency standards and a comprehensive program to achieve greater energy efficiency standards in existing buildings;

- The 2016 Mobile Source Strategy is estimated to reduce emissions from mobile sources including an 80 percent reduction in smog-forming emissions and a 45 percent reduction in diesel particulate matter from 2016 levels in the Air Basin, a 45 percent reduction in statewide GHG emissions (from both on-road and off-road mobile sources) and a 50 percent reduction in statewide consumption of petroleum-based fuels;
- The Sustainable Freight Action Plan to improve freight efficiency and transition to zero emission freight handling technologies (described in more detail below);
- SB 1383, which requires a 50 percent reduction in anthropogenic black carbon and a 40 percent reduction in hydrofluorocarbon and methane emissions below 2013 levels by 2030; and
- AB 398, which extends the state Cap-and-Trade Program through 2030.

In the 2017 Scoping Plan Update, CARB recommends statewide targets of no more than six MT CO_2e per capita by 2030 and no more than two metric tons CO_2e per capita by 2050. CARB acknowledges that because the statewide per capita targets are based on the statewide GHG emissions inventory that includes all emissions sectors in the state (including large industrial sources covered under the state's cap and trade program), they are not applicable for use at the local level. Rather, it is appropriate for local jurisdictions to derive evidence-based local per-capita goals based on local emissions sectors and growth projections.

To demonstrate how a local jurisdiction can achieve their long-term GHG goals at the community plan level, CARB recommends developing a geographically specific GHG reduction plan (i.e., climate action plan) consistent with the requirements of CEQA Guidelines section 15183.5(b). A so-called "CEQA-qualified" GHG reduction plan, once adopted, can provide local governments with a streamlining tool for project-level environmental review of GHG emissions, provided there are adequate performance metrics for determining project consistency with the plan. Absent conformity with such a plan, CARB recommends "that projects incorporate design features and GHG reduction measures, to the degree feasible, to minimize GHG emissions. Achieving no net additional increase in GHG emissions, resulting in no contribution to GHG impacts, is an appropriate overall objective for new development (CARB 2017a)."

On-Road and Off-Road Vehicle and Equipment Rules

Light-Duty Vehicles

In 2002, Governor Davis signed AB 1493 (Pavley), which required CARB to set GHG emission standards for passenger vehicles, light duty trucks, and other vehicles whose primary use is non-commercial personal transportation manufactured in and after 2009. Because the Pavley standards (named for the bill's author, state Senator Fran Pavley) would impose stricter standards than those under the CAA, California applied to the USEPA for a waiver under the CAA. In 2009, the USEPA granted the waiver. The waiver has been extended consistently since 2009; however, in 2018 the USEPA and NHTSA indicated their intent to revoke California's waiver, and prohibit future state emissions standards enacted under the CAA. In response to the Federal SAFE Vehicles Rules and the One National Program on Federal Preemption of State Fuel Economy Standards, in November 2019 California and 23 other states, environmental groups, and the cities of Los Angeles and New

York, filed a petition with the U.S. Court of Appeals for the District of Columbia Circuit, for the EPA to reconsider the published rule. As noted above, consistent with President Biden's executive order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, USEPA and NHTSA are now evaluating whether and how to replace the SAFE Rule.

Low Carbon Fuel Standard

In January 2007, Governor Schwarzenegger enacted Executive Order S-01-07, which mandates that the state: (1) establish a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and (2) adopt a Low Carbon Fuel Standard (LCFS) for transportation fuels in California. The overall goal of the LCFS is to lower the carbon intensity of California transportation fuel. The 2017 Scoping Plan Update calls for the LCFS to reduce fuel carbon intensity by at least 18 percent by 2030. In September 2018, CARB extended the LCFS program to 2030, making significant changes to the design and implementation of the Program including a doubling of the carbon intensity reduction to 20 percent by 2030.

Title 24 Building Energy Efficiency Standards

CCR Title 24 establishes California's Building Energy Efficiency Standards; Part 11 is referred to as the California Green Building Standards (CALGreen) Code. The purpose of the CALGreen Code is to "improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a positive environmental impact and encouraging sustainable construction practices in the following categories: (1) planning and design; (2) energy efficiency; (3) water efficiency and conservation; (4) material conservation and resource efficiency; and (5) environmental air quality (CBSC 2010)." In 2016, the CALGreen Code was updated to include new mandatory measures for residential and nonresidential buildings, and the new measures took effect on January 1, 2017. The CALGreen Code was most recently updated in 2018 with new measures taking effect on January 1, 2020 (CBSC 2019).SB 1383 (Short-lived Climate Pollutants)

Senate Bill 1383, passed in 2016, requires statewide reductions in short-lived climate pollutants across various industry sectors. The short-lived climate pollutants covered under AB 1383 include methane, fluorinated gases, and black carbon—all GHGs with a much higher warming impact than carbon dioxide and with the potential to have detrimental effects on human health. SB 1383 requires the CARB to adopt a strategy to reduce methane by 40 percent, hydrofluorocarbon gases by 40 percent, and anthropogenic black carbon by 50 percent below 2013 levels by 2030. The methane emission reduction goals include a 75 percent reduction in the level of statewide disposal of organic waste from 2014 levels by 2025.

Regional

South Coast Air Quality Management District

SCAQMD has jurisdiction over air quality planning for all of County of Orange, Los Angeles County except for the Antelope Valley, the non-desert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The Air Basin is a subregion within SCAQMD jurisdiction. While air quality in the Air Basin has improved, the Air Basin requires continued diligence to meet the air quality standards.

SCAQMD adopted a "Policy on Global Warming and Stratospheric Ozone Depletion" on April 6, 1990. The policy commits SCAQMD to consider global impacts in rulemaking and in drafting revisions to the Air Quality Management Plan. In March 1992, the SCAQMD Governing Board reaffirmed this policy and adopted amendments to the policy to include the following directives:

- Phase out the use and corresponding emissions of chlorofluorocarbons, methyl chloroform (1,1,1-trichloroethane or TCA), carbon tetrachloride, and halons by December 1995;
- Phase out the large quantity use and corresponding emissions of hydrochlorofluorocarbons by the year 2000;
- Develop recycling regulations for hydrochlorofluorocarbons (e.g., SCAQMD Rules 1411 and 1415);
- Develop an emissions inventory and control strategy for methyl bromide; and
- Support the adoption of a California GHG emission reduction goal.

In 2008, SCAQMD released draft guidance regarding interim CEQA GHG significance thresholds (SCAQMD 2008). Within its October 2008 document, SCAQMD proposed the use of a percent emission reduction target to determine significance for commercial/residential projects that emit greater than 3,000 metric tons of carbon dioxide equivalents ($MTCO_2e$) per year. On December 5, 2008, the SCAQMD Governing Board adopted the staff proposal for an interim GHG significance threshold for stationary source/industrial projects where SCAQMD is the lead agency. However, SCAQMD did not adopt a GHG significance threshold for land use development projects (e.g., mixed-use/commercial projects) and formed a GHG Significance Threshold Working Group to further evaluate potential GHG significance thresholds. This Working Group has been inactive since 2011 and SCAQMD has not formally adopted any GHG significance threshold guidance for land use development projects.

Air Quality Guidance Documents

SCAQMD's CEQA guidelines are voluntary initiatives recommended for consideration by local planning agencies. The *CEQA Air Quality Handbook* (Handbook) published by SCAQMD provides local governments with guidance for analyzing and mitigating project-specific air quality impacts (SCAQMD 1993). SCAQMD is currently updating some of the information and methods in the Handbook, such as the screening tables for determining the air quality significance of a project and the on-road mobile source emission factors. While this process is underway, SCAQMD recommends using other approved models to calculate emissions from land use projects, such as CalEEMod (SCAQMD 2020).

Rules and Regulations

The SCAQMD has adopted many rules and regulations to regulate sources of air pollutant emissions in the Air Basin. With respect to GHG emissions, the proposed project may be subject to the following SCAQMD rule and regulation. While the focus of the rule and regulation are on criteria air pollutants and toxic air contaminants, they would nonetheless control GHG emissions as co-benefits:

Regulation XIV – Toxics and Other Non-Criteria Pollutants: Regulation XIV sets requirements for new permit units, relocations, or modifications to existing permit units which emit toxic air contaminants or other non-criteria pollutants. The following rule may apply to the proposed project:

Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines: This rule applies to stationary compression ignition engine greater than 50 brake horsepower and sets limits on emissions and operating hours. In general, new stationary emergency standby diesel-fueled engines greater than 50 brake horsepower are not permitted to operate more than 50 hours per year for maintenance and testing.

Southern California Association of Governments

The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization for the region in which the County of Orange and City of Irvine are located. In May 2020, SCAG adopted the *2020-2045 Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS), also referred to as *ConnectSoCal*, which is an update to the previous 2016-2040 RTP/SCS (SCAG 2020).

The 2020-2045 RTP/SCS provides a vision for transportation throughout the region for the next several decades by considering the role of transportation in the broader context of economic, environmental, and quality-of-life goals for the future, identifying regional transportation strategies to address mobility needs. The 2020-2045 RTP/SCS describe how the region can attain the GHG emission-reduction targets set by CARB by achieving an 8 percent reduction in per capita transportation GHG emissions by 2020 and a 19 percent reduction in per capita transportation GHG emissions by 2035 compared to the 2005 level on a per capita basis. Compliance with and implementation of the 2020-2045 RTP/SCS policies and strategies would have co-benefits of reducing per capita criteria air pollutant emissions (e.g. nitrogen dioxide, carbon monoxide, etc.) associated with reduced per capita vehicle miles traveled (VMT) (SCAG 2020).

Local

Local jurisdictions, such as the County of Orange (County) and the City of Irvine (City) have the authority and responsibility to reduce GHG emissions through their land use decision-making authority.

Orange County General Plan

The County is responsible for the assessment and mitigation of pollutant emissions resulting from its land use decisions. The County's General Plan Resource Element sets forth the goals, objectives, and policies which guide the County in its implementation of its air quality improvement programs and strategies. A number of these goals, objectives, and policies are relevant to the proposed project, and relate to minimizing particulate emissions from construction activities, managing traffic congestion during peak hours, and increasing energy efficiency in private developments.

The Resource Element establishes the following goal pertaining to the proposed project's energy use: Goal 3: Maximize the conservation of energy resources in all future land use and transportation planning decisions.

City of Irvine General Plan

The City is responsible for the assessment and mitigation of pollutant emissions resulting from its land use decisions. The City's General Plan Energy Element sets forth the objectives and policies which guide the City in its implementation of its energy improvement programs and strategies. Reduction of energy use results in a reduction in GHG emissions and therefore is relevant to the GHG analysis. The Energy Element establishes the following objectives pertaining to the proposed project energy use: Goal I-1: Maximize energy efficiency through land use and transportation planning.

3.7.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from Appendix G of the CEQA Guidelines are used as thresholds of significance to determine the impacts of the proposed project as related to greenhouse gas emissions. The proposed project would have a significant impact if it would:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
2. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.
3. Result in cumulatively considerable impacts to greenhouse gas emissions.

Greenhouse Gas Emissions Thresholds

CEQA Guidelines section 15064.4 gives lead agencies the discretion to determine whether to assess the significance of GHG emissions quantitatively or qualitatively. Section 15064.4 recommends considering certain factors, among others, when determining the significance of a project's GHG emissions, including the extent to which the proposed project may increase or reduce GHG emissions as compared to the existing environment; whether the proposed project exceeds an applicable significance threshold; and extent to which the proposed project complies with regulations or requirements adopted to implement a reduction or mitigation of GHGs. None of the amendments establishes a threshold of significance; rather, so long as any threshold selected is supported by substantial evidence (see section 15064.7(c)), lead agencies are granted discretion to establish significance thresholds for their respective jurisdictions, including by looking to thresholds developed by other public agencies, such as air districts, or suggested by experts, such as the California Air Pollution Control Officers Association (CAPCOA).

The California Natural Resources Agency's *Final Statement of Reasons for Regulatory Action* from December 2009 similarly provides that project-level quantification of emissions should be conducted where it would assist in determining the significance of emissions, even where no numeric threshold applies. In such cases, CNRA's guidance provides that qualitative thresholds can be utilized to determine the ultimate significance of project-level impacts based on a project's consistency with plans, which can include applicable regional transportation plans. Even when using a qualitative threshold, quantification can inform "the qualitative factors" and indicate "whether emissions reductions are possible, and, if so, from which sources (CNRA 2009)."

Neither CARB nor the County of Orange has adopted quantitative significance thresholds for assessing project-level impacts related to GHG emissions. As a method for determining significance under CEQA, SCAQMD developed a draft tiered flowchart in 2008 for determining significance thresholds for GHGs for industrial projects where SCAQMD is acting as the lead agency. In December 2008, SCAQMD adopted a 10,000 $MTCO_2e$/year threshold for industrial facilities, but only with respect to for projects in which SCAQMD is the lead agency. SCAQMD has not adopted a threshold of significance for residential or commercial projects. Additionally, SCAQMD formed a GHG Significance Threshold Working Group to evaluate potential GHG significance thresholds and had proposed, but not adopted, a 3,000 $MTCO_2e$/year screening level for land use development projects. However, the aforementioned Working Group has been inactive since 2011 and no screening levels drafted by the Working Group have been formally adopted for land use development projects. Nonetheless, while the proposed project is an infrastructure project and does not fit neatly into a category (industrial, commercial, or residential/), in the absence of a formally adopted threshold applicable to this proposed project, the more stringent of the two quantitative thresholds discussed above (i.e., 3,000 $MTCO_2e$/year) is used to evaluate the significance for this proposed project.

Greenhouse Gas Reduction Plans, Policies and Regulations

A significant impact would occur if the proposed project would conflict with applicable regulations, plans and policies that were adopted to reduce GHG emissions that contribute to global climate change. For the proposed project, as an infrastructure project, this analysis considers the proposed project's potential to conflict with the following applicable plans, policies and regulations to reduce GHG emissions:

- The 2017 Climate Change Scoping Plan Update, CARB's plan for achieving a 40 percent reduction on GHG emissions from 1990 levels by 2030, statewide, as mandated by SB 32; and
- The SCAG 2020-2045 RTP/SCS, the regional plan for achieving sustainable land use patterns that reduce passenger vehicle GHG emissions, as mandated by SB 375.

Methodology

Construction

The evaluation of potential impacts to GHG emissions that may result from the construction of the proposed project is consistent with CEQA Guidelines section 15064.4(a) and recent related guidance from OPR. This analysis considered GHG emissions resulting from construction activities associated with the proposed project as detailed under Regional Construction Emissions above. Because potential impacts resulting from GHG emissions would be long-term rather than acute, GHG emissions were calculated on an annual basis. In accordance with SCAQMD guidance, GHG emissions from construction have been amortized (i.e., averaged annually) over the lifetime of the proposed project. SCAQMD defines the lifetime of a project as 30 years. Therefore, the proposed project's total construction GHG emissions are divided by 30 to determine an annual construction emissions estimate comparable to operational emissions.

GHG quantification methods rely on guidance from State and regional agencies with scientific expertise in quantifying GHG emissions, including CARB and SCAQMD. Along with the air quality emissions, GHG emissions were estimated using CalEEMod Version 2016.3.2 for off-road construction equipment and Safe Rule 1 adjusted EMFAC2017 emissions for on-road vehicles as detailed above. Emissions calculations and modeling output are included in Appendix B of this Draft EIR.

Operation

Existing operations at the proposed project site generate GHG emissions from electrical consumption. The proposed project would not result in new or increased use of motor vehicles, water or natural gas consumption, or wastewater or solid waste generation. The proposed project would result in the consumption of 1,300,000 kWh annually. The existing operations consist of approximately 217,273 kWh annually, therefore the annual increase in electrical consumption is approximately 1,082,727 kWh. The increase in electrical consumption was used to quantify annual operational GHG emissions. Emissions from annual electrical consumption are added to the amortized construction emissions and compared to the SCAQMD's quantitative screening level. For further explanation, please see Appendix B of this Draft EIR.

Impact Analysis

Greenhouse Gas Emissions

Impact 3.7-1: The proposed project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

Construction

According to SCAQMD methodology, because GHG emissions are a cumulative impact, project significance is determined by the combined amortized construction and operational emissions. The proposed project's total estimated GHG emissions during construction are identified in **Table 3.7-2**. As shown, estimated GHG emissions would be approximately 9,567 $MTCO_2e$ over the entire lifetime of the project. This would equal approximately 319 $MTCO_2e$ per year after amortization over 30 years per SCAQMD methodology.

TABLE 3.7-2
AMORTIZED ANNUAL CONSTRUCTION GHG EMISSIONS

Source	$MTCO_2e$
Vegetation Clearing	483
Access Routes/Intersection Improvements	434
Mobilization, site prep/Staging Areas	208
Upstream Excavation and Foundation Treatment	1,127
Dam Excavation and Foundation Treatment	689
Install Inlet/Outlet	308
Install Embankment to Bottom of Blanket Drain	643
Install Blanket Drain	546
Install Chimney/Remaining Embankment	3,856
Spillway Construction	152
Construction of Filtration/Chloe/Dechlor Facility	566
Wetlands/Riparian Installation	161
Installation of Recreation Facilities	288
Demobilization	97
Maximum Geotechnical (23 tests)	20
Total Project Construction Emissions	**9,567**
Amortized Project Construction Emissions	**319**

SOURCE: ESA 2020

Operation

Operational GHG emissions result from area sources and the increased electrical use as a result of daily activities once the proposed improved reservoir is operational. **Table 3.7-3** shows the total annual GHG emissions associated with the combined construction and operation of the proposed project. As shown in Table 3.7-3, operational emissions result in 161 $MTCO_2e$ annually, which is attributed almost exclusively to increased electrical use.

TABLE 3.7-3
ANNUAL OPERATIONAL GHG EMISSIONS

Source	$MTCO_2e$
Area	<1
Energy	157
Mobile Source	4
Waste	0
Water	0
Subtotal Operational Emissions	*161*
Amortized Project Construction Emissions	319
Total Project Emissions	**480**
District-wide energy savings	535
Total Net Emissions	(55)
Screening Level	3,000
Exceed Screening Level?	No

SOURCE: ESA, 2020

Furthermore, the objectives of the proposed project include reducing the need to purchase supplemental imported untreated water from MWD by storing recycled water that is already produced. Conveying imported untreated water from the State Water Project (SWP) and the Colorado River to Orange County requires a tremendous amount of energy for pumping. Replacing imported water with locally generated recycled water reduces the overall energy associated with imported water since there would be less energy needed for conveyance. Approximately 1,890 kWh per acre foot is required for water supply and conveyance in the IRWD service area due to importing water from outside of the region from the SWP and Colorado River (IRWD 2019). Without the proposed project, approximately 4,500 AF of untreated water would be imported through MWD, resulting in approximately 8,505,000 kWh/year of electricity consumption. Under the proposed project, the provision of approximately 4,500 AF of locally-produced recycled water would result in approximately 4,806,000 kWh/year of electricity consumption, which is an approximate savings of 3,699,000 kWh annually.

The combined annual construction and operational emissions from the proposed project result in approximately 480 $MTCO_2e$. The district-wide savings in approximately 3,699,000 kWh annually results in a reduction in district emissions of approximately 535 MT CO_2e annually and results in a district wide reduction in GHG emissions of approximately 55 $MTCO_2e$ annually.[3] As the proposed project's annual GHG emissions would not exceed the threshold of significance, emissions impacts with respect to the generation of GHGs would be less than significant.

[3] 1,082,727 kWh of net increase in electrical use results in 157 $MTCO_2e$ annually. 3,699,000 kWh of electric use results in approximately 535 $MTCO_2e$ annually. Project emissions (480 MTCO2e) minus the district emissions (535 MTCO2e) equals a 55 MTCO2e annual reduction in district emissions from the implementation of the project.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Plan, Policy or Regulation

Impact 3.7-2: The proposed project would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Consistency with the Climate Change Scoping Plan

The CARB Climate Change Scoping Plan was designed to reduce GHG emissions from new land use projects. The proposed project would be subject to the Scoping Plan requirements. The majority of the Scoping Plan measures target measures that reduce energy and transportation emissions from residential and commercial/industrial development and therefore the majority of the Scoping Plan measures are not applicable to the proposed project. Out of the Recommended Actions contained in CARB's Scoping Plan, the actions that are most applicable to the proposed program would be reducing diesel-fueled commercial motor vehicle idling, and reducing energy associated with water use. The proposed project would be designed to comply with the California regulations to limit idling of onsite vehicles to 5 minutes or less per location.

The objectives of the proposed project include reducing the need to purchase imported water from MWD by storing and using additional recycled water stored by the proposed project and maximize the use of recycled water produced by IRWD for the benefit of IRWD customers. Once operational, the proposed project would increase the amount of recycled water available within IRWD and therefore would reduce the emissions associated with the transport of non-potable water from other sources. Replacing purchased imported water with locally generated recycled water for use by local customers reduces the overall energy-related GHG emissions associated with the purchase of imported water since there would be less GHG emissions from water supply and conveyance. Approximately 1,890 kWh per acre foot is required for water supply and conveyance in the IRWD service area due to importing water from outside of the region from the SWP and Colorado River (IRWD 2019). Without the proposed project approximately 4,500 AF of untreated water would be imported through MWD, resulting in approximately 8,505,000 kWh/year of electricity consumption district-wide. Treatment and transport of approximately 4,500 AF of locally-produced recycled water would result in approximately 4,806,000 kWh/year of district-wide electricity consumption, which is an approximate savings of 3,699,000 kWh annually. By providing IRWD customers with recycled water stored under the proposed project, electricity used for water supply and conveyance from imported water would be offset by the recycled water, thus reducing district-wide GHG emissions. The 2017 Climate Change Scoping Plan recognizes the nexus between water and energy consumption. The water-energy nexus provides opportunities for reducing energy demand and reducing emissions of GHGs. The 2017 Climate Change Scoping Plan, states that "recycled water has the potential to reduce GHGs if it replaces, and not merely serves as an alternative to, an existing, higher-carbon water supply"

(CARB 2017a). Thus, the proposed project would be consistent with the Scoping Plan's strategy to reduce water-related GHG emissions.

As the proposed project would not increase traffic within the region, and would reduce the overall energy-related GHG emissions associated with the use of imported water, the proposed project would not conflict with the Scoping Plan. That combined with the reduction in vehicle idling, the proposed project would be consistent with the Scoping Plan measures applicable to the project. Therefore, the proposed project would result in less than significant impacts.

Consistency with SB 375

The key goal of the Sustainable Communities Standard is to achieve GHG emission reduction targets through integrated land use and transportation strategies. The focus of these reductions is on transportation and land use strategies that influence vehicle travel. The proposed project would not significantly or permanently increase vehicle traffic within the County or the region. While the proposed project would result in an increase in short-term employment compared to existing conditions, the project would not result in long-term employment growth in excess of regional projections by SCAG. Therefore, the proposed project would not conflict with the implementation of SB 375 nor the 2020-2045 RTP/SCS and impacts would be less than significant.

Consistency with Applicable Regulations

The Heavy-Duty Vehicle and Light-Duty vehicle rules have been established to reduce CO2 emissions from the combustion of fossil fuels. The proposed project would not involve the manufacture of vehicles or production of vehicle fuels. However, vehicles that are purchased and used within the project site would comply with any vehicle and fuel standards that the CARB adopts or has adopted. Therefore, the construction and operation of the proposed project would not conflict with these regulations.

CARB's ATCM limits heavy-duty diesel motor vehicle idling to reduce DPM and other TACs and applies to all the haul trucks, heavy duty vendor trucks, and construction equipment that would be used on the project site. CARB also implemented the Truck and Bus Regulation to further reduce NOx, PM10 and PM2.5 from on-road diesel operating vehicles. CARB has also promulgated emissions standards for off-road diesel construction equipment greater than 24 horsepower to reduce criteria pollutant emissions. The proposed project would operate both on- and off-road trucks and construction equipment. These vehicles would comply with all of the CARB regulations and onsite trucks and equipment would be monitored to ensure that idling would occur for only five minutes at any given time. Therefore, the proposed project would be consistent with the applicable regulations for heavy-duty, light-duty and off-road vehicles and equipment and impacts would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Cumulative Impacts

Impact 3.7-3: Concurrent construction and operation of the proposed project and related projects in the geographic scope would not result in cumulative impacts regarding greenhouse gas emissions.

The GHG emissions of the proposed project alone would not cause a direct physical change in the environment. According to CAPCOA, "GHG impacts are exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective. (CAPCOA 2008)" It is global GHG emissions in their aggregate that contribute to climate change, not any single source of GHG emissions alone. The impact analysis of the project's GHG emissions and consistency with existing plans and policies related to GHG emissions provided above for the proposed project serves as a cumulative impact analysis. Therefore, as discussed above, the proposed project would be consistent with applicable plans, policies or regulations adopted for the purpose of reducing GHG emissions and the proposed project would not generate GHG emissions that would have a significant impact on the environment. As such, the proposed project would result in a less than cumulatively considerable impact related to applicable GHG emissions and GHG reduction plans and policies and cumulative impacts would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

3.7.4 References

Anderegg, William R. L., J.W. Prall, J. Harold, S.H., Schneider, 2010. Expert Credibility in Climate Change, Proceedings of the National Academy of Sciences of the United States of America. 2010; 107:12107–12109.

Cal-Adapt. 2020. *Exploring California's Climate Change Research*. Available at http://cal-adapt.org. Accessed October 2020.

California Air Pollution Officers Association (CAPCOA). 2008. *CEQA & Climate change: Evaluating and Addressing Greenhous Gas Emissions from Projects Subject to the California Environmental Quality Act*, January. Available at http://capcoa.org/wp-content/uploads/downloads/2010/05/CAPCOA-White-Paper.pdf. Accessed June 2020.

CAPCOA. 2017. California Emissions Estimator Model. Available at http://caleemod.com/. Accessed June 2020.

CARB. 2008. *Climate Change Scoping Plan*, December. Available at https://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm. Accessed June 2020.

CARB. 2014. *First Update to the Climate Change Scoping Plan*, May. Available at https://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm. Accessed June 2020.

CARB. 2016. *Southern California Association of Governments' (SCAG) 2016 Sustainable Communities Strategy (SCS) ARB Acceptance of GHG Quantification Determination*, June. Available at https://ww3.arb.ca.gov/cc/sb375/mpo/bcag/bcag_scs_executive_order_2016.pdf. Accessed June 2020.

CARB. 2017a. *California's 2017 Climate Change Scoping Plan: The strategy for achieving California's 2030 greenhouse gas target*, November. Available at www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.

CARB. 2017b. *1990 to 2004 Inventory Data and Documentation*. Available at https://www.arb.ca.gov/cc/inventory/1990level/1990data.htm. Accessed June 2020.

CARB. 2019. *California Greenhouse Gas 2000–2017 Emissions Trends and Indicators Report*. Available at https://ww2.arb.ca.gov/ghg-inventory-data. Accessed June 2020.

California Natural Resources Agency (CNRA). 2009. *2009 California Climate Adaptation Strategy*.

CNRA. 2014. *Safeguarding California: Reducing Climate Risk, an Update to the 2009 California Climate Adaptation Strategy*, July.

CNRA. 2018. *Safeguarding California Plan: 2018 Update*. Available at https://resources.ca.gov/Initiatives/Building-Climate-Resilience. Accessed June 2020.

California Building Standards Commission (CBSC). 2010. *California 2010 Green Building Standards Code (CALGreen).* Available at https://ladbs.org/docs/default-source/publications/misc-publications/2010-ca-green-building-standards-code.pdf?sfvrsn=11. Accessed June 2020.

CBSC. 2019. *2019 California Green Building Standards Code*. Available at https://calgreenenergyservices.com/wp/wp-content/uploads/2019_california_green_code.pdf. Accessed June 2020.

Intergovernmental Panel on Climate Change (IPCC). 2007. *Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Available at https://www.ipcc.ch/assessment-report/ar4/. Accessed June 2020.

IPCC. 2014. *Climate Change 2014 Synthesis Report.* Available at http://ipcc.ch/report/ar5/syr/. Accessed June 2020.

Irvine Ranch Water District (IRWD). 2019. *Embedded Energy Plan Final Report*, December. Available at https://www.irwd.com/images/pdf/doing-business/energy-programs/1.%20Embedded%20Energy%20Plan%20-%20Final%20Report.pdf. Accessed June 2020.

South Coast Air Quality Management District (SCAQMD). 1993. *CEQA Air Quality Handbook*, November.

SCAQMD. 2008. *Draft Guidance Document – Interim CEQA Greenhouse Gas (GHG) Significance Threshold*, October. Available at http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgattachmente.pdf. Accessed June 2020.

SCAQMD. 2020. Air Quality Modeling. Available at https://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-modeling. Accessed October 2020.

Southern California Association of Governments (SCAG). 2020. *2020-2045 Regional Transportation Plan/Sustainable Communities Strategy*, May. Available at https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal-plan_0.pdf?1606001176. Accessed March 2021.

USEPA. 2020. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990–2018*. Available at https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018. Accessed June 2020.

3.8 Hazards and Hazardous Materials

This section evaluates the potential hazards and hazardous materials impacts associated with construction and operation of the proposed project. This section includes: a description of the existing hazards and hazardous materials at the proposed project site; a summary of applicable regulations related to hazards and hazardous materials; and an evaluation of the potential impacts of the proposed project related to the hazard conditions on the proposed project site and in the surrounding area, including cumulative impacts. Potential hazards from flooding associated with the construction and operation of the proposed project, including dam safety issues, are discussed in Section 3.9, *Hydrology and Water Quality*.

3.8.1 Environmental Setting

This discussion of the potential presence of hazardous materials at the proposed project site is based on the results of the sampling of lake bottom sediments provided in the *Syphon Reservoir, Dry Lakebed Geotechnical Exploration* by GEI Consultants (GEI 2016), the *Phase I Environmental Site Assessment, Syphon Canyon Dam and Reservoir* by URS Corporation (URS 2009), and a search of regulatory agency databases using the California State Water Resources Control Board (SWRCB) GeoTracker database and the California Department of Toxic Substances Control (DTSC) EnviroStor database, which are discussed further below.

Definitions

Definitions of terms used in the characterization of baseline conditions, regulatory framework, and impact analysis for hazards and hazardous materials are provided below:

- **Hazardous Material:** The term "hazardous material" can have varying definitions depending on the regulatory programs. For the purposes of this EIR, the term refers to both hazardous materials and hazardous wastes. The California Health and Safety Code Section 25501(n) defines hazardous material as: Hazardous material means any material that because of its quantity, concentrations, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, and any material that a handler or the administering agency has a reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.
- **Hazardous Waste:** A "hazardous waste" is a waste that because of its quantity, concentration, or physical, chemical, or infectious characteristic, causes or significantly contributes to an increase in mortality or illness or poses substantial or potential threats to public health or the environment (42 U.S.C. 6903(5)). Hazardous wastes are further defined under the Resource Conservation and Recovery Act (RCRA) as substances exhibiting the characteristics of ignitability, reactivity, corrosivity, or toxicity. Chemical-specific concentrations used to define whether a material is a hazardous, designated, or nonhazardous waste include Total Threshold Limit Concentrations (TTLCs), Soluble Threshold Limit Concentrations (STLCs), and Toxic Characteristic Leaching Procedure (TCLPs), listed in California Code of Regulations (CCR) Title 22, Chapter 11, Article 3, Section 66261, and are used as waste acceptance criteria for landfills. Waste materials with chemical concentrations above TTLCs, STLCs, and TCLPs

must be sent to Class I disposal facilities, may be sent to Class II disposal facilities depending on the waste material, and may not be sent to Class III disposal facilities.[1]

- **Acutely Hazardous Waste:** Waste that has been found to be fatal to humans in low doses, or is otherwise capable of causing or significantly contributing to an increase in serious irreversible, or incapacitating reversible illness (40 CFR §261.11(2)).
- **Screening Levels for Hazardous Materials in Soil, Soil Gas, or Groundwater:** The U.S. Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) and San Francisco Bay Area Regional Water Quality Control Board (RWQCB) Environmental Screening Levels (ESLs) are guidelines used to evaluate the potential risk associated with chemicals found in soil or groundwater where a release of hazardous materials has occurred. Although developed and maintained by the San Francisco Bay Area RWQCB, ESLs are used by regulatory agencies throughout the state. Screening levels have been established for both residential and commercial/industrial land uses, and for construction workers. Residential screening levels are the most restrictive. Soil with chemical concentrations below these screening levels generally would not require remediation and would be suitable for unrestricted uses if disposed of offsite.

Commercial/industrial screening levels are generally less restrictive than residential screening levels because they are based on potential worker exposure to hazardous materials in the soil (and these are generally less than residential exposures). Screening levels for construction workers are also less restrictive than for commercial/industrial workers because construction workers are only exposed to the chemical of concern during the duration of construction, while industrial workers are assumed to be exposed over a working lifetime. Chemical concentrations below these screening levels generally would not require remediation and would be suitable for unrestricted uses. In addition, there are other more specific but similar screening levels used more narrowly focused human health or ecological risk assessment considerations

Onsite Hazardous Materials

Recycled water currently is dechlorinated with sodium hypochlorite added prior to re-introduction of the stored water into IRWD's recycled water distribution system. The chemical is stored inside the existing strainer and disinfection facility onsite at the existing Syphon Reservoir. Sodium hypochlorite is not designated as acutely hazardous materials per 40 CFR §261.11(2).

Prior to the construction of the existing Syphon Reservoir, the proposed project site was in agricultural use (GEI 2016). Given the configuration of Syphon Canyon at the project site, residual agricultural chemicals, if any, would be expected to accumulate in the lake bottom sediments. Sediment samples were collected and analyzed for chlorinated herbicides, organochlorine pesticides, organophosphorus pesticides, metals, and organic compounds (GEI 2016, AECOM 2020a). Various metals were detected at concentrations below their respective RSLs and ESLs, except for arsenic. However, arsenic is a naturally occurring metal. The DTSC conducted a study of arsenic in southern California and concluded that the naturally occurring concentration of arsenic in southern California is about 12 milligrams per kilogram (mg/kg) (DTSC 2018). The reported

1 Class I disposal facilities are designed specifically for hazardous waste, as defined by CCR Title 22. Class II facilities are "designated" waste facilities and must acquire special permitting to accept designated types of hazardous materials. Class III disposal facilities are strictly for non-hazardous waste (CCR Title 23, Division 3, Chapter 15).

arsenic concentrations in the sediment samples from the proposed project site were 13, 9.5, and 11 mg/kg (GEI 2016) and 3.4 and 5.2 mg/kg (AECOM 2020a). Based on the five samples, the average detected concentration of arsenic in the lake bottom sediments is 8.42 mg/kg. Therefore, the average arsenic concentration is below the naturally occurring background level.

Herbicides and pesticides were detected at low concentrations that are several orders of magnitude below RSLs. Diesel range organic compounds were also detected at low concentrations that are several orders of magnitude below RSLs. Semi-volatile or volatile organic compounds were not detected. Based on available data, the existing Syphon Reservoir lakebed sediments do not contain metals, herbicides, pesticides, or other organic compounds, at levels that would classify them as impacted soils.

The Phase I environmental site assessment (URS 2009) for the proposed project site noted that the existing site structures, as of 2009, (i.e., strainer and disinfection facilities structures) predated the nationwide ban on the use of asbestos-containing materials (ACM) and lead-based paint (LBP) in building materials in the mid-1970s. However, IRWD replaced and upgraded the facility in 2013 to its current configuration. The 2013 building materials post-date the ban on ACM and LBP and the current facility would not contain these hazardous materials. The Phase I Environmental Site Assessment concluded that polychlorinated biphenyls (PCBs) are not present in any of the existing building materials.

Hazardous Materials Database Search

The hazardous materials database search included as part of the Phase 1 environmental site assessment indicated no Recognized Environmental Conditions[2] in connection with current site activities, and no recorded environmentally sensitive sites were observed on or immediately adjacent to the proposed project site (URS 2009).

The GeoTracker database, maintained by the SWRCB and the EnviroStor database, maintained by the DTSC, were checked for nearby hazardous materials sites. The GeoTracker database includes the following hazardous materials site lists: leaking underground storage tank (LUST) cleanup sites; spills, leaks, investigation and cleanup (SLIC) sites; permitted underground storage tank (UST) facilities; land disposal sites; military cleanup sites; and other cleanup sites. The EnviroStor database includes federal Superfund, state response, voluntary cleanup, school cleanup, and hazardous waste corrective action. The DTSC is also responsible for updating the Hazardous Waste and Substances Site List (Cortese List). The list is a planning document used by state and local agencies and developers to comply with CEQA requirements by providing location information for hazardous material release sites.

The search of the GeoTracker and EnviroStor databases identified one nearby hazardous materials site. The Frank R. Bowerman Landfill is located at 11002 Bee Canyon Access Road in unincorporated area of Orange County near Irvine, California, approximately one mile to the northeast of the project site

2 As per ASTM 1527-13, the industry standard for conducting Phase I assessments, a Recognized Environmental Condition is defined as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

(Geosyntec 2020). This landfill is an active Class III municipal waste landfill and has been in operation since 1990. The County owns the 725-acre site, where 534 acres are permitted for landfill activities. The site accepts an annual average of 8,500 tons per day of refuse with the peak daily tonnage of 11,500 tons per day. The facility is owned and operated by Orange County Waste and Recycling. There are 17 monitoring wells onsite to assess the quality of the groundwater in order to identify any release of pollutants from the landfill. The site is regulated under waste discharge requirements R8-2010-0017. Groundwater beneath the site is flowing in a south-southwest direction, which would be cross gradient to the proposed project site. In other words, groundwater from the landfill is not anticipated to flow beneath the Syphon Reservoir project site. The groundwater monitoring program indicates that there has not been a release of landfill leachate chemicals to groundwater from the landfill.

Schools

The Crean Lutheran High School Athletic Complex is located southwest and adjacent to the existing Syphon Dam. The Crean Lutheran High School is located at 12500 Sand Canyon Avenue, across Portola Parkway, about 1,300 feet (about 0.25 mile) south of the Syphon Dam. Stonegate Elementary School is located at 100 Honors, about 2,000 feet (0.37 mile) west of the Syphon Dam.

Airports

Airport Environs Land Use Plans (AELUP) exist for each of the airports in Orange County, which include John Wayne Airport, Fullerton Municipal Airport, and Joint Forces Training Base Los Alamitos. The project site is not located within any Airport Planning Areas as depicted in the AELUP (ALUC for Orange County 2005). The closest airport to the project site is John Wayne Airport, approximately 7.7 miles southwest of the proposed project site. The proposed project site is within 2 miles of the former Marine Corps Air Station (MCAS) El Toro, which was approximately 1.9 miles south of the project Site. The El Toro MCAS was decommissioned in 1999 (BRAC PMO 2017) and would not be able to affect or be affected by the proposed project.

Emergency Response

The City of Irvine Office of Emergency Management (OEM) maintains the Evacuation Plan for the City (City of Irvine 2019). The Evacuation Plan identifies Evacuation Management Zones (EMZ), which include primary evacuation routes within each zone. The proposed project site is within Zone 6A; State Route 133 to the southeast and Portola Parkway to the west are labelled as possible evacuation routes (City of Irvine 2020).

All dams under DSOD jurisdiction are required to have an Emergency Action Plan (EAP) to establish the response in the event of a failure of the dam. The current Emergency Action Plan (EAP) for the Syphon Reservoir (Stetson Engineers 2021) and has been reviewed by the California Office of Emergency Services, Dam Safety Planning Division (CalOES-DSPD), which approved of the EAP in March 2021 (CalOES-DSPD 2021). The EAP describes the existing dam and reservoir; identifies notification, communication, and response responsibilities of IRWD and impacted jurisdictions/public safety agencies; surveillance, monitoring, and response procedures; estimated inundation depths and arrival times; and training procedures. Please refer to Section 3.9, *Hydrology and Water Quality*, for additional information about the Syphon Reservoir EAP.

Wildfire

The California Department of Forestry and Fire Protection publishes Fire Hazard Severity Zone (FHSZ) maps, for both state and Local Responsibility Areas. The proposed project site is mapped as being within a Moderate FHSZ (CAL FIRE 2011). However, the surrounding area to the east is mapped as a Very High FHSZ (VHFHSZ) (CAL FIRE 2011). Please refer to Section 3.14, *Wildfire*, and Figure 3.14-1, Fire Hazard Severity Zones, for additional details.

3.8.2 Regulatory Framework

Federal

The primary federal agencies with responsibility for hazardous materials management include the U.S. Environmental Protection Agency (USEPA), U.S. Department of Labor Occupational Safety and Health Administration (Fed/OSHA), and the U.S. Department of Transportation (USDOT). Federal laws, regulations, and responsible agencies are summarized in **Table 3.8-1**.

TABLE 3.8-1
FEDERAL LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible Federal Agency	Description
Hazardous Materials Management	Community Right-to-Know Act of 1986 (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA))	Imposes requirements to ensure that hazardous materials are properly handled, used, stored, and disposed of, and to prevent or mitigate injury to human health or the environment in the event that such materials are accidentally released.
Hazardous Waste Handling	Resource Conservation and Recovery Act of 1976 (RCRA)	Under RCRA, the USEPA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste from “cradle to grave.”[a]
	Hazardous and Solid Waste Act	Amended RCRA in 1984, affirming and extending the “cradle to grave” system of regulating hazardous wastes. The amendments specifically prohibit the use of certain techniques for the disposal of some hazardous wastes.
Hazardous Materials Transportation	U.S. Department of Transportation (USDOT)	USDOT has the regulatory responsibility for the safe transportation of hazardous materials. The USDOT regulations govern all means of transportation except packages shipped by mail (49 CFR).
	U.S. Postal Service (USPS)	USPS regulations govern the transportation of hazardous materials shipped by mail.
Occupational Safety	Occupational Safety and Health Act of 1970	Fed/OSHA sets standards for safe workplaces and work practices, including the reporting of accidents and occupational injuries (29 CFR 1910).
Structural and Building Components (Lead-based paint, polychlorinated biphenyls, and asbestos)	Toxic Substances Control Act	Regulates the use and management of polychlorinated biphenyls in electrical equipment, and sets forth detailed safeguards to be followed during the disposal of such items.
	USEPA	The USEPA monitors and regulates hazardous materials used in structural and building components and their effects on human health.

NOTES:
[a] “Cradle-to-grave” is used by the USEPA in this context to mean that it (the USEPA) regulates hazardous waste from its generation to its disposal (USEPA 2017).

State and local agencies often have either parallel or more stringent rules than federal agencies. In most cases, state law mirrors or overlaps federal law and enforcement of these laws is the responsibility of the state or of a local agency to which enforcement powers are delegated. For these reasons, the requirements of the law and its enforcement are discussed under either the state or local agency section.

State

The primary state agencies with responsibility for hazardous materials management in the region include the DTSC and the RWQCB within the California Environmental Protection Agency (Cal EPA), California Occupational Safety and Health Administration (Cal/OSHA), California Department of Health Services (CDHS), California Highway Patrol (CHP), and the California Department of Transportation (Caltrans). State laws, regulations, and responsible agencies are summarized in **Table 3.8-2**.

TABLE 3.8-2
STATE LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible State Agency	Description
Hazardous Materials Management	Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program); CUPA (Health and Safety Code Sections 25404 et seq.)	In January 1996, Cal EPA adopted regulations, which implemented a Unified Program at the local level. The agency responsible for implementation of the Unified Program is called the Certified Unified Program Agency (CUPA), which for the Orange County, is the Orange County Environmental Health Division (OCEHD). The following programs are consolidated under the unified program: • Hazardous Materials Release Response Plans, and Inventory (also referred to as Hazardous Materials Business Plans) • California Accidental Release Program (CalARP) • Underground Storage Tanks • Aboveground Petroleum Storage Spill Prevention Control and Countermeasures • Hazardous Waste Generation and Onsite Treatment • Uniform Fire Code Plan and Inventory Requirements
	State Hazardous Waste and Substances List (“Cortese List”); DTSC, RWQCB, SC EHD.	The oversight of hazardous materials sites often involves several different agencies that may have overlapping authority and jurisdiction. For the onsite hazardous materials cases and issues, the RWQCB is the lead agency. Other cases may be overseen by the DTSC, the RWQCB, Orange County, or other agencies.
Hazardous Waste Handling	California Hazardous Materials Release Response Plan and Inventory Law of 1985; CUPA	The California Hazardous Materials Release Response Plan and Inventory Law of 1985 (Business Plan Act) requires that businesses that store hazardous materials onsite prepare a Hazardous Materials Business Plan (HMBP) and submit it to the local CUPA, which in this case is the OCEHD.

TABLE 3.8-2
STATE LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible State Agency	Description
	California Hazardous Waste Control Act; DTSC	Under the California Hazardous Waste Control Act, California Health and Safety Code, Division 20, Chapter 6.5, Article 2, Section 25100, et seq., DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste in California. The hazardous waste regulations establish criteria for identifying, packaging, and labeling hazardous wastes; dictate the management of hazardous waste; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills. DTSC is also the administering agency for the California Hazardous Substance Account Act. California Health and Safety Code, Division 20, Chapter 6.8, Sections 25300 et seq., also known as the State Superfund law, providing for the investigation and remediation of hazardous substances pursuant to State law.
	California Fire Code	The California Fire Code regulates the storage and handling of hazardous materials, including the requirement for secondary containment, separation of incompatible materials, and preparation of spill response procedures.
Hazardous Materials Transportation	Titles 13, 22, and 26 of the California Code of Regulations	Regulates the transportation of hazardous waste originating in and passing through the state, including requirements for shipping, containers, and labeling.
	CHP and Caltrans	These two state agencies are primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies.
Workplace Safety	Cal/OSHA	Cal/OSHA has primary responsibility for developing and enforcing workplace safety regulations in California. Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Title 29 of the Code of Federal Regulations (CFR). Cal/OSHA standards are generally more stringent than federal regulations.
	Cal/OSHA regulations (Title 8 CCR)	Concerning the use of hazardous materials in the workplace require employee safety training, safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation.
Construction Storm Water General Permit (Construction General Permit; Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ)	RWQCB	Dischargers whose project disturbs one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one of more acres, are required to obtain coverage under the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit; Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ). Construction activity subject to this permit includes clearing, grading, grubbing, and other disturbances to the ground such as excavation and stockpiling, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of a facility. The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific Best Management Practices (BMPs) designed to prevent sediment and pollutants from contacting stormwater from moving offsite into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area.

TABLE 3.8-2
STATE LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible State Agency	Description
Underground Infrastructure	California Code of Regulations Sections 4216–4216.9	Sections 4216–4216.9 "Protection of Underground Infrastructure" requires an excavator to contact a regional notification center (e.g., Underground Services Alert or Dig Alert) at least two days prior to excavation of any subsurface installations. Any utility provider seeking to begin a project that could damage underground infrastructure can call Underground Service Alert, the regional notification center for southern California. Underground Service Alert will notify the utilities that may have buried lines within 1,000 feet of the project. Representatives of the utilities are then notified and are required to mark the specific location of their facilities within the work area prior to the start of project activities in the area.

Local

County of Orange

General Plan, Safety Element

General Goals and Objectives – Public Safety

Goal 1: Provide for a safe living and working environment consistent with available resources.

Objective 1.1: To identify public safety hazards and determine the relative threat to people and property in Orange County

Goal 2: Minimize the effects of public safety hazards through implementation of appropriate regulations and standards which maximize protection of life and property.

Objective 2.1: To create and maintain plans and programs which mitigate the effects of public safety hazards.

Objective 2.2: To encourage the development and utilization of technologies that minimize the effects of public safety hazards.

General Goals and Objectives - Wildfire

Goal 1: Provide a safe living environment, ensuring adequate fire protection facilities and resources to prevent and minimize the loss of life and property fire.

Policy 2: To establish improved development standards for location of new construction, structural design, emergency vehicular access, and detection hardware.

Policy 3: To improve building code regulations to provide increased built-in fire protection.

Policy 5: To continue to improve the minimum water system design requirements for fire protection.

Policy 9: To encourage improvement of fire defense systems in hazardous areas.

Implementation Measures:

Hazardous Materials Services: Orange County enacted the Hazardous Material Disclosure Ordinance after the 1985 Fricker Chemical Fire, which was followed by state and federal law, requiring companies to disclose the hazardous materials they used and stored. Information from the disclosure and business plan program is provided to both emergency responders during hazardous materials incidents and the public upon request, and is used for regional emergency planning. The Orange County Fire Authority (OCFA) targets the greatest frequency and more in-depth inspection efforts to the highest hazard occupancies, to insure compliance with codes and recommended Best Management Practices (BMPs).

California Accidental Release Program (CalARP): CalARP is intended to result in an increased level of safety for the public and environment surrounding facilities using certain highly toxic and flammable materials. It is also intended to increase the level of communication among hazardous materials uses, the public, and emergency responders.

City of Irvine

General Plan, Safety Element

Objective J-1: Hazard Occurrence. Identify actions that the City, in concert with other jurisdictions, must take to reduce the probability of hazard occurrence.

Policy (c): Establish criteria for land development in hillside areas with emphasis on fire retardant materials, minimization of exposure risk to wildfire and adjacent structure fires, provision on access for firefighting personnel and equipment, and removal of combustible vegetation.

Objective J-2: Disaster Response. Identify actions that the City, in conjunction with other jurisdictions, must take to reduce the severity of disasters.

Policy (b): Ensure that each development will have adequate emergency ingress and egress.

Policy (d): Continue to maintain and implement the City of Irvine Emergency Plan

3.8.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from CEQA Guidelines Appendix G are used as thresholds of significance to determine the impacts of the proposed project as related to hazards and hazardous materials. The proposed project would have a significant impact if it would:

1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials; or create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
2. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.

3. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment.
4. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area.
5. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
6. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.
7. Result in cumulatively considerable impacts to hazardous materials and wildfire.

Methodology

Information for this assessment of impacts relative to hazards and hazardous materials is based on a review of literature research (e.g., fire severity zone maps provided by CAL FIRE), the DTSC EnviroStor database, SWRCB's GeoTracker database, the Cortese List, and the General Plans for the County of Orange and the City of Irvine. This information was used to identify potential impacts to workers, the public, or the environment.

The proposed project would be regulated by the various laws, regulations, and policies summarized in Section 3.8.2, *Regulatory Framework*. Compliance by the proposed project with applicable federal, state, and local laws and regulations is assumed in this analysis, and local and state agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Note that compliance with many of the regulations is a condition of permit approval.

A significant impact would occur if, after considering the features described in Chapter 2, Project Description, and the required compliance with regulatory requirements, an impact would still occur. For those impacts considered to be potentially significant, mitigation measures are proposed to reduce the identified impacts.

Impact Analysis

Hazardous Materials

Impact 3.8-1: The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, disposal, or the accidental release of hazardous materials.

Construction

During the demolition and new construction phases, construction equipment and materials may include fuels, oils and lubricants, solvents and cleaners, cements and adhesives, paints and thinners, degreasers, cement and concrete, and asphalt mixtures, which are all commonly used in construction. The proposed project site currently stores water treatment chemicals (sodium hypochlorite) that would be temporarily stored offsite while the new proposed treatment facility is constructed. The routine use or an accidental spill of hazardous construction-related materials could result in inadvertent releases, which could adversely affect construction workers, the public, and the environment, resulting in a potentially significant impact.

Construction activities would be required to comply with numerous hazardous materials regulations designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, and to reduce the potential for a release of construction-related fuels or other hazardous materials into the environment. Contractors would be required to prepare and implement Hazardous Materials Business Plans (HMBPs) that would require that hazardous materials used for construction would be used properly and stored in appropriate containers with secondary containment to contain a potential release. The California Fire Code would also require measures for the safe storage and handling of hazardous materials.

As discussed in Section 3.6, *Geology and Soils*, construction contractors would be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) for construction activities according to the National Pollutant Discharge Elimination System (NPDES) General Construction Permit requirements. The SWPPP would list the hazardous materials proposed for use during construction; describe spill prevention measures, equipment inspections, equipment and fuel storage; protocols for responding immediately to spills; and describe BMPs for controlling site runoff.

In addition, the transportation of hazardous materials would be regulated by the USDOT, Caltrans, and the CHP. Together, federal and state agencies determine driver-training requirements, load labeling procedures, and container specifications designed to minimize the risk of accidental release.

Workers handling hazardous materials are required to adhere to OSHA and Cal/OSHA health and safety requirements. Hazardous materials must be transported to and from the proposed project area in accordance with RCRA and USDOT regulations, managed in accordance with the OCEHD regulations, and disposed of in accordance with RCRA and the CCR at a facility that is permitted to accept the waste. Since compliance with existing hazardous materials regulations and programs are mandatory, the proposed project's construction activities are not expected to create a potentially significant hazard to construction workers, the public, or the environment.

Finally, in the event of a spill that releases hazardous materials at the proposed project site, a coordinated response would occur at the federal, state, and local levels, including the OCFA, which is the local hazardous materials response team. In the event of a hazardous materials spill, the OCFA and local police department would be simultaneously notified and sent to the scene to assess and respond to the situation.

As discussed in Section 3.8.1, *Environmental Setting*, the chemical testing of onsite lake bottom sediments indicated no residual agricultural chemicals at concentrations above regulatory standards. Given that that primary location for the accumulation of pesticides, herbicides, and metals would be the lake bottom sediments, the surrounding alluvium and bedrock materials that would be used to provide materials to construct the new proposed dam are not expected to have residual agricultural chemicals at concentrations above regulatory standards.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials during construction of the proposed project would limit the potential for creation of hazardous conditions due to the routine use or accidental release of hazardous materials. The impact to the public and the environment would be less than significant.

Operation

As discussed in Section 2.4.3, *Treatment Facilities*, recycled water would be dechlorinated with sodium bisulfite prior to entering the reservoir for storage. Approximately 11,000 gallons of sodium bisulfite would be stored onsite and proposed metering pumps would be used to facilitate the dechlorination process. Sodium bisulfite would be stored within two tanks inside a new proposed building adjacent to the proposed filtration facility. A proposed masonry block wall building would house the storage tanks, metering pumps, and control system and would also serve as secondary containment system for the tanks. Spill containment pads would be located within the proposed facility. The proposed treatment facility would add sodium hypochlorite prior to re-introduction into IRWD's recycled water distribution system, similar to existing operations at the reservoir. The hypochlorite system would pump metered sodium hypochlorite to achieve an approximate 5-part-per-million chlorine residual in the recycled water. Approximately 17,000 gallons of sodium hypochlorite would be stored onsite and metering pumps would be used to facilitate the chlorination process. Sodium hypochlorite would be stored within two tanks inside the same building as the dechlorination system, either of which would incorporate secondary containment into the structure. The routine use or an accidental spill of hazardous materials could result in inadvertent releases, which could adversely affect workers, the public, and the environment and result in a potentially significant impact**.**

As required by the State's Hazardous Materials Management Program, IRWD, as the operator of the proposed facility would be required to prepare and submit a HMBP to the OCEHD, the local CUPA for the facility prior to the start of operations. The HMBP is required to include information on hazardous material handling and storage, including site layout, storage in appropriate containers with secondary containment to contain a potential release, and emergency response and notification procedures in the event of a spill or release. In addition, the plan requires annual employee health and safety training. The plan must be approved by the CUPA prior to commencement of project construction, and the proposed project would be subject to post-construction compliance inspections. The HMBP would also provide the OCEHD and OCFA emergency response personnel with the information they need to plan appropriately for a chemical release, fire, or other incident, which would reduce the potential for an accidental release to cause harmful health effects to workers or the public or substantial degradation to soil or water quality. All hazardous materials are required to be stored and handled according to manufacturer's directions and local, state and federal regulations. The California Fire Code would also require measures for the safe storage and handling of hazardous materials, including secondary containment.

Transportation and/or disposal of sodium bisulfite, sodium hypochlorite, and wastes, such as spent cleaning solutions, would also be subject to regulations for the safe handling, transportation, and disposal that would include appropriate containerization and labeling, transportation by licensed hazardous materials haulers, and disposal at licensed facilities permitted to accept the waste.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials during operation of the proposed project would limit the potential for creation of hazardous conditions due to the routine use or accidental release of hazardous materials. The impact to the public and the environment would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Hazardous Materials near Schools

Impact 3.8-2: The proposed project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.

Construction

Construction of the proposed project would require the short-term use of various hazardous materials, as discussed above in Impact 3.8-1. The transport of the hazardous materials could use haul routes that pass by schools, particularly the Crean Lutheran High School Athletic Complex, located just below the dam. In addition, the Crean Lutheran High School is located at 12500 Sand Canyon Avenue, across Portola Parkway, about 1,300 feet (about 0.25 mile) south of the Syphon Dam. During the demolition and new construction phases at the proposed project site, construction equipment and materials may include fuels, oils and lubricants, solvents and cleaners, cements and adhesives, paints and thinners, degreasers, cement and concrete, and asphalt mixtures, which are all commonly used in construction. The construction materials, which are not considered acutely hazardous, would be transported, used, and disposed of during construction. In addition, the proposed site currently stores water treatment chemicals (specifically sodium bisulfite and sodium hypochlorite) that would be temporarily transported and stored offsite while the new proposed treatment facilities are constructed. The routine use or an accidental spill of hazardous materials could result in inadvertent releases in proximity to nearby schools, which could adversely affect students, staff, and the general public.

As described above under Impact 3.8-1*,* construction activities would be required to comply with numerous hazardous materials regulations designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, and to reduce the potential for a release of construction-related fuels or other hazardous materials into the environment, including in proximity to schools.

In addition, as described in Section 2.4.4, *Access and Maintenance Roads*, a new proposed access road will be constructed into the project site starting from the intersection of Portola Parkway and Sand Canyon Avenue before any other proposed project component. Consequently, no construction or operational traffic would access the site through the Athletic Complex, which is currently how IRWD accesses the project site.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials during operation of the proposed project would reduce the potential risks to schools within 0.25 miles of the project site, related to emitting and handling hazardous substances; the impact would be less than significant.

Operation

The operation of the project would result in the routine use and transport of some hazardous materials associated with water treatment (specifically sodium bisulfite and sodium hypochlorite). As described above under Impact 3.8-1, the use of water treatment chemicals would be regulated under the HMBP, as well as various other regulations, that would be required for the operation of the proposed facility. In addition, the chemicals would be stored within containers that are themselves within secondary containment.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials during operation of the proposed project would reduce the impact to schools within one-quarter mile of the project site to less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Hazardous Material Site Listing

Impact 3.8-3: The proposed project would not be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment.

Construction and Operation

The proposed project site is not included on a list of hazardous materials sites (Cortese List) complied pursuant to Government Code Section 65962.5; therefore, there would be no impact.

Mitigation Measures

None required

Significance Determination

No Impact

Safety Hazards Near Airport

Impact 3.8-4: The proposed project is not located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport; the proposed project would not result in a safety hazard or excessive noise for people residing or working in the project area.

Construction and Operation

The proposed project site is outside of the Airport Planning Areas for the operational airports in Orange County. The project site is located within 2 miles of the former El Toro MCAS; however, the former El Toro MCAS was decommissioned in 1999, is not operational and is not a public airport or public use airport. Therefore, the proposed project construction and operation would not result in an airport-related safety hazard or airport-related noise for people residing or working in the area. There would be no impact.

Mitigation Measures

None required

Significance Determination

No Impact

Emergency Response Plan

Impact 3.8-5: The proposed project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Construction

The Evacuation Plan for the City of Irvine indicates the proposed project site is bounded by two evacuation routes: Portola Parkway to the west and SR-133 to the southeast. Construction of the proposed project involves intersection improvements at the Portola Parkway/Sand Canyon Avenue intersection. All other project construction would be located onsite and not on public rights-of-ways. The proposed project would modify the existing intersection and associated traffic lights to allow construction access through the intersection directly into the proposed project site. Cross walks and associated pedestrian signals would also be modified to facilitate safe pedestrian crossing in all directions. All proposed modifications would be implemented in accordance with the City of Irvine requirements, including traffic control to ensure emergency access is maintained on both rights-of-ways. The intersection modification would not involve closure of any roadways; however, temporary lane closures could be required, for example to allow for restriping of lanes or creating the curb cut and entrance to the proposed access road. As explained in Section 3.12, *Transportation*, to ensure that impacts related to the circulation system do not occur as a result of the proposed project, IRWD would implement **Mitigation Measure TRA-1**, which would require the preparation and implementation of a Traffic Control Plan. The Traffic Control Plan would include, but not be limited to, signage, striping, delineated detours, flagging operations, changeable message signs, delineators, arrow boards, and K-Rails that would be used during construction to guide motorists, bicyclists, and pedestrians safely through the proposed construction area and allow for adequate emergency access and circulation to the satisfaction of the City of Irvine. The Traffic Control Plan would be coordinated with the City of Irvine, as necessary, as well as with emergency responders, which include fire departments, police departments, and ambulances that have jurisdiction within the proposed project area. Therefore, with implementation of Mitigation Measure TRA-1, impacts to circulation system during the initial intersection improvement phase of the proposed project would be reduced to a less than significant level, and project construction would not impair or physically interfere with emergency response teams or an evacuation plan. Impacts would be less than significant with mitigation.

Operation

Operation and maintenance activities for the proposed project would be substantially similar to current conditions respective to emergency response and evacuation. No operation-related activities would occur within surrounding rights-of-ways or along evacuation routes. Once the proposed improvements at Portola Parkway/Sand Canyon Avenue intersection are complete, site access for operation and maintenance vehicles would be through the intersection into IRWD property. The proposed project would not impair implementation of or physically interfere with the City of Irvine Evacuation Plan. As a result, no impact would occur.

As discussed in Section 3.8.1, *Environmental Setting, Emergency Response*, all dams under DSOD jurisdiction are required to have an Emergency Action Plan (EAP) to establish the response in the event of a failure of the dam. The Syphon Reservoir EAP describes the existing dam and reservoir; identifies notification, communication, and response responsibilities of IRWD and impacted jurisdictions/public safety agencies; surveillance, monitoring, and response procedures; estimated inundation depths and arrival times; and training procedures. Implementation of the proposed project would require an update to the Syphon Reservoir EAP and approval of the updated EAP by DSOD. Please refer to Section 3.9, *Hydrology and Water Quality*, for a more detailed discussion of the Syphon Reservoir EAP.

Mitigation Measures

> Implement Mitigation Measure TRA-1: Traffic Control Plan (see Section 3.12, *Transportation*, for details)

Significance Determination

Less than Significant Impact with Mitigation

Wildland Fires

Impact 3.8-6: The proposed project could expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.

Construction

As discussed in Section 3.8.1, *Environmental Setting*, the proposed project site is located within a State Responsibility Area, Moderate Fire Hazard Severity Zone (FHSZ) and is adjacent to areas mapped as a Very High FHSZ. As discussed in Impact 3.14-2 in Section 3.14, *Wildfire*, the proposed project site includes slopes surrounding the existing reservoir that are susceptible to prevailing winds. Brush and grassland habitats within the proposed project site are highly flammable. The primary fire hazards from project construction would involve the use of vehicles and equipment. Heat or sparks from construction vehicles and equipment could ignite dry vegetation and cause a fire, particularly during the dry, hot conditions from June to September and from September to December when dry, Santa Ana winds are more likely to occur. Additionally, construction activities that could result in sparks have a greater likelihood of creating a source of ignition. Therefore, depending on the time of year (as seasonality may affect climate conditions, prevailing winds, and vegetation/fuels) and the location of construction activities, the increase in sources of potential ignition associated with project construction could exacerbate the risk of wildfire at the project site and in the surrounding area. Project construction could increase the risk of exposure of people or structures to significant loss, injury, or death involving wildland fires, which would result in a potentially significant impact.

As explained for Impact 3.14-2 in Section 3.14, *Wildfire*, all personnel on the proposed project site would have to comply with Public Resources Code (PRC) Sections 4427, 4428, 4431, and 4442, which include regulations relating to the handling of combustible fuels and equipment that can exacerbate fire risks. During construction, strict adherence to these PRC sections would ensure that contractors are responsible for all monitoring and safety measures ensuring that any risk to exacerbate wildfire would be reduced. Additionally, all construction must comply with fire protection and prevention requirements specified by the California Code of Regulations (CCR) and Cal/OSHA. This includes various measures such as easy accessibility of firefighting equipment, proper storage of combustible liquids, no smoking in service and refueling areas, and worker training for firefighter extinguisher use. Furthermore, implementation of **Mitigation Measure WDF-1** would be required to ensure fire hazard reduction measures are implemented during proposed project activities to further reduce the potential for wildfire impacts on project workers. As a result, the potential impact would be reduced to a less than significant level with mitigation.

Operation

Operation of the proposed project would not include any activities that would exacerbate wildfire risk relative to existing conditions. The proposed project site would continue to operate as a recycled water storage reservoir. The proposed project would only require periodic maintenance. The new proposed filtration and disinfection facilities would require monthly or bi-monthly chemical deliveries, similar to existing conditions. IRWD Operations and Maintenance staff would continue to conduct daily safety and security checks of the site, similar to existing conditions. There would be a less than significant impact due to wildland fires during operation of the proposed project.

As discussed above, the proposed project site includes slopes susceptible to prevailing winds, and brush and grassland habitats within the project site are highly flammable. The proposed project would involve expansion of the existing reservoir which would result in increased water storage capacity and water levels. This would effectively create more inundated area and fewer steep slopes susceptible to prevailing winds within the proposed project area in winter and spring months when the reservoir is full. The reduction of flammable surface area within the Moderate FHSZ could prevent or reduce uncontrolled spread of wildfire. As the reservoir is drawn down in the summer months to satisfy recycled water needs in IRWD's service area, the surface area susceptible to wildfire risk would increase. However, the flammable vegetation removed during construction would continue to be absent within the limits of the high water elevation, reducing the risk of wildfire. Operation-related activities would involve a limited number of maintenance trucks for inspections and material delivery. These trucks would be limited to established access roads and would have a low potential of producing sparks, fire, or flame that could result in uncontrolled spread of wildfire. Nevertheless, due to the site topography and wildfire risk, operators of the project site would comply with PRC Sections 4427, 4428, 4431, and 4442, which include regulations relating to the handling of combustible fuels and equipment that can exacerbate fire risks, and IRWD would require implementation of Mitigation Measure WDF-1. As a result, impacts would be reduced to a less than significant level with mitigation.

Mitigation Measure

Implement Mitigation Measure WDF-1: Fire Hazard Reduction Measures (see Section 3.14, *Wildfire*, for details)

Significance Determination

Less than Significant Impact with Mitigation

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts relative to hazards and hazardous materials. As previously discussed, the proposed project would have no impact with respect to being located on a hazardous materials site listed on Government Code Section 65962.5 or being located within two miles of an airport. Accordingly, the proposed project could not contribute to cumulative impacts related to these topics and are not discussed further.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative hazardous materials impacts encompasses and is limited to the proposed project site and its immediately adjacent area. This is because impacts relative to hazardous materials are generally site-specific and depend on the nature and extent of the hazardous materials release, and existing and future soil and groundwater conditions. For example, hazardous materials incidents tend to be limited to a smaller more localized area surrounding the immediate spill location and extent of the release, and could only be cumulative if two or more hazardous materials releases spatially overlapped.

The timeframe during which the proposed project could contribute to cumulative hazards and hazardous materials effects includes both the construction and operations phases. For the proposed project, the operations phase is permanent. However, similar to the geographic limitations discussed above, it should be noted that impacts relative to hazardous materials are generally time-specific. Hazardous materials events could only be cumulative if two or more hazardous materials releases occurred at the same time, as well as overlapping at the same location.

Impact 3.8-7: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative short-term and long-term impacts to hazards, hazardous materials, and wildfires.

Cumulative Impacts during Project Construction

Significant cumulative impacts related to hazards and hazardous materials could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more cumulative projects identified in Table 3-1, Related Projects for Cumulative Analysis, to substantially increase risk that people or the environment would be exposed to hazards and hazardous materials. The only cumulative projects that could be geographically adjacent or overlap components of the proposed project would be cumulative project Number 3, Gateway Community Park, and Number 9, Truck Route Roadway Rehabilitation, shown on Figure 3-1, Cumulative Project Locations. Cumulative project Number 3 would involve the construction of a new community park adjacent to the north side of the proposed project. Cumulative project Number 9 would involve the rehabilitation and paving of streets including Portola Parkway just west of the proposed project.

Cumulative projects would be subject to the same regulatory requirements discussed for the proposed project, including the implementation of HMBPs and compliance with existing regulations for the transport, use, storage, and disposal of hazardous materials. That is, cumulative projects involving releases of or encountering hazardous materials also would be required to manage their hazardous materials to the same established regulatory standards and, in the case of spills or accidents, remediate their respective sites to the same established regulatory standards.

This would be the case regardless of the number, frequency, or size of the release(s), or the residual amount of chemicals present in the soil from previous spills. While it is possible that the proposed project and cumulative projects could result in releases of hazardous materials at the same time and in overlapping locations, the responsible party associated with each spill would be required to remediate site conditions to the same established regulatory standards. The residual less-than-significant effects of the proposed project that would remain after remediation would not combine with the potential residual effects of cumulative projects to cause a potential significant cumulative impact because residual impacts would be highly site-specific.

Accordingly, no significant cumulative impact with respect to the use or release of hazardous materials would result. For the above reasons, the combined effects of the construction of the proposed project in combination with cumulative projects would not have a cumulatively considerable contribution to a cumulative impact relative to the use of hazardous materials.

The construction of the cumulative projects could require the temporary closure of traffic lanes, which could impact emergency access. Similar to the proposed project, other cumulative construction projects would be required to provide appropriate traffic control and emergency access for their projects similar to Mitigation Measure TRA-1. Implementation of traffic control plans would reduce the cumulatively considerable contribution to a cumulative impact relative to emergency access.

Finally, cumulative projects in areas susceptible to wildfires would also be required to implement wildfire prevention measures to prevent wildfire, such as the proposed project's Mitigation Measure WDF-1. For the above reasons, the combined effects of the proposed project and cumulative projects would not result in a cumulatively considerable effect, and impacts would be less than significant.

Cumulative Impacts during Project Operations

Significant cumulative impacts related to operational hazards could occur if the incremental impacts of the proposed project combined with those of one or more of the cumulative projects to cause a substantial increase in risk that people or the environment would be exposed to hazardous materials used or encountered during the operations phase.

The only cumulative projects that could be geographically adjacent or overlap components of the proposed project would be cumulative project Number 3, Gateway Community Park, and Number 9, Truck Route Roadway Rehabilitation, shown on Figure 3-1. Cumulative project Number 3 would involve the construction of a new community park adjacent to the north side of the proposed project. Once constructed, the community park may use fertilizers, pesticides, and/or herbicides, a change from existing conditions. Cumulative project Number 9 would involve the rehabilitation and paving of streets including Portola Parkway just west of the proposed project. Once constructed, the roadway rehabilitation project would not result in an increase of the use of hazardous materials during operations and is not considered further.

Similar to the proposed project, the cumulative project activities involving the handling, storage, and disposal of hazardous materials would be required to prepare and implement an HMBP and comply with applicable regulations, including those governing the use, storage, transportation, and disposal of hazardous materials, including emergency response and notification procedures in the event of a spill or release. Specifically, the use of pesticides for cumulative project Number 3 would be required to comply with regulations enforced by the California Department of Pesticide Regulation, which regulates the sale, use, and disposal of pesticides within California. Transportation and disposal of wastes, such as spent cleaning solutions (for the proposed project) or spent pesticides (for cumulative project Number 3) would also be subject to regulations for the safe handling, transportation, and disposal of chemicals and wastes. As noted previously, such regulations include standards to which parties responsible for hazardous materials releases must return spill sites, regardless of location, frequency, or size of release, or existing background contaminant concentrations to their original conditions. Compliance with existing regulations regarding hazardous materials use would reduce the risk of environmental or human exposure to such materials would reduce the cumulatively considerable contribution to a cumulative impact relative to hazardous materials.

Finally, cumulative projects in areas susceptible to wildfires would also be required to implement wildfire prevention measures to prevent wildfire, such as the proposed project's Mitigation Measure WDF-1, which would require all spark arrestors on construction equipment to be in good working order, and all vehicles and crews to have access to functional fire extinguishers at all times. With compliance with existing regulations and implementation of mitigation measures to require spark arrestors and fire extinguishers, the combined effects of the proposed project and cumulative projects would not result in a cumulatively considerable effect, and impacts would be less than significant relative to wildfires.

Mitigation Measures

Implement Mitigation Measure TRA-1: Traffic Control Plan (see Section 3.12, *Transportation*, for details)

Implement Mitigation Measure WDF-1: Fire Hazard Reduction Measures (see Section 3.14, *Wildfire*, for details)

Significance Determination

Less than Significant Impact with Mitigation

3.8.4 References

AECOM. 2020a. *Existing Lakebed Sediment Environmental Sampling Results, Irvine Ranch Water District, Syphon Reservoir Improvement Project, IRWD Project 03808*, April 21.

Airport Land Use Commission (ALUC) for Orange County. 2005. *Airport Planning Areas, Figure 1*, July 21.

Base Realignment and Closure Program Management Office (BRAC PMO). 2017. *Former Marine Corps Air Station El Toro Base Summary*, March.

CAL FIRE. 2011. Very High Fire Hazard Severity Zones in LRA, Orange County, October.

California Office of Emergency Services, (CalOES). 2021. *Emergency Action Plan – Approval Syphon Canyon Dam, No. 1029.004, Orange County*. March 5.

City of Irvine. 2019. City of Irvine Annex VIII Evacuation Plan, September.

City of Irvine. 2020. *Irvine Evacuation Zones*.

Department of Toxic Substances Control (DTSC). 2018. *Determination of a Southern California Regional Background Arsenic Concentration in Soil*, January.

GEI. 2016. *Syphon Reservoir, Dry Lakebed Geotechnical Exploration*, June 13.

Geosyntec. 2020. *Semi-Annual Water Quality Monitoring Report (October 2019 – March 2020), Frank R. Bowerman Landfill, Orange County, California*, April 30.

Stetson Engineers. 2021. *Emergency Action Plan (EAP) for Syphon Canyon Dam, 6301 Portola Parkway, Irvine, CA 92620, Orange County*, February 5.

URS. 2009. *Phase I Environmental Site Assessment, Syphon Canyon Dam and Reservoir, Irvine, California 92618*, December 9.

3.9 Hydrology and Water Quality

This section evaluates the potential hydrology and water quality impacts associated with construction and operation of the proposed project. This section includes a description of the existing hydrologic conditions in and around the proposed project site; a summary of applicable regulations related to hydrology and water quality; and an evaluation of the potential impacts of the proposed project related to hydrology in and around the project site, including cumulative impacts.

To inform the project design, the investigations listed below have been conducted to investigate site conditions and identify potential hydrological issues and provide recommendations to address those issues. The information provided in the listed reports are the primary source of information for this section.

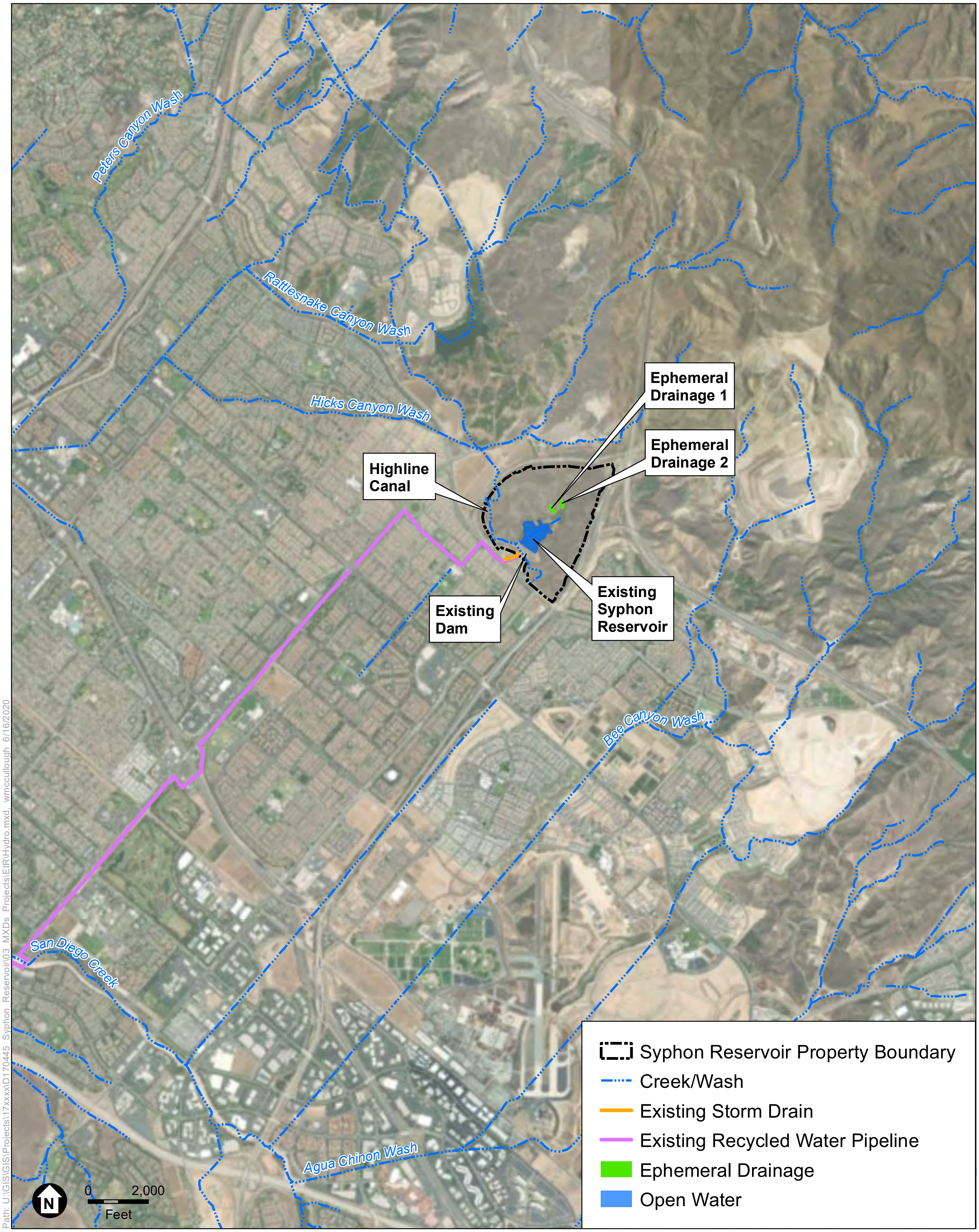
- Environmental Science Associates (ESA). 2018. *Syphon Reservoir Improvement Project Jurisdictional Delineation Report*, July.
- GEI. 2012. *Syphon Reservoir Expansion, Engineering Feasibility Study, Engineering Summary Report*, August.
- HDR. 2019. *Supplemental Spillway and Outlet Design Layout Evaluations, Syphon Reservoir Improvement Project.* July, 17.
- Stetson. 2018. *Technical Memorandum – Inundation Modeling for Syphon Canyon Dam Enlargement*, December 2018.

3.9.1 Environmental Setting

Regional and Local Hydrology

IRWD's Syphon Reservoir is located northeast of Portola Parkway, between Bee Canyon Access Road and State Route 133 in unincorporated Orange County, just east of the Irvine city limits. The existing Syphon Reservoir is an enclosed water body located in the bowl-shaped Syphon Canyon, at the foothills of the Santa Ana Mountains, between Bee Canyon to the north and Hicks Canyon south of the site. The Syphon Reservoir is located within the lower Santa Ana Basin, whose surface waters include the San Diego Creek Drainage and its tributaries including Rattlesnake Canyon Wash, Peters Canyon Wash, Hicks Canyon Wash, Bee Canyon Wash, and two ephemeral[1] drainages in the vicinity of the project site, as depicted on **Figure 3.9-1**. San Diego Creek and its tributaries drain into Newport Bay at the Pacific Ocean about 11.5 miles southwest of Syphon Reservoir. Land uses surrounding the proposed project site generally consist of open space (including lands under conservation plans), agriculture, residential, and the Crean Lutheran High School Athletic Complex, located immediately north of Portola Parkway and southwest of the existing dam. With the exception of the Highline Canal, which would be abandoned with the project, and two unnamed ephemeral drainages, no surface streams flow in the Syphon Canyon.

[1] Ephemeral drainages only flow for short periods of time in direct reaction to rainfall. Intermittent or seasonal drainages flow for weeks to months of the year when it receives ample runoff water from the surrounding watershed, springs, groundwater discharge, or melting snow.



SOURCE: ESA, 2020; ESRI, 2020; NHD, 2020

Syphon Reservoir Improvement Project

Figure 3.9-1
Surface Waters and Drainages in the Vicinity of Syphon Reservoir

ESA

Site Drainage and Topography

The Syphon Canyon tributary basin to the existing reservoir encompasses about 204 acres or 0.32 square miles. The topography in Syphon Canyon surrounding the existing reservoir is hilly with ridges and terraced slopes. Ground surface elevations range from 675 above mean sea level (amsl, based on North American Vertical Datum of 1988 [NAVD88]) at the northwest corner of the drainage basin to 319 amsl at Portola Parkway just downstream of the existing dam. The drainage basin has been historically used for agriculture, consisting of citrus orchards on the hillsides and field crops in the valley. Drainage from the existing reservoir occurs through an outlet works, which serves the dual purpose of low level outlet for recycled water distribution, and for emergency drawdown per the California Department of Water Resources, Division of Safety of Dams (DSOD) criteria. The DSOD is the state agency with jurisdiction over the design, construction, and safety of dams. The existing spillway was constructed for emergency purposes but has never been used during its 62-year history, including during IRWD's ownership and operation of the existing Syphon Reservoir (GEI 2012).

Storm water falling on the area southwest of the existing dam and outside of the catchment area of the reservoir flows into an existing concrete-lined channel that runs parallel to Portola Parkway on the north side of the roadway and discharges into an existing 7-foot high by 10-foot wide concerte box culvert (see **Figure 3.9-2**).

Syphon Reservoir is a constructed reservoir with wetland features, not considered to be waters of the United States (ESA 2018). Generally speaking, Syphon Reservoir is a "closed system," meaning that the facility, used to store tertiary-treated recycled water, is contained and managed in a manner discrete from the watershed, within which it is located. Although the project proposes to expand the capacity of the current reservoir, no modifications to offsite conveyance infrastructure would be required as part of the proposed project. Under normal operating conditions all flow out of Syphon Reservoir is conveyed back to Eastwood Recycled Water Pump Station through an existing 36-inch recycled water pipeline. The exception to this involves periodic storm flows from the area southwest of the dam and outside of the reservoir catchment area, which are collected through an existing concrete channel and discharged to the existing Portola Parkway stormdrain through an existing concrete box culvert depicted in Figure 3.9-2.

Surface Water

As previously discussed, the proposed project site is an artificially constructed reservoir and thus has no naturally occurring surface water flow. As discussed in Section 3.3.1, *RWQCB Wetlands and Waters of the State*, the proposed project site is considered to have some areas along the edges of the existing reservoir that are considered to be Waters of the State due to the presence of established but artificial (i.e., man-made) wetlands. The state regulates artificially constructed wetlands if the wetland is specifically identified in a Basin Plan as a wetland or other Waters of the State. A review of the Basin Plan indicates that the Syphon Reservoir is designated as a Water of the State (SARWQCB 2019). Therefore, the RWQCB could regulate the project activities under Porter-Cologne Water Quality Control Act.

D170445.00

SOURCE: HDR, 2019

Syphon Reservoir Improvement Project

Figure 3.9-2
Portola Parkway Storm Drain

ESA

Groundwater

The project overlies the Irvine subbasin at the eastern fringes of the Coastal Plain of Orange County Groundwater Basin, which is identified by the California Department of Water Resources (DWR) under the Sustainable Groundwater Management Act (SGMA) as a medium-priority basin (DWR, 2018). SGMA is discussed further under Section 3.9.2, *Regulatory Framework, Sustainable Groundwater Management Act*. Subsurface inflow from the foothills into the Irvine subbasin provides an estimated 14,000 acre feet per year of groundwater recharge into the greater Orange County Groundwater Basin (OCWD, 2017). As noted in the Water Quality Control Plan for the Santa Ana Region (Basin Plan), beneficial uses for this groundwater basin include municipal and domestic supply, agricultural supply, industrial services supply, and industrial process supply (Santa Ana RWQCB, 2019). One of the geotechnical analyses completed for the proposed project determined that groundwater levels below the project site range from 3 feet below ground surface (bgs) at the toe of the existing dam, to 44 feet bgs at the embankment (GEI 2012).

Water Quality

As discussed in Section 2.2, *Project Purpose and Need*, the expansion of Syphon Reservoir would assist in meeting projected demands within the service area by allowing the storage of additional recycled water produced at the Michelson WRP during periods of low demand (winter months) for use during periods of high demand (summer months). The recycled water is used to maintain community landscaping, as well as agricultural, business and industrial uses, such as cooling tower applications and toilet flushing in dual-plumbed commercial buildings. The existing water quality of the recycled water produced from the Michelson WRP as described by total dissolved solids (TDS) averaged 663 milligrams per liter (mg/l) from 2010 to 2019 (IRWD, 2021). The concentrations of TDS in IRWD's recycled water is limited to 720 mg/l under its permit from the Regional Water Quality Control Board (RWQCB).

Flood Hazards

Flood hazards in an urban environment are influenced by development patterns, as storm events contribute to rapid runoff over impervious surfaces and can flood local drainages. In addition, flood hazards can occur due to emergency releases from dams that lead to local or regional inundation. The existing Syphon Reservoir is in Zone A, which is a special flood hazard area without base flood elevation.[2] However, given that the existing reservoir is within a closed basin (i.e., the reservoir basin is closed off by the dam), the Syphon Reservoir would not be considered to be at risk from flooding due to a 100-year storm event. Lands surrounding the existing reservoir are in Zone X, defined by FEMA as an area of minimal flood hazard (FEMA 2009). Issues with flood hazards associated with the proposed project are related to dam safety and inundation areas, as described in more detail below.

[2] Zone A means that FEMA has determined that the area may be subject to a 100-year flood event but has not prepared a detailed hydraulic analysis to quantify the base flood elevation or potential flood depth.

Dam Safety

The DSOD refers to the Syphon Reservoir as the Syphon Canyon Reservoir. The existing Syphon Dam is a homogeneous earthen embankment with observed seepage at the downstream toe of the dam (GEI 2012). The surface area of Syphon Reservoir is approximately 28 acres. The holding capacity is 578 acre feet of water at the spillway crest elevation of 380.4 feet (Stetson 2018). The existing reservoir is under the jurisdiction of the DSOD, which requires preparation of inundation maps, for areas downstream of dams that could be subject to flooding in the event of a dam failure, as discussed further in Section 3.9.2, *Regulatory Framework*.

DSOD hazard potential classifications are based on Federal guidelines published by the Federal Emergency Management Agency (FEMA). FEMA recommends a three-step rating system that defines low, significant, and high hazard potential classifications, determined from factors including potential loss of life, economic loss, and environmental damage resulting from a *hypothetical* dam failure scenario. DSOD further subdivides FEMA's High classification to an Extremely High classification in order to identify dams upstream of highly populated areas or extensive development dams with short evacuation waiting times. When the population within the inundation area consists of 1,000 persons or more, the dam is generally assigned an "Extremely High" risk classification (IRWD 2020). The mapped inundation area for the existing Syphon Reservoir is provided in **Figure 3.9-3** (Stetson 2018). As depicted on the figure, under existing conditions, the potential area of inundation extends into residential Irvine before reaching defined channels downstream, such as Peters Canyon Wash and San Diego Creek. The area downstream of Syphon Dam is highly populated, thus the downstream hazard for the existing Syphon Reservoir is classified by DSOD as extremely high (DWR 2019a). Note that the cited maximum depths at each cross section in Figure 3.9-3 are determined by existing topography and typically occur near the centerline of the designated flood area; the depths would decrease to zero at the edges of the designated area.

Tsunami and Seiche Hazards

Tsunamis are ocean waves generated by vertical movement of the sea floor, normally associated with earthquakes or volcanic eruptions. Seiches are oscillations of enclosed or semi-enclosed bodies of water that result from seismic events, wind stress, volcanic eruptions, underwater landslides, and local basin reflections of tsunamis. The proposed project site is not located in a coastal area subject to tsunamis (Cal OES, 2019). Seiches due to seismic and wind-driven wave activity have potential to occur within the Syphon Reservoir.

SOURCE: Stetson, 2018

Syphon Reservoir Improvement Project

Figure 3.9-3
Existing Reservoir Inundation Area

ESA

This page intentionally left blank

3.9.2 Regulatory Framework

Federal

Clean Water Act

The Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA) was enacted in 1948, and expanded in 1972 as a basic structure for regulating discharges of pollutants into the waters of the United States and regulating water quality standards for surface waters (USEPA 2019). The United States Environmental Protection Agency (USEPA) is the federal agency responsible for water quality management pursuant to the CWA. The purpose of the CWA is to protect and maintain the quality and integrity of the Nation's waters by requiring states to develop and implement state water plans and policies. The relevant sections of the CWA are summarized below.

CWA Section 402: National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) permit program under Section 402 of the CWA is one of the primary mechanisms for controlling water pollution through the regulation of sources that discharge pollutants into waters of the United States. USEPA has delegated authority of issuing NPDES permits in California to the State Water Resources Control Board (SWRCB), which has nine Regional Water Quality Control Boards (RWQCBs). The Santa Ana RWQCB regulates water quality in the proposed project area. The NPDES permit program is discussed in detail below under State Regulations.

National Flood Insurance Program

FEMA determines flood elevations and floodplain boundaries based on U.S. Army Corps of Engineers' studies. FEMA also distributes the Flood Insurance Rate Maps (FIRM) used in the National Flood Insurance Program. FIRMs identify the locations of special flood hazard areas, including 100-year floodplains. The proposed project site is located in an identified FIRM flood hazard area (FEMA 2009) as described above in Section 3.9.1, *Environmental Setting, Flood Hazards*. The existing Syphon Reservoir is in Zone A, which is a special flood hazard area without base flood elevation.[3] However, given that the existing reservoir is within a closed basin (i.e., the reservoir basin is closed off by the dam), the Syphon Reservoir would not be considered to be at risk from flooding due to a 100-year storm event. Lands surrounding the existing reservoir are in Zone X, defined by FEMA as an area of minimal flood hazard, which is the lowest possible rating for flood risk (FEMA 2009). Therefore, the federal government does not require flood insurance for any properties due to Syphon Reservoir in its current or proposed form.

Federal Guidelines for Dam Safety and Emergency Action Planning

The Water Resources Development Act of 1996 (Public Law 104-303), directed the FEMA to establish a National Dam Safety Program and formally established the National Dam Safety

[3] Zone A means that FEMA has determined that the area may be subject to a 100-year flood event but has not prepared a detailed hydraulic analysis to quantify the base flood elevation or potential flood depth.

Review Board and the Interagency Committee on Dam Safety as its authorized permanent advisory body. Through this Act, FEMA developed guidelines for dam owners to improve conditions for preparedness for foreseeable emergencies. The guidelines are intended to encourage development of comprehensive and consistent emergency action planning to protect lives and reduce property damage and involve participation of emergency management authorities and dam owners in emergency action planning (FEMA 2013). Emergency action plans (developed for a given dam location) outline actions to be taken to alleviate dam problems, and outline responsibilities and procedures for warning/notification, and notably, the development of inundation maps to identify critical infrastructure and at-risk population sites that may require protective measures, warning, and evacuation planning.

State

California Department of Water Resources, Division of Safety of Dams

The DSOD, through Division 3 of the California Water Code, is entrusted with regulatory authority and oversight for dam safety. The DSOD provides oversight of the design, construction, and maintenance of over 1,200 jurisdictional sized dams in California. Jurisdictional dams are dams that are more than 6 feet high and impound 50 acre-feet or more of water, or 25 feet or higher and impound more than 15 acre-feet of water. The jurisdictional height of a dam, as determined by DSOD, is the vertical distance measured from the lowest point at the downstream toe of the dam to its maximum storage elevation, which is typically the spillway crest. The Syphon Reservoir is considered a jurisdictional dam. The DSOD ensures dam safety by:

- Reviewing and approving dam enlargements, repairs, alterations, and removals to ensure that the dam appurtenant structures are designed to meet minimum requirements.
- Performing independent analyses to understand the performance of the dam and appurtenant structures. These analyses can include structural, hydrologic, hydraulic, and geotechnical evaluations.
- Overseeing construction to ensure work is being done in accordance with the approved plans and specifications.
- Inspecting each dam on an annual basis to ensure it is safe, performing as intended, and is not developing issues. Roughly 1/3 of these inspections include in-depth instrumentation reviews of the dam surveillance network data.
- Periodically reviewing the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California.

The California Office of Emergency Services Dam Safety Program was enhanced though passage of SB 92 (2017). The bill required preparation of Emergency Action Plans (EAPs) (except for dams designated as low-hazard) and brings inundation mapping under the jurisdiction of the California DWR. This legislation set forth additional provisions for EAPs including compliance requirements, exercises of the plan and coordination with local public safety agencies.

EAPs are written documents that identify potential emergency conditions at a dam and specify pre-planned actions to help minimize property damage and loss of life should these conditions occur. EAPs contain procedures and information that instruct dam owners to issue early warning and notification messages to downstream emergency management authorities. EAPs also provide assistance and guidance to local jurisdictions on their emergency planning for a dam failure event to ensure effective dam incident emergency response procedures and planning. SB 92 also requires EAPs be updated (at minimum) every 10 years or when there are significant changes at the dam, its critical appurtenant structures, or downstream hazard classification (DWR 2019b).

Consistent with Federal Guidelines for Dam Safety, IRWD prepared an EAP for Syphon Reservoir (Stetson Engineers 2021). The EAP was reviewed by the California Office of Emergency Services, Dam Safety Planning Division (CalOES-DSPD), which approved the EAP in March 2021 (CalOES-DSPD 2021). In addition, the City of Irvine Police Department, as the primary public safety agency for the Syphon Reservoir EAP, has reviewed and approved the emergency notification processes and procedures described in the EAP (IRWD 2020c). The Syphon Reservoir EAP would be required to be updated and recirculated for agency review and comment in the event of approval of the proposed project.

The Syphon Reservoir EAP describes the existing dam and reservoir; identifies notification, communication, and response responsibilities of IRWD and impacted jurisdictions/public safety agencies; surveillance, monitoring, and response procedures; estimated inundation depths and arrival times; and training procedures. Although highly improbable, in the event of a potential and imminent dam failure, the observer of the potential failure would immediately contact IRWD’s 24-hour operations stand-by number and 911. IRWD would then notify the City of Irvine Police Department, and together they would immediately begin emergency response actions, as well as further notifications to other police departments, fire departments, public works, schools, Caltrans, and other responsible entities, all of whom would implement further notifications and evacuations, as appropriate. Concurrently, IRWD would begin emergency drawdown of the reservoir through the storm drain system, and implement appropriate stabilization actions. In parallel, IRWD would initiate the sequential notification of the DWR Flood Operations Center, CalOES Warning Center, and the DSOD. All of these entities have pre-established response actions designed to rapidly drain the reservoir to the nearby storm drain system, stabilize the dam and reservoir, and minimize impacts to the downstream areas.

California Fish and Game Code Section 1602

Pursuant to Division 2, Chapter 6, Section 1602 of the state Fish and Game Code, CDFW regulates diversion obstructions, or alterations to the natural flow or bed, channel, or bank of any river, stream or lake which supports fish or wildlife. According to the Syphon Reservoir Jurisdictional Delineation, there are waters of the state on the project site that could be subject to CDFW jurisdiction including Syphon Reservoir, wetland and riparian vegetation and two ephemeral drainages, which drain into the existing reservoir (ESA 2018). Therefore, the proposed project would be required to apply for a Lake and Streambed Alteration Agreement through CDFW.

Construction General Permit

The *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ; Construction General Permit) regulates discharges of pollutants in stormwater associated with construction activity to waters of the U.S. from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than 1 acre of land surface. As previously discussed, the proposed project site does not have waters of the U.S. However, during construction of the new proposed dam, stormwater falling on the project site could become runoff that could flow downslope to the City of Irvine and possibly affect offsite waters of the U.S. if not properly controlled. The Construction General Permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground projects, including the installation of water pipelines and other utility lines.

The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific best management practices (BMPs) designed to prevent pollutants from contacting stormwater and keep all products of erosion from moving off site into receiving waters. The SWPPP BMPs are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all BMPs is required under the provisions of the Construction General Permit. The Construction General Permit is discussed in more detail in Section 3.6, *Geology and Soils*.

NPDES Municipal Separate Storm Sewer System Permit (MS4)

In 1987, amendments to the Clean Water Act expanded the NPDES permit program to regulate discharges from storm drains owned and operated by municipalities, such as the County of Orange and the City of Irvine.[4] In November 1990, USEPA published regulations that established application requirements for stormwater permits for municipal stormwater discharges. In California, the NPDES stormwater permit program is administered and enforced by the SWRCB through the nine RWQCBs by issuing Waste Discharge Requirements and NPDES permits. These permits are reissued approximately every five years and also include applicable provisions of the state Porter-Cologne Act, which is the principal legislation for controlling stormwater pollutants in California. The permit establishes regulations covering discharge prohibitions, receiving water limitations, municipal operations, new development, construction site controls (construction site runoff), and other regulations to regulate surface water quality.

The discharge prohibitions prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses. The municipal operations regulations include a number of requirements to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure, such as the proposed project. The

4 The project site is located within the County of Orange. Stormwater from the project site drains into the City of Irvine.

requirements include source control, site design, and stormwater treatment requirements, such as minimizing disturbance of natural infiltration areas and the addition of impervious surfaces, controlling and directing runoff, and the use of infiltration and bioretention measures, among other measures. The MS4 Permit for the proposed project area is discussed further below in the section on local regulations.

Groundwater Dewatering Permit for the Santa Ana Region

Discharge of groundwater would require coverage under the General Discharge Permit for Discharges to Surface Waters of Groundwater resulting from Groundwater Dewatering Operations and/or Groundwater Cleanup Activities at Sites within the San Diego Creek/ Newport Bay Watershed Polluted by Petroleum Hydrocarbons, Solvents, Metals, and/or Salts (Dewatering Permit for Santa Ana Region). It is anticipated that if groundwater were to be encountered during the proposed project's excavation, groundwater would be dewatered and conveyed to proposed onsite settling ponds or discharged to the existing storm drain, if necessary, pursuant to the conditions and requirements in Order Number: R8-2007-041; NPDES Number: CAG918002 (Santa Ana RWQCB 2009).

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA) of 2014, effective January 1, 2015, authorizes local agencies to manage groundwater in a sustainable manner and allows limited state intervention when necessary to protect groundwater resources.

The SGMA defined "sustainable groundwater management"; established a framework for local agencies to develop plans and implement strategies to sustainably manage groundwater resources; prioritized the basins with conditions of overdraft (ranked as high and medium priority); and set a 20-year timeline for implementation. Basins were initially prioritized under the SGMA by the California Department of Water Resources in 2014 under the California Statewide Groundwater Elevation Monitoring Program.

The proposed project site is within the Coastal Plain of Orange County Groundwater Basin (Basin 8-1), designated as a medium priority basin due to the heavy reliance of the basin's groundwater as a source of drinking water supply (OCWD 2017). The Groundwater Sustainability Agencies for this basin (collectively) include Orange County Water District, IRWD and the City of La Habra. Together the three agencies ("Submitting Agencies") submitted an Alternative to a Groundwater Sustainability Plan (GSP), or the "Basin 8-1 Alternative," which is "functionally equivalent" to a GSP for management of groundwater resources in the basin. Under SGMA, the Basin 8-1 Alternative should demonstrate how water managers have already achieved or will achieve sustainable groundwater management of the basin. An alternative, per Water Code Section 10733.6 (b), may be: an existing groundwater management plan; groundwater management pursuant to an adjudication; or, as in the case of the Basin 8-1 Alternative, an analysis of basin conditions that demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years.

Local

Santa Ana Water Quality Control Plan

The proposed project site is located within the region under the jurisdiction of the Santa Ana RWQCB, which establishes regulatory standards and objectives for water quality in the region in the *Water Quality Control Plan, Santa Ana River Basin*, commonly referred to as the Basin Plan. The Basin Plan identifies existing and potential beneficial uses for surface water and groundwater and provides numerical and narrative water quality objectives designed to protect those uses. Syphon Reservoir, spelled as Siphon Reservoir in the Basin Plan, has the following surface water beneficial uses:

> AGR - Agricultural Supply waters are used for farming, horticulture or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing.
>
> REC1 - Water Contact Recreation (Primary Contact Recreation) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing and use of natural hot springs. Note that although the Syphon Reservoir is listed with a REC1 beneficial use, IRWD does not permit primary contact recreation because the reservoir waters are used for water supply.
>
> REC2 - Non-contact Water Recreation (Secondary Contact Recreation) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing and aesthetic enjoyment in conjunction with the above activities.
>
> WARM - Warm Freshwater Habitat waters support warmwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish and wildlife, including invertebrates.
>
> WILD - Wildlife Habitat waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife.
>
> RARE - Rare, Threatened or Endangered Species waters support the habitats necessary for the survival and successful maintenance of plant or animal species designated under state or federal law as rare, threatened or endangered.

As previously discussed, the proposed project site is an artificially constructed reservoir and thus has no naturally occurring surface water flow. As discussed in Section 3.3.1, *RWQCB Wetlands and Waters of the State*, the proposed project site is considered to have some areas along the edges of the reservoir that are considered to be Waters of the State due to the presence of established but artificial (i.e., man-made) wetlands. The state regulates artificially constructed wetlands if the wetland is specifically identified in a Basin Plan as a wetland or other water of the State. A review of the Basin Plan indicates that the Syphon Reservoir is designated as a Water of the State (SARWQCB 2019). Therefore, the RWQCB could regulate the proposed project activities under Porter-Cologne Water Quality Control Act.

As discussed above in Section 3.9.1, *Environmental Setting, Groundwater*, the proposed project site overlies the Irvine subbasin at the eastern fringes of the Coastal Plain of Orange County Groundwater Basin. Beneficial uses identified in the Basin Plan for this groundwater basin include the following:

> MUN - Municipal and Domestic Supply waters are used for community, military, municipal or individual water supply systems. These uses may include, but are not limited to, drinking water supply.
>
> AGR - Agricultural Supply waters are used for farming, horticulture or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing.
>
> IND - Industrial Service Supply waters are used for industrial activities that do not depend primarily on water quality. These uses may include, but are not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection and oil well repressurization.
>
> PROC - Industrial Process Supply waters are used for industrial activities that depend primarily on water quality. These uses may include, but are not limited to, process water supply and all uses of water related to product manufacture or food preparation.

Orange County Municipal Storm Water Permit [MS4]

The Orange County Municipal Storm Water Permit (MS4) applies to the proposed project (Municipal NPDES Permit No. CAS 618030, Order No. R8-2009-0030 - NPDES Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region, Areawide Urban Storm Water Runoff, Orange County). The NPDES municipal general permits issued by the RWQCB establish regulations covering discharge prohibitions, receiving water limitations, municipal operations (such as the proposed project), new development, construction site controls (construction site runoff), and other regulations to regulate surface water quality (RWQCB 2009). The discharge prohibitions prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses and includes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards. The receiving water limitations provide narrative and numeric water quality standards. The municipal operations regulations include a number of requirements to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure. The requirements include source control, site design, and stormwater treatment requirements, such as minimizing disturbance of natural infiltration areas and the addition of impervious surfaces, controlling and directing runoff, and the use of infiltration and bioretention measures, among other measures. To more efficiently address the requirements, the permittees within the County of Orange, which includes the City of Irvine, developed the Drainage Area Management Plan (DAMP), described below. The MS4 permit applies to the proposed project because (1) the area downgradient (west) of the dam would drain stormwater to the County of Orange.

Drainage Area Management Plan (DAMP)

The DAMP is a programmatic document developed and enforced by the Permittees (which includes the County of Orange and the City of Irvine) and approved by the Santa Ana RWQCB that translates the MS4 Permit requirements into Permittee programs and implementation plans (Orange County 2007). The DAMP is used by the Permittees in the development of their Local Implementation Plans (LIPs), individual ordinances, plans, policies and procedures to manage urban runoff.

Relative to the proposed project, the DAMP would require that the project control sediment and other pollutants from entering the municipal stormwater system. The DAMP describes best management practices (BMPs) in their Model Water Quality Management Plan (WQMP) for Source Control, Site Design, and Treatment Control BMPs that should be considered to guide the design and implementation of the BMPs, with further details provided in DAMP Appendix A-7, and briefly summarized below.

Structural Source Control BMPs are low-technology practices designed to prevent pollutants from contacting stormwater runoff or to prevent discharge of contaminated runoff to the storm drainage system. Site-specific Structural Source Control BMPs include designing and constructing outdoor material and waste storage areas to reduce pollution introduction; use of efficient irrigation systems and landscape design, water conservation, smart controllers, and source control; and protection of slopes and channels and providing energy dissipation measures.

Site Design BMPs aim to minimize impervious areas, maximize permeable areas, minimize directly connected impervious areas, create reduced or zero discharge areas (runoff volume reduction), and conserve natural areas. BMPs include infiltration swales, detection basins, and vegetation. Site Design BMPs reduce direct runoff and increase infiltration onsite, reducing the transport mechanism for moving pollutants offsite.

Treatment Control BMPs are engineered technologies designed to remove pollutants from stormwater runoff. Treatment Control BMPs depend on the type of pollutants in the stormwater runoff, volume or flow of stormwater runoff to be treated, project site conditions, receiving water conditions, and General Industrial Permit requirements, when applicable. Treatment Control BMPs include vegetated strips and swales, dry or wet detention basins, constructed wetlands, detention basins/sand filters, porous pavement, porous landscape, infiltration basins and trenches, media filter, and other proprietary control measures.

County of Orange

General Plan, Resources and Land Use Elements

The following goals and policies from the Resources Element of the Orange County General Plan are relevant to the proposed project's consideration of water resources (Orange County, 2005).

> **Goal 1:** Ensure an adequate dependable supply of water of acceptable quality for all reasonable uses.
>
> **Policies**
>
> **1. Water Supply:** To ensure the adequacy of water supply necessary to serve existing and future development as defined by the General Plan.
>
> **2. Conservation:** To reduce per capita and total water consumption through conservation and reclamation programs and the support of new technologies.
>
> **3. Groundwater Resources:** To support groundwater management efforts that are conducted by County water agencies.
>
> **4. Shortage Planning:** To ensure that Orange County will not be severely impaired by any potential future water shortages.
>
> **5. Water Quality:** Protect and improve water quality through continued management, enforcement, and reporting requirements.
>
> Encourage an integrated water resources approach for stormwater management that considers water supply, water quality, flood control, open space, and native habitats.
>
> Promote coordination between the County, cities, and other stakeholders in the identification and implementation of watershed protection and Low Impact Development (LID) principles.
>
> Consider implementation of LID principles to conserve natural features (trees, wetlands, streams, etc.), hydrology, drainage patterns, topography, and soils.
>
> Encourage the creation, restoration, and preservation of riparian corridors, wetlands, and buffer zones. Continue to educate the public about protecting water resources.

The following policies from the Land Use Element of the Orange County General Plan (as updated in 2015) establish a framework for managing urban and stormwater runoff (Orange County 2015).

> Encourage, support and require all new development and redevelopment projects to identify opportunities for implementation of Low Impact Development (LID) principles in the early stages of the development planning process.

Promote, support, and require innovative site planning and development techniques that allow for implementation of LID principles while taking into consideration specific hydrology and geology conditions.

Encourage, support and require the use of LID as art of an overall strategy to mitigate stormwater impacts from new development and redevelopment projects consistent with current NPDES permit requirements.

Encourage and support, where applicable, the use of buffer zones to protect natural water bodies, including but not limited to, wetlands and riparian corridors. Where infeasible, require other measures to protect natural water bodies.

City of Irvine

General Plan, Conservation and Open Space Element

Objective L-12: Water. Coordinate land planning efforts with the appropriate federal, state, and local agencies, and landowners to encourage the integration of existing and future water sources (reservoirs, lakes, and drainage courses) into development (City of Irvine, 2015).

General Plan, Safety Element

Goal: Minimize the danger to life and property from manmade and natural hazards, including fire hazards, flood hazards, on-seismic geologic hazards, and air hazards.

City of Irvine Municipal Code Control of Stormwater/ Urban Runoff

Irvine Municipal Code Section 6-8-303 contains requirements for control of stormwater and urban runoff including submittal of a Water Quality Management Plan (WQMP) for priority development projects. The WQMP shall be undertaken in accordance with a drainage area management plan; the City (of Irvine's) local implementation plan; and any conditions and requirements established by the community development department reasonably related to the reduction or elimination of pollutants in runoff from the project site. Specific requirements for litter control, implementation of BMPs, and provisions for construction site inspection shall be incorporated into the WQMP.

3.9.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from CEQA Guidelines Appendix G are used as thresholds of significance to determine the impacts of the proposed project as related to hydrology and water quality. The proposed project would have a significant impact if it would:

1. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.
2. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
   a) Result in substantial erosion or siltation on- or off-site;
   b) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;
   c) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
   d) Impede or redirect flood flows.
4. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.
5. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.
6. Result in a cumulatively considerable impact to hydrology and water quality.

Methodology

The environmental analysis of potential impacts to hydrology and water quality is based on a review of regional literature and water resources data and the site-specific geotechnical investigation, including dam safety and inundation analysis, the feasibility study, design reports and constructability analysis prepared for the proposed project.

The analysis assumes that the proposed project would comply with the various laws and regulations pertaining to water quality, dam safety, and others described in Section 3.9.2, *Regulatory Framework*. For example, as the project would disturb more than one acre, compliance with the Construction General Permit would be required along with implementation of BMPs and conditions of a SWPPP to limit impacts during construction.

Following consideration of the proposed project, as described in the Project Description, and the project's assumed implementation and compliance with regulatory requirements, this impact analysis evaluates whether a significant impact would occur based on the CEQA Appendix G thresholds of significance outlined herein. For potential impacts considered to be significant, mitigation is proposed to reduce the severity of such impacts to less than significant levels.

Impact Analysis

Water Quality

Impact 3.9-1: The proposed project would not violate water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.

Construction

Implementation of the proposed project would include construction of access roads, clearing of vegetation and other ground disturbing activities to expand the reservoir and construct the proposed dam, such as trenching, disking, grading and excavation of more than 2 million cubic yards of soil, most of which would be used to re-contour the site. These proposed construction-related activities would result in large stockpiles of soils, and would require the use of hazardous materials that could be mobilized and transported off site by stormwater run-off (nonpoint-source pollution), potentially degrading the water quality of surface waters such as Peter's Canyon Wash and San Diego Creek (as receiving waters via the Portola Parkway storm drain) and the groundwater in Basin 8-1 during construction.

In the absence of planned management for stormwater runoff, soil-disturbing activities, such as excavation and site clearing, could result in erosion of soils from exposed ground surfaces and the migration of soil and sediment in stormwater run-on and run-off to downstream water bodies and storm drains. As part of the proposed project, lined stormwater runoff settling basins would be constructed to contain runoff and stormwater during construction. The proposed settling basins would collect sediment-laden water in the event of a storm; the collection would remove the erosive energy of the flowing water, thus preventing erosion. The basins would then allow the sediment to settle at the bottom of the basin, rather than flowing offsite, which would prevent contaminants, in this case sediment, from leaving the site in stormwater runoff and degrading surface or groundwater quality in the areas west of the project site.

Construction of the proposed project requires maintenance of stockpiled spoils, which could migrate off site during precipitation events and increase sedimentation in downstream receiving water bodies. In addition, fuels, oils and lubricants, and other hazardous materials associated with construction equipment also could adversely affect water quality if spilled or stored improperly and transported offsite by stormwater runoff or allowed to percolate into the underlying groundwater basin. Because the proposed project's construction would disturb more than 1 acre, compliance with the General Construction Permit and development of a SWPPP would be required.

As discussed in Section 3.6, *Geology and Soils*, the Construction General Permit will require the preparation of a SWPPP. Settling basins would be constructed to collect any stormwater runoff from the site during construction and would be one of the BMPs described in and required by the Construction General Permit and its SWPPP. In addition, the SWPPP would require specific BMPs designed to prevent sediment and pollutants from contacting stormwater and from moving offsite into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management and good housekeeping, and are intended to protect surface water quality by preventing the offsite migration of eroded soil and construction-related pollutants from the construction area. As previously discussed, settling basins would be constructed and would be one of the BMPs. In addition, the SWPPP would include typical construction BMPs such as scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, and vehicle and equipment washing and fueling.

Dewatered groundwater would be discharged in a manner consistent with the terms of the Groundwater Discharge Permit for the Santa Ana Region. Adherence to the terms of the applicable NPDES permits would ensure that water quality violations would not occur as conditions in the discharge permits, a SWPPP, and BMPs would be implemented to ensure that there would not be a resulting degradation of surface or ground water quality. With compliance with existing regulations, impacts relative to water quality during construction would be less than significant.

Operation

As described in Section 2.4.2, *Reservoir Enlargement*, a proposed seepage control system would be installed and implemented to regulate discharges, effectively intercepting recycled water, while routing seepage into an internal seepage collection system. The seepage control system would consist of a steeply inclined chimney drain and gently sloping blanket drain, which would be installed at a low point at the downstream toe of the new proposed dam to prevent erosion in the embankment area and ensure slope stability. The seepage control system would prevent erosion, which would prevent sediment-laden water from flowing offsite and impacting the water quality of receiving waters to the west.

During reservoir operations, water would be discharged in the event of an emergency into the existing Portola Parkway storm drain through a dissipation channel to allow for controlled discharge. This controlled discharge would be into the existing storm drain system at a rate within the storm drain's capacity per the IRWD Emergency Action Plan as required by the DSOD. With controlled discharge, there would be no uncontrolled erosion that could result in sediment-laden water entering receiving waters west of the proposed project.

Stormwater falling on the west side of the new proposed dam would be routed into the municipal stormwater system and therefore would be required to comply with the MS4 and DAMP requirements discussed in Section 3.9.2, *Regulatory Framework, Local, MS4 and DAMP*. In addition, in the event of an emergency drawdown of water in the new proposed reservoir, some of the new reservoir's water would be routed to the municipal stormwater system and would be required to comply with MS4 and DAMP requirements. MS4 and DAMP BMPs would include Structural Source Control BMPs (e.g., contained outdoor material and waste storage areas; efficient irrigation systems; and protection of slopes), Site Design BMPs (e.g., minimize impervious areas, maximize permeable areas, minimize directly connected impervious areas, create reduced or zero discharge areas (runoff volume reduction), and conserve natural areas), and Treatment Control BMPs (e.g., vegetated strips and swales, dry or wet detention basins, constructed wetlands, detention basins/sand filters, porous pavement, porous landscape, infiltration basins and trenches, media filter, and other proprietary control measures). These BMPs would control the release of sediment and other pollutants into the municipal stormwater system.

The creation of additional storage space for recycled water at Syphon Reservoir would result in changing the composition of recycled water supplied by IRWD to users within their service area (IRWD 2021). The volume of recycled water used within the service area would increase, which would in turn enable IRWD to reduce the volume of water imported from outside of the service area. As a result, there would be an increase in the amount of recycled water available to dual-plumbed commercial buildings for toilet flushing and cooling towers. Since the sewage from toilet flushing and cooling towers returns as influent to the Michelson WRP, the proposed project could affect the TDS concentrations in the recycled water produced at the Michelson WRP. To evaluate this impact to recycled water quality, IRWD conducted a mass balance analysis of its recycled water supply to estimate the change in TDS loading produced by the Michelson WRP as a result of the proposed project. The TDS concentration of recycled water produced by the Michelson WRP is a complex, interdependent result of flow and TDS loads contributed to and discharged from the Michelson WRP's sewer-sheds. Rather than evaluate these complex processes that can change by day, seasons, and year, the analysis used a simple mass balance to estimate the impact of a change in TDS loading on the TDS load produced by the Michelson WRP.

The mass balance analysis indicated that the increased use of recycled water in dual-plumbed buildings and cooling towers is expected to increase TDS concentration from the average of 663 mg/l (as measured from 2010 to 2019) by 1.6 mg/l for a total TDS concentration of 665 mg/l. This is considered a less than significant increase because it is still well below the permit limitation of 720 mg/l TDS.

The proposed project would comply with existing water quality regulations, and impacts relative to water quality during operations would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Groundwater Supplies

Impact 3.9-2: The proposed project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

Construction

During the three-year duration of construction, the existing reservoir would be empty, so there may be a temporary decrease in groundwater infiltration during this time. As noted in the geotechnical investigation for the proposed project, groundwater levels in the immediate area around the reservoir fluctuate with reservoir levels, which indicates that groundwater levels are partially supported by surface water infiltration from the reservoir under existing conditions (GEI 2012). As construction of the proposed project is anticipated to encounter groundwater during excavation of the new proposed reservoir, dewatering of this groundwater would be necessary to enable construction of the new dam. Dewatering would take place as described in Section 2.5.3, *Excavation of Material/Existing Dam and Dewatering*. As groundwater depth at the downstream toe of the existing dam is approximately three feet below the ground surface, groundwater relief trenches for dewatering would be installed in sediments and into the alluvium during excavation. The area downstream of the toe of the dam would also be dewatered. Flows from dewatering operations would be routed to the runoff settling basins proposed to be constructed for the project or discharged to the storm drain. In the event that offsite discharge would be necessary, such discharge would occur in a manner consistent with the terms of the Santa Ana Regional Groundwater Dewatering Permit, pursuant to the conditions and requirements in Order Number: R8-2007-041; NPDES Number: CAG918002. Impacts associated with construction dewatering would be negligible because the Syphon Canyon basin is a relatively small portion of the greater Orange County Coastal Plain Groundwater Basin and dewatering during construction would not have a long-term effect with respect to groundwater levels or supplies. Therefore, construction of the proposed project would not impede sustainable management of the basin, and the impact would be less than significant.

Operation

Operation of the proposed project would result in direct alteration of the landscape that would impact the site's capacity for groundwater recharge. The proposed project would expand Syphon Reservoir over a broader extent of acreage from a surface area footprint of 28 acres up to approximately 82 acres projected at the spillway crest. The existing footprint of the reservoir would continue to be a source of recharge to groundwater because the reservoir is not lined. The expanded footprint of the new proposed reservoir would also not be lined. With the saturation in the expanded reservoir area, the volume of recharge to groundwater would increase, resulting in a beneficial impact to groundwater supplies. As discussed in Section 3.9.1, *Environmental Setting*, Basin 8-1 is designated under SGMA as a medium priority basin, due to the heavy reliance of the basin's groundwater as a source of drinking water supply. The increase in the new reservoir's storage capacity under the proposed project would provide for enhanced recharge to groundwater resources, consistent with strategies for sustainable management of groundwater. Thus, relative to groundwater supplies and sustainable management of the basin, the proposed project would result in a beneficial impact.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Alteration of Drainage Patterns

Impact 3.9-3: The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation onsite or offsite; or substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite or offsite; or create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect flood flows.

Construction

The proposed project would not significantly alter the existing drainage pattern of the project site during construction. During construction of the proposed project, over 2 million cubic yards of sediment is proposed to be excavated from the project site comprised of topsoil, alluvium, colluvium, slopewash, formational materials, and materials from the existing dam. Over-excavation would occur and replacement with compacted embankment fill. Excavated materials would be processed in the stockpile areas; approximately 2.2 million cubic yards of compacted material would be reused onsite for construction of the new dam (excluding topsoil and lake bottom sediments, not suitable for embankment fill). As discussed under Impact 3.9-1, site alteration through movement of substantial quantities of soil and earth materials has the potential to result in erosion or siltation within the site during construction.

However, due to the bowl-shaped topography of the site and the project's planned settlement basins and other required BMPs, drainage within the proposed project site area east of the existing and proposed dam would continue to flow into the reservoir basin, as it does now. That water would be directed to and captured by the settlement basins, and not allowed to leave the proposed project site in an uncontrolled fashion, thus preventing impacts to drainage systems west of the proposed project site. This would prevent offsite erosion or siltation because no uncontrolled flow from the proposed project site could occur. This would also prevent any onsite or offsite flooding, and impedance or redirection of flood flows due to the project construction because all runoff would be controlled so as to not exceed the capacity of the existing drainage systems west of the project site. As discussed above in Impact 3.9-1, compliance with the state Construction General Permit would require the preparation of a SWPPP, which would describe the BMPs, including the settlement basins, required to control runoff and prevent polluted runoff. Therefore, impacts related to altering drainage patterns during construction would be less than significant.

Operation

Once constructed, the drainage pattern of the proposed project site would be substantially the same as the existing conditions. The change from existing conditions relative to drainage would be that the volume of water in the new proposed reservoir would be larger than it is now. The increase in the volume of water could have an adverse impact on the area west of the reservoir if the water were to be released at a volume that causes erosion, siltation, flooding, exceedance of drainage system capacities, or additional pollution.

Consideration of the volume of discharge to the storm water system is important for several reasons. According to the projected capacity of the expanded reservoir, per DSOD emergency release requirements, the outlet facilities must be capable of draining 2,479 AF of water in ten days, which translates to a discharge rate of 178 cfs into the storm drain system. In consultation with IRWD, a design for multiple intakes in the reservoir column would allow for flexibility in management, while meeting the emergency release criteria. IRWD has an established reservoir level monitoring program to ensure that the reservoir maintains sufficient freeboard to handle heavy storm events without overflowing into the spillway. The existing spillway was constructed for emergency purposes but has never been used during its 62-year history, including during IRWD's ownership and operation of the existing Syphon Reservoir (GEI 2012). As standard operating practice, IRWD would continue to monitor weather and lower the water levels in the new proposed reservoir in advance of an anticipated storm event to prevent overtopping the reservoir or exceeding the stormwater drainage capacity west of the reservoir.

Discharge capacity to the existing Portola Parkway storm drain was evaluated in the *Supplemental Spillway and Outlet Design Layout Evaluation*, prepared for the proposed project (HDR 2019). The existing Portola Parkway storm drain has been identified as the only means available for transferring storm flows from within the basin containing Syphon Reservoir to the local stormwater drainage system west of the dam and reservoir. This existing storm drain consists of a 10-foot by 7-foot concrete box culvert, sized to accommodate a 100-year storm with a peak flow of approximately 640 cfs. As previously noted, given that the existing reservoir is within a closed basin (i.e., the reservoir basin is closed off by the dam), the Syphon Reservoir is not considered to be at risk from flooding due to a 100-year storm event. This is largely because the drainage basin is very small and the reservoir's area makes up a large area of the tributary basin. Under normal operating procedures, where the proposed reservoir would be maintained at a minimum of 2 feet below the spillway crest elevation, the enlarged reservoir would capture all of the 100-year storm inflow from the tributary basin upstream of the reservoir with no spillway outflow. The residual 100-year storm flow into and through the existing Portola Parkway storm drain would be substantially less than its estimated design capacity. Per the evaluation, this leaves ample capacity to accommodate DSOD's required drawdown outflow of 178 cfs, well below the existing storm drain capacity of 640 cfs.

As designed, a proposed baffled concrete dissipation structure and short rip-rap channel would be installed to reduce velocities to safe levels to control the release of water through the discharge pipeline and into the storm drain. Operation of the proposed project would be managed in a manner that would not result in erosion, siltation, or excessive runoff. Settlement and groundwater pressure monitoring, utilization of dissipation controls, and other site monitoring would maintain the new expanded reservoir in sound order. As required under DSOD regulations, regular monitoring and reporting would occur. An enlarged reservoir would continue to capture all stormwater within Syphon Canyon drainage basin; therefore, the proposed project would not impede or redirect flood flows. Impacts pertaining to erosion and runoff would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Flood Hazard, Tsunami, or Seiche

Impact 3.9-4: The proposed project would not result in a flood hazard, tsunami, or seiche, and risk release of pollutants due to project inundation.

As discussed in Section 3.9.1, *Environmental Setting*, in *Flood Hazards*, the project site is not located in an area subject to tsunamis, resulting in no impact. Impacts relative to the release of pollutants associated with flood hazards are analyzed above in Impacts 3.9-1 and 3.9-2, which concluded a less than significant impact. Impacts relative to seiches and flooding due to dam failure are analyzed below.

Construction

Prior to construction, the existing reservoir would be drained. The reservoir would not be operational during construction, and therefore, seiches and flooding due to dam breach, overtopping or emergency release would not be possible. Therefore, relative to seiches and flooding during construction, there would be no impact.

Operation

The new engineered dam and reservoir would meet or exceed the current safety and design requirements established by the DSOD, which is the governing state agency that has jurisdiction over the design, construction, and operation of dams. IRWD would exceed these current requirements by implementing state-of-the-art Risk-Informed Decision-Making (RIDM) processes that improve dam safety and substantially reduce the risk of dam failure. The risk-informed design approach for the Syphon Reservoir Improvement Project would result in a dam design that avoids failures and associated consequences to downstream communities consistent with IRWD's priority of public safety. The design for the expanded reservoir would be based on specific rigorous design standards, risk analysis, and site-specific geotechnical investigations to inform the design, as discussed in Section 3.6, *Geology and Soils*. The design would be peer-reviewed through a rigorous process overseen by an independent Technical Advisory Group (TAG), comprised of nationally recognized industry experts, which may include the disciplines of dam geology/site characterization, seismic analysis, hydrology/hydraulics, dam construction, and potential failure mode analysis and RIDM. The purpose of the TAG is to provide an independent assessment of the design development including, but not limited to, review of design criteria, design details, technical approach, and other aspects of the design engineer's work to confirm the project design is in full compliance with or exceeds governing standards and requirements.

Following review by the TAG, the design would then be submitted to the DSOD for their review and approval. As such, the new proposed dam would be constructed to withstand a variety of site conditions to maintain capacity for the purpose of water storage and substantially reduce the risk of dam failure. This design would include withstanding damage from earth displacements or a seiche caused by a seismic event, while maintaining stability of the dam structure to prevent breaching or overtopping. In addition, and as part of the proposed project, a new spillway would be installed to prevent the reservoir from overtopping and safely and efficiently release water to the nearby storm drain system.

To monitor for settlement and lateral movement, monuments, open wells, and/or piezometers would be installed to assess changes in groundwater pressure that would monitor the stability of the dam. The proposed dam's structure, seepage control components, and spillway would be designed and evaluated for structural integrity by geotechnical engineers.

IRWD would be required to continuously monitor subsurface conditions such as lateral movement, seismic stability, and groundwater pressure to evaluate changes that could compromise the integrity of the reservoir. New proposed dam security instrumentation would also be implemented to identify situations that may require intervention, such as an emergency release of water from the reservoir.

A detailed evaluation of risks to downstream communities was prepared as part of the proposed project's feasibility study to assess geographic areas that could potentially become inundated in the event of a hypothetical and improbable dam breach, overtopping, or emergency release (Stetson 2018). As part of DSOD requirements, a new proposed spillway would be included to provide direction for emergency release flows and prevent the reservoir from overtopping. All recycled water flowing into and out of the Syphon Reservoir for storage is controlled directly by IRWD. Consistent with DSOD requirements for dam safety and emergency planning, the proposed project's feasibility studies evaluated scenarios for a hypothetical and extremely unlikely breach of the proposed reservoir and prepared a map of the potential flow path and limits of inundation (see **Figure 3.9-4**) for the existing reservoir and for the proposed project. The results of these analyses determined that based on modeled conditions and terrain, a hypothetical and improbable breach of the new expanded Syphon Reservoir would flow overland, split at the I-5 Culver Drive Bridge, and continue through the defined channels of Trabuco Road Drainage and Peters Canyon Channel before reaching Upper Newport Bay and, ultimately, the Pacific Ocean (GEI 2012; Stetson 2018). Figure 3.9-4 provides cross sections of the timing and depth of inundation at various distances downstream of the reservoir, compared to the existing conditions for the current Syphon Dam and Reservoir. The depths depict the worst-case scenario of a dam collapse such that all of the water is released at once. A slower failure would allow IRWD to release some of the water to the improved spillway and storm drain system, reduce the rate at which water is released from the reservoir, and thus reduce the rate and amount of inundation. In addition, the maximum depth would not be uniform along the cross sections in Figure 3.9-4. The maximum depth is determined by existing topography and typically occurs near the center of the cross section, decreasing to zero at the ends of the cross sections. The risk-informed design approach for the Syphon Reservoir Improvement Project would result in a dam design that avoids failures and associated consequences to downstream communities that could occur in the hypothetical and improbable scenarios described above.

As previously noted, IRWD is an experienced reservoir operator with a strong track record in reservoir and facilities, construction, maintenance, performance, and safety. IRWD operates five reservoirs, including Syphon Reservoir, all of which are state-inspected by the DSOD and meet all requirements for safe use. IRWD goes above and beyond the required safety standards by monitoring its dams daily, and inspecting them monthly to measure and analyze drain flows, monitoring wells, groundwater and other fluid pressures. Additionally, IRWD retains dam safety experts to inspect its dams annually.

As part of the enhanced DSOD requirements for emergency preparedness, IRWD would be required to update the EAP for the Syphon Reservoir to account for the increased size of the new reservoir. This process would facilitate input from public safety agencies to mitigate risks for downstream communities. The updated EAP would include updated inundation maps and would be used by public safety agencies responsible for emergency response. As previously noted, the EAP is a plan for early identification of potential dam safety incidents and specifies pre-planned actions to help minimize risks to public safety should these conditions occur. The EAP contains procedures and exercises for dam operators to issue early warning and notifications to emergency management authorities. In accordance with the EAP, in the improbable event there is any determination of a dam safety issue or incident at Syphon Reservoir, the EAP notification, communication, and response responsibilities would be activated as previously described above in Section 3.9.2, *Regulatory Framework, California Department of Water Resources, Division of Safety of Dams*. IRWD would notify the City of Irvine Police Department, and both IRWD and the Irvine Police Department would immediately begin emergency response actions, as well as further notifications to other police departments, fire departments, public works, schools, Caltrans, and other responsible entities, all of whom would implement further notifications and evacuations, as appropriate. Local, county and state authorities have coordinating plans in place to address local emergency operations and/or warnings and evacuations.

The proposed new dam and reservoir would meet or exceed the current safety, design and construction requirements established by the DSOD and would ensure the risks to public safety are minimized. A new proposed spillway would provide direction for emergency release flows to prevent the reservoir from overtopping, and dam instrumentation would be implemented to identify situations that may require an emergency release of water from the reservoir to the storm drain system through the 48-inch discharge pipeline, thus further reducing risk of downstream flooding.

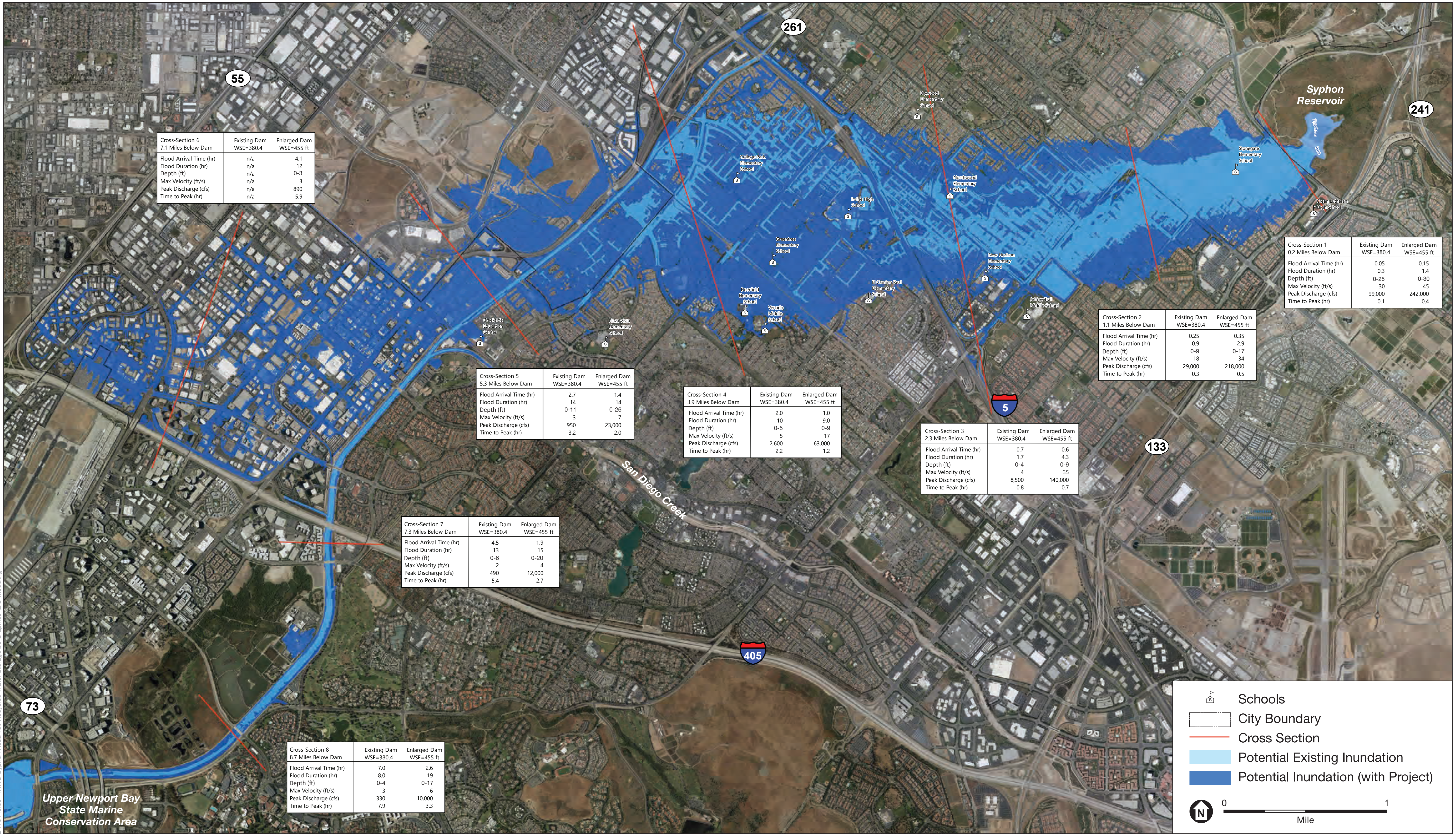
With compliance with existing regulations for the design and operation of the dam, and adherence to the procedures in the EAP, the impacts relative to the release of pollutants during seiches and flooding due to breaches of the dam would be less than significant, and would not require additional mitigation.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact



Cross-Section 1 0.2 Miles Below Dam	Existing Dam WSE=380.4	Enlarged Dam WSE=455 ft
Flood Arrival Time (hr)	0.05	0.15
Flood Duration (hr)	0.3	1.4
Depth (ft)	0-25	0-30
Max Velocity (ft/s)	30	45
Peak Discharge (cfs)	99,000	242,000
Time to Peak (hr)	0.1	0.4

Cross-Section 2 1.1 Miles Below Dam	Existing Dam WSE=380.4	Enlarged Dam WSE=455 ft
Flood Arrival Time (hr)	0.25	0.35
Flood Duration (hr)	0.9	2.9
Depth (ft)	0-9	0-17
Max Velocity (ft/s)	18	34
Peak Discharge (cfs)	29,000	218,000
Time to Peak (hr)	0.3	0.5

Cross-Section 3 2.3 Miles Below Dam	Existing Dam WSE=380.4	Enlarged Dam WSE=455 ft
Flood Arrival Time (hr)	0.7	0.6
Flood Duration (hr)	1.7	4.3
Depth (ft)	0-4	0-9
Max Velocity (ft/s)	4	35
Peak Discharge (cfs)	8,500	140,000
Time to Peak (hr)	0.8	0.7

Cross-Section 4 3.9 Miles Below Dam	Existing Dam WSE=380.4	Enlarged Dam WSE=455 ft
Flood Arrival Time (hr)	2.0	1.0
Flood Duration (hr)	10	9.0
Depth (ft)	0-5	0-9
Max Velocity (ft/s)	5	17
Peak Discharge (cfs)	2,600	63,000
Time to Peak (hr)	2.2	1.2

Cross-Section 5 5.3 Miles Below Dam	Existing Dam WSE=380.4	Enlarged Dam WSE=455 ft
Flood Arrival Time (hr)	2.7	1.4
Flood Duration (hr)	14	14
Depth (ft)	0-11	0-26
Max Velocity (ft/s)	3	7
Peak Discharge (cfs)	950	23,000
Time to Peak (hr)	3.2	2.0

Cross-Section 6 7.1 Miles Below Dam	Existing Dam WSE=380.4	Enlarged Dam WSE=455 ft
Flood Arrival Time (hr)	n/a	4.1
Flood Duration (hr)	n/a	12
Depth (ft)	n/a	0-3
Max Velocity (ft/s)	n/a	3
Peak Discharge (cfs)	n/a	890
Time to Peak (hr)	n/a	5.9

Cross-Section 7 7.3 Miles Below Dam	Existing Dam WSE=380.4	Enlarged Dam WSE=455 ft
Flood Arrival Time (hr)	4.5	1.9
Flood Duration (hr)	13	15
Depth (ft)	0-6	0-20
Max Velocity (ft/s)	2	4
Peak Discharge (cfs)	490	12,000
Time to Peak (hr)	5.4	2.7

Cross-Section 8 8.7 Miles Below Dam	Existing Dam WSE=380.4	Enlarged Dam WSE=455 ft
Flood Arrival Time (hr)	7.0	2.6
Flood Duration (hr)	8.0	19
Depth (ft)	0-4	0-17
Max Velocity (ft/s)	3	6
Peak Discharge (cfs)	330	10,000
Time to Peak (hr)	7.9	3.3

SOURCE: Stetson, 2018

Syphon Reservoir Improvement Project

Figure 3.9-4
Existing and Enlarged Reservoir Inundation Area

ESA

This page intentionally left blank

Water Quality Control Plan or Sustainable Groundwater Management Plan

Impact 3.9-5: The proposed project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Construction

The proposed project site is located in Basin 8-1, Coastal Plain of Orange County Groundwater Basin. IRWD, together with the Orange County Water District and the City of La Habra (Submitting Agencies), submitted the Basin 8-1 Alternative to the DWR in January 2017 in compliance with SGMA as an alternative to a sustainable groundwater management plan. The Basin 8-1 Alternative indicates that Basin 8-1 has operated within its sustainable yield over a period of at least 10 years (IRWD, et al., 2018). Syphon Reservoir is located at the fringes of Basin 8-1 and is managed within the requirements of SGMA by IRWD. Although the proposed project involves temporary dewatering during construction, the proposed project would not otherwise interfere with management of the basin. Site runoff during construction would be contained in settlement basins to prevent offsite impacts. Upon completion of construction, the water would be allowed to flow into the existing storm drain system, similar to existing conditions.

Additionally, and as previously discussed, the proposed project would comply with the terms of the NPDES Construction General Permit, the waste discharge requirements of the NPDES dewatering discharge permit, as well as conditions for discharge into the existing Portola Parkway storm drain, managed by Orange County Flood Control District. All of these require various measures discussed above in Impact 3.9-1 to prevent degradation of water quality, which would be consistent with the Basin Plan and the Basin 8-1 Alternative. Therefore, impacts relative to the Basin Plan and the alternative sustainable groundwater management plan would be less than significant.

Operation

Once operational, the new proposed reservoir would function as a closed system and would not interact with surface waters, eliminating any impact to surface waters and not conflicting with the Basin Plan and with SGMA. In addition, and as discussed under Impact 3.9-2, the proposed project would increase recharge to groundwater, which would be consistent with the goals of the Basin Plan and the Basin 8-1 Alternative, resulting in a beneficial impact.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts relative to hydrology and water quality. As previously discussed, the proposed project would have no impact with respect to tsunamis. Accordingly, the proposed project could not contribute to cumulative impacts related to tsunamis, which is not discussed further. Cumulative projects are listed on Table 3-1, Related Projects for Cumulative Analysis, and shown on Figure 3-1, Cumulative Project Locations. None of the cumulative projects are water storage projects and therefore could not cumulatively contribute to flooding (inundation) due to a breach in a water storage facility (e.g., a reservoir behind a dam). Accordingly, the cumulative projects could not contribute to cumulative impacts related to flooding due to the breach of a water storage facility, which is not discussed further.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative hydrology and water quality impacts encompasses the proposed project site and its surrounding drainages and underlying groundwater basin. The timeframe during which the proposed project could contribute to cumulative hydrology and water quality impacts includes both the construction and operations phases. For the proposed project, the operations phase is permanent. Note that impacts relative to hydrology and water quality are generally time-specific. Cumulative impacts could only be cumulative if two or more hydrology and water quality impacts occurred at the same time, as well as overlapping at the same location.

Impact 3.9-6: Concurrent construction and operation of the proposed project and related projects in the geographic scope would not result in cumulative impacts to hydrology and water quality.

Cumulative Impacts during Project Construction

As described in Table 3-1 and shown on Figure 3-1, there are various road improvement and other capital improvement projects proposed to occur in the vicinity of the proposed project that could be constructed within a similar timeframe as the proposed project. Several large development projects are also under review or approved for construction in the neighboring City of Irvine. If the proposed project and the cumulative projects are constructed at the same time, the erosion effects from construction activities or altering drainage patterns could be cumulatively significant. However, the state Construction General Permit would require each project to prepare and implement a SWPPP. The SWPPPs would describe BMPs to control runoff and prevent erosion for each project. Through compliance with this requirement, the potential for water quality impacts would be reduced. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state, and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels. This protection for water quality would also be consistent with the Basin Plan and Basin 8-1 Alternative. Therefore, impacts would not be cumulatively considerable, and this impact would be less than significant.

Similar to the proposed project, cumulative projects that require dewatering would also be required to comply with the Santa Ana Regional Groundwater Dewatering Permit. The permit requirements include measures to prevent impacts to water quality due to discharging groundwater from dewatering actions. Therefore, this impact not be cumulatively considerable; this impact would be less than significant.

Cumulative Impacts during Project Operations

For maintaining water quality, cumulative projects would be required to comply with the requirements of the Orange County MS4 permit (Santa Ana Regional NPDES Permit, Order No. R8-2009-0030, as amended by Order No. R8-2010-0062), which covers the county and all of its cities. Operators of municipal separate storm sewer systems (MS4s) are required to develop a stormwater management program designed to prevent harmful pollutants from impacting water resources via stormwater runoff. Cumulative projects would be required to comply with the MS4 permit by including BMPs in the project designs to control runoff and remove pollutants, including sediments. BMPs include measures such as infiltration basins, vegetated swales, and other measures. With compliance with the requirements of this permit, the incremental impacts of the proposed project combined with impacts of other projects in the area would not cause a significant cumulative impact related to water quality. The contribution from cumulative projects would not be cumulatively considerable and this impact would be less than significant.

As discussed above for Impact 3.9-2, the proposed project would have a beneficial impact to groundwater supply and recharge. Therefore, the proposed project would not contribute impacts to groundwater that could be cumulatively considerable, and this impact would be less than significant.

The MS4 permit discussed above would also require the operation of cumulative projects to be designed to avoid adverse effects to the capacity of the local stormwater drainage system. As discussed above for Impact 3.9-3, DSOD regulations for dams require the spillways be designed to not adversely affect the stormwater drainage systems into which they drain. Similarly, the MS4 permit discussed above would also require cumulative projects to be designed to not adversely affect the capacity of the local stormwater drainage system. With compliance with these existing regulations, the contribution from cumulative projects would not be cumulatively considerable and this impact would be less than significant.

As discussed above for Impact 3.9.1, the proposed project would result in a less than significant increase to TDS concentrations in the recycled water produced at the Michelson WRP, which would be well below the RWQCB permit limitation of 720 mg/l. There are three cumulative projects (see Table 3-1) that could combine with the proposed project to have cumulative impacts to the TDS concentrations of recycled water produced at the Michelson WRP: Cumulative Projects 20, 21, and 22. Cumulative Projects 20 and 21 are groundwater projects that would increase the amount of groundwater supplied to IRWD's customers. The Orange County Water

District's Mid Basin Injection Project came online in 2020 and increased the availability of groundwater for water supply (Cumulative Project 20). In addition, Orange County Water District's GWRS Final Improvement Project is scheduled to be online in 2023 ahead of the construction of the Syphon Reservoir Improvement Project, which would further facilitate the use of groundwater (Cumulative Project 21). Groundwater from the Orange County Groundwater Basin is estimated to have a TDS concentration of approximately 236 mg/l, after the Mid Basin Injection and GWRS Final Improvement Projects are operational and blend with ambient groundwater quality, which is lower than imported surface water (IRWD 2021). As explained above for Impact 3.9-1, IRWD conducted a mass balance analysis of the proposed project, as well as Cumulative Projects 20, 21, and 22, and determined the cumulative result, with these new supplies after accretions and depletions by water users before discharging to the sewer system, would be an estimated TDS reduction of approximately 19.1 mg/l in recycled water (IRWD 2021). With the increase in use of high quality groundwater supply, the contribution from cumulative projects would not be cumulatively considerable, and this impact would be beneficial.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

3.9.4 References

California Department of Water Resources (DWR). 2019. DSOD Inspection and Reevaluation Protocols. Available at https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/DSOD-Inspection-and-Reevaluation-Protocols_a_y19.pdf. Accessed April 30, 2020.

DWR. 2019b. California Natural Resources Agency Department of Water Resources Division of Dam Safety Dams within Jurisdiction of the State of California Dams Listed Alphabetically by County, September. Available at https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/2019-Dams-Within-Jurisdiction-of-the-State-of-California-Alphabetically-by-County_a_y20.pdf. Accessed April 30, 2020.

California Governor's Office of Emergency Services. n.d. My Hazards Mapping Tool. Available at http://myhazards.caloes.ca.gov/. Accessed April 30, 2020.

California State Water Resources Control Board (SWRCB). 2020. Construction General Permit Order 2009-0009-DWQ. Available at https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html. Accessed May 8, 2020.

City of Irvine. 2015. *Current General Plan*. Available at https://www.cityofirvine.org/community-development/current-general-plan. Accessed April 22, 2020.

County of Orange. n.d. Orange County General Plan. Resources and Land Use Elements. Available at https://www.ocgov.com/gov/pw/cd/planning/generalplan2005.asp. Accessed April 21, 2020.

Environmental Science Associates (ESA). 2018. *Syphon Reservoir Improvement Project Jurisdictional Delineation Report*, July.

Federal Emergency Management Agency (FEMA). 2013. *Federal Guidelines for Dam Safety: Emergency Action Planning for Dams*. FEMA 64, July. Available at https://www.fema.gov/media-library-data/5b20db599c212f77fd5e85d256f471a3/EAP_Federal_Guidelines_FEMA_P-64.pdf. Accessed April 28, 2020.

Geotechnical Environmental Water Resources Ecological Consultants, Inc. (GEI). 2012. *Syphon Reservoir Expansion Engineering Feasibility Study, Engineering Summary Report*. Prepared in Association with Stantec, Dudek, and Flow Science, Inc. for Irvine Ranch Water District, August.

HDR. 2019. *Supplemental Spillway and Outlet Design Layout Evaluations, Syphon Reservoir Improvement Project*, July 17.

Irvine Ranch Water District (IRWD). 2020a. IRWD Website, Construction Dam Safety Program. Available at https://www.irwd.com/construction/dam-safety-program. Accessed June 16, 2020.

IRWD. 2020b. Email communication with IRWD/ESA May 14.

IRWD. 2020c *Preliminary Draft Emergency Action Plan for Syphon Reservoir DSOD Dam No. 1029.004*. Prepared by Stetson Engineers, Inc., January 29.

IRWD. 2021. *Draft Syphon Reservoir Improvement Project – Recycled Water Quality Assessment*. Memorandum prepared by IRWD to Project File, March 16.

Orange County, 2007, *Drainage Area Management Plan (DAMP)*.

Orange County Water District. 2017. *Basin 8-1 Alternative Final Report*. Available at https://www.ocwd.com/media/4918/basin-8-1-alternative-final-report-1.pdf. Accessed April 22, 2020.

Santa Ana Regional Water Quality Control Board (RWQCB). 2009, *Order No. R8-2009-0030, NPDES No. CAS618030, Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region, Areawide Urban Storm Water Runoff, Orange County*. (Orange County Municipal Storm Water Permit [MS4]). May 22.

Santa Ana RWQCB. n.d. Adopted Order R8-2009-0045 General WDRs for Groundwater Discharges to Surface Waters San Diego Creek/Newport Bay Watershed. Amendment of Order No. R8-2007-0041. Available at https://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2009/09_045_amendment_of_order_r8_2007_0041_SanDiegoCreek_NewportBayWatershed.pdf. Accessed April 27, 2020.

Santa Ana RWQCB. 2019. *The Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin*, January, 1995 as amended: June 2019.

Stetson, 2018. *Technical Memorandum – Inundation Modeling for Syphon Canyon Dam Enlargement*, December 2018.

United States Environmental Protection Agency (USEPA) Official Website. 2019. Summary of the Clean Water Act. Available at https://www.epa.gov/laws-regulations/summary-clean-water-act. Accessed April 17, 2020.

3.10 Noise

This section evaluates the potential for noise and groundborne vibration impacts that may result from construction and operation of the proposed project. This section includes: an overview of the fundamental principles of noise and vibration and describes the existing noise environment in the proposed project vicinity; a summary of applicable regulations related to noise and vibration; and an evaluation of the potential impacts of the proposed project related to noise and vibration in and around the proposed project site, including cumulative impacts.

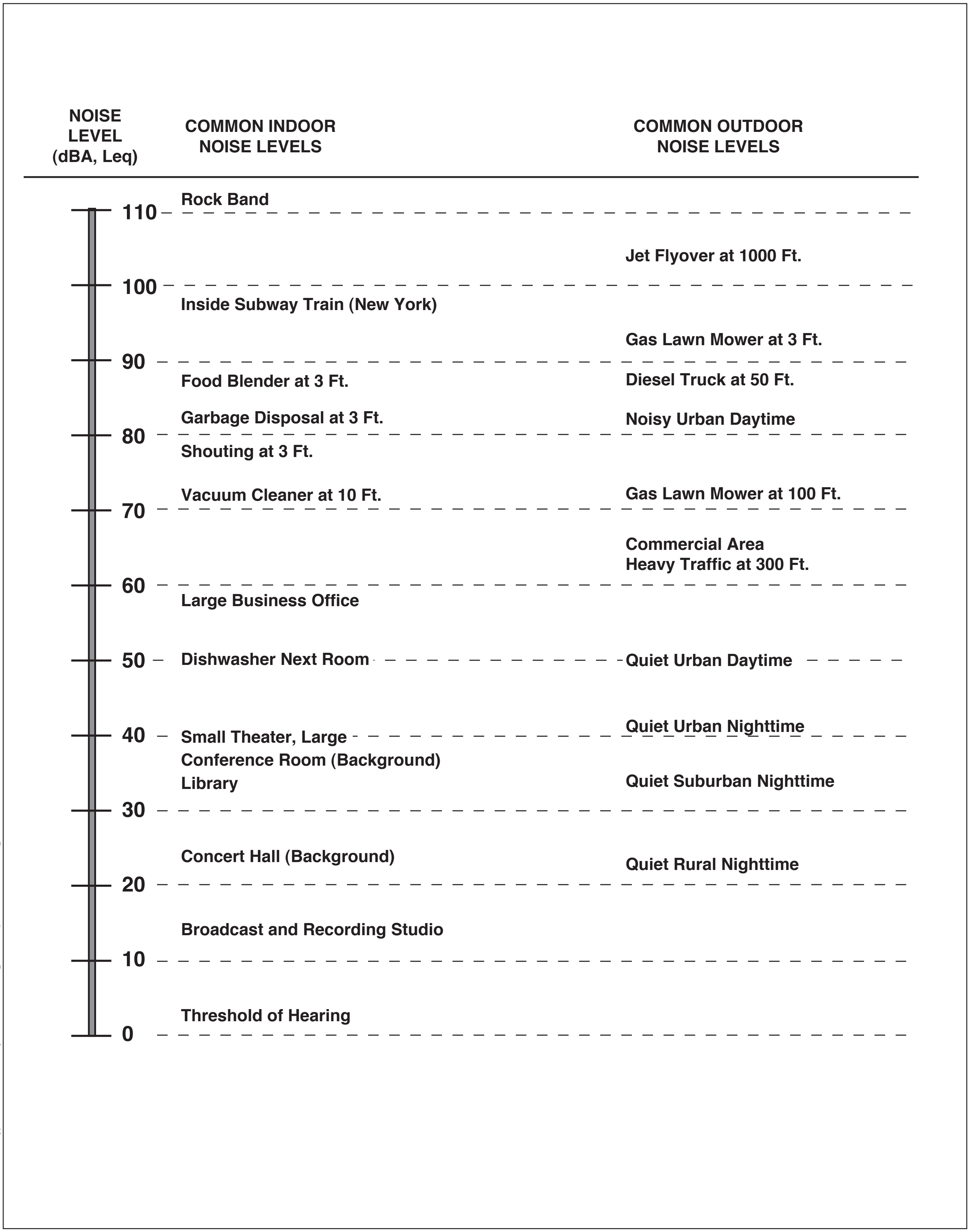
3.10.1 Environmental Setting

Noise Principles and Descriptors

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air). Noise is generally defined as unwanted sound (i.e., loud, unexpected, or annoying sound). Acoustics is defined as the physics of sound. In acoustics, the fundamental scientific model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. Acoustics primarily addresses the propagation and control of sound.

Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), which is the standard unit of sound amplitude measurement. The dB scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound, with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of feeling and pain, respectively. Pressure waves traveling through air exert a force registered by the human ear as sound.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude, with audible frequencies of the sound spectrum ranging from 20 to 20,000 Hz. The typical human ear is not equally sensitive to this frequency range. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to these extremely low and extremely high frequencies. This method of frequency filtering or weighting is referred to as A-weighting, expressed in units of A-weighted decibels (dBA), which is typically applied to community noise measurements. Some representative common outdoor and indoor noise sources and their corresponding A-weighted noise levels are shown in **Figure 3.10-1**.



SOURCE: State of California, Department of Transportation (Caltrans), Technical Noise Supplement (TeNS). October 1998. Available: http://www.dot.ca.gov/hq/env/noise/pub/Technical Noise Supplement.pdf

Figure 3.10-1
Decibel Scale and Common Noise Sources

Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time; a noise level is a measure of noise at a given instant in time. However, noise levels rarely persist at that level over a long period of time. Rather, community noise varies continuously over a period of time with respect to the sound sources contributing to the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with many of the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources, such as changes in traffic volume. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the noise exposure to be measured over periods of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. The following noise descriptors are used to characterize environmental noise levels over time, which are applicable to the proposed project.

L_{eq}: The equivalent sound level over a specified period of time, typically, 1 hour (L_{eq}(1)). The Leq may also be referred to as the average sound level.

L_{max}: The maximum, instantaneous noise level experienced during a given period of time.

L_{min}: The minimum, instantaneous noise level experienced during a given period of time.

CNEL: The Community Noise Equivalent Level (CNEL) is the average A-weighted noise level during a 24-hour day that includes an addition of 5 dB to measured noise levels between the hours of 7 a.m. to 10 p.m. and an addition of 10 dB to noise levels between the hours of 10 p.m. to 7 a.m. to account for noise sensitivity in the evening and nighttime, respectively.

Effects of Noise on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance)
- Interference effects (e.g., communication, sleep, and learning interference)
- Physiological effects (e.g., startle response)
- Physical effects (e.g., hearing loss)

Although exposure to high noise levels has been demonstrated to cause physical, psychological, and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects interrupt daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can include both awakening and arousal to a lesser state of sleep.

With regard to the subjective effects, the responses of individuals to similar noise events are diverse and influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity. Overall, there is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction on people. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur[1]:

- Except in carefully controlled laboratory experiments, a change of 1 dBA in ambient noise levels cannot be perceived.
- Outside of the laboratory, a 3 dBA change in ambient noise levels is considered to be a barely perceivable difference.
- A change in ambient noise levels of 5 dBA is considered to be a readily perceivable difference.
- A change in ambient noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the decibel scale. The human ear perceives sound in a non-linear fashion; therefore, the dBA scale was developed. Because the dBA scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. Under the dBA scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dBA higher than one of the sources under the same conditions. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA. Under the dBA scale, three sources of equal loudness together produce a sound level of approximately 5 dBA louder than one source, and ten sources of equal loudness together produce a sound level of approximately 10 dBA louder than the single source.[2]

Noise Attenuation

When noise propagates over a distance, the noise level reduces with distance depending on the type of noise source and the propagation path. Noise from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern, referred to as "spherical spreading."

---

1 California Department of Transportation (Caltrans), Technical Noise Supplement (TeNS), Section 2.2.1, September, 2013.

2 Caltrans, Technical Noise Supplement (TeNS), Section 2.2.1.1, September, 2013.

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (i.e., reduce) at a rate of between 6 dBA for acoustically “hard” sites and 7.5 dBA for “soft” sites for each doubling of distance from the reference measurement, as their energy is continuously spread out over a spherical surface (e.g., for hard surfaces, 80 dBA at 50 feet attenuates to 74 at 100 feet, 68 dBA at 200 feet, etc.). Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the reduction in noise levels with distance (i.e., distance loss) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, which in addition to geometric spreading, provides an excess ground attenuation value of 1.5 dBA (per doubling distance).[3] Most sites are a combination of both hard and soft surfaces; therefore, using the hard site criteria of 6 dBA is the more conservative approach.

Roadways and highways consist of several localized noise sources on a defined path, and hence are treated as “line” sources, which approximate the effect of several point sources. Noise from a line source propagates over a cylindrical surface, often referred to as “cylindrical spreading.” Line sources (e.g., traffic noise from vehicles) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement.[4] Therefore, noise due to a line source attenuates less with distance than that of a point source with increased distance.

Additionally, receptors located downwind from a noise source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Atmospheric temperature inversion (i.e., increasing temperature with elevation) can increase sound levels at long distances (e.g., more than 500 feet). Other factors such as air temperature, humidity, and turbulence can also have significant effects on noise levels. [5]

Fundamentals of Vibration

Vibration can be interpreted as energy transmitted in waves through the ground or man-made structures, which generally dissipate with distance from the vibration source. Because energy is lost during the transfer of energy from one particle to another, vibration becomes less perceptible with increasing distance from the source.

As described in the Federal Transit Administration’s (FTA) *Transit Noise and Vibration Impact Assessment*, groundborne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard.[6] In contrast to airborne noise, groundborne vibration is not a common environmental problem, as it is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, heavy trucks traveling on rough roads, and construction activities, such as blasting, pile-driving, and operation of heavy earth-moving equipment.

3 Caltrans, Technical Noise Supplement (TeNS), Section 2.1.4.2, September, 2013.
4 Caltrans, Technical Noise Supplement (TeNS), Section 2.1.4.1, September, 2013.
5 Caltrans, Technical Noise Supplement (TeNS), Section 2.1.4.3 September, 2013.
6 FTA, Transit Noise and Vibration Impact Assessment, Section 7.1.3, 2018.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal in inches per second (in/sec), and is most frequently used to describe vibration impacts to buildings.

Groundborne noise is a result of groundborne vibration and specifically refers to the rumbling noise emanating from the motion of building room surfaces due to the vibration of floors and walls; it is perceptible only inside buildings.[7] The relationship between groundborne vibration and groundborne noise depends on the frequency content of the vibration and the acoustical absorption characteristics of the receiving room. For typical buildings, groundborne vibration that causes low frequency noise (i.e., the vibration spectrum peak is less than 30 Hz) results in a groundborne noise level that is approximately 50 decibels lower than the velocity level. For groundborne vibration that causes mid-frequency noise (i.e., the vibration spectrum peak is 30 to 60 Hz), the groundborne noise level will be approximately 35 to 37 decibels lower than the velocity level.[8] Therefore, for typical buildings, the groundborne noise decibel level is lower than the groundborne vibration velocity level.

Project Area

Sensitive Receptors

Some land uses are considered more sensitive to noise than others due to the amount of noise exposure and the types of activities typically involved at the receptor location. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, nursing homes, and parks are generally more sensitive to noise than commercial and industrial land uses. The distance of the noise sensitive receptor locations was calculated from the property line of the receptors to the closest proposed project site boundary. Existing noise sensitive uses within 500 feet of the proposed project site are shown in **Figure 3.10-2** and include the following:

- R1: The Crean Lutheran High School Athletic Complex, located between Portola Parkway and the toe of the existing dam, approximately 55 feet from the proposed project site.
- R2 and R3: Residential neighborhoods located on the southwest side of Portola Parkway, are as close as 180 feet from the proposed access road construction. Construction of the new proposed dam, reservoir and treatment facilities would occur farther away from these sensitive receptors, approximately 700 feet.
- R4: Crean Lutheran High School, located on the south side of Portola Parkway, east of Sand Canyon Road. This property line of the school is located approximately 140 feet from the proposed access road construction.

All other noise-sensitive uses are located at greater distances and/or shielded from activity at the proposed project by buildings closer to the project area and would experience lower noise levels associated with the proposed project. Therefore, additional sensitive receptors beyond those identified above are not evaluated in this analysis.

7 FTA, Transit Noise and Vibration Impact Assessment Manual, Section 5.4, 2018.
8 FTA, Transit Noise and Vibration Impact Assessment Manual, Table 6-3 and Table 6-14, pages 126 and 146, 2018.

SOURCE: Google, 2020; ESA, 2020

Syphon Reservoir Improvement Project

Figure 3.10-2
Noise Sensitive Receiver Locations

ESA

Vibration-Sensitive Receptor Locations

Activities associated with implementation of the proposed project have the potential to generate low levels of groundborne vibration due to the operation of equipment (i.e., rubber-tired dozer, drill rigs, and haul trucks). Groundborne vibrations propagate though the ground and rapidly diminish in intensity with increasing distance from the source. No high-impact activities, such as pile driving or blasting, would be used during construction of the proposed project. The nearest off-site buildings to the project site that could be exposed to vibration levels generated from project activities include residential uses located on the southwest side of Portola Parkway, located approximately 300 feet from the proposed project boundary.

Existing Conditions

The existing noise environment within the project area is comprised primarily of vehicle traffic including trucks, buses, etc. on Portola Parkway, Sand Canyon Avenue, Irvine Boulevard, and State Route 133 (SR-133). Secondary noise sources include nearby residential activities and activities associated with nearby schools. While the proposed project site is located with the jurisdiction of the Orange County, the residents and school that would be impacted by the noise from the proposed project are located within the jurisdiction of the City of Irvine. Therefore, the analysis uses the City of Irvine's noise thresholds. The Noise Element of the City of Irvine's General Plan provides estimated vehicular traffic noise levels for areas throughout the City for the year 2020. The General Plan does not have estimated traffic noise levels for the local roadways directly adjacent to the proposed project site. The closest roadway segment with estimated 2020 traffic noise levels is Irvine Boulevard between Yale Avenue and Jeffrey Road. Similar to the proposed project vicinity, this area consists primarily of residential land uses, where the noise environmental is comprised primarily from vehicular traffic. The estimated 2020 traffic noise levels for this area is 71.7 dBA CNEL, 100 feet from the centerline of the roadway.

3.10.2 Regulatory Framework

Federal

Noise Standards

There are no federal noise standards that directly regulate environmental noise related to the construction or operation of the proposed project. With regard to noise exposure and workers, OSHA regulations safeguard the hearing of workers exposed to occupational noise. Federal regulations also establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations, Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

Vibration Standards

The effects of groundborne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most Projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration levels exceed the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings. The City does not address vibration either in the municipal code or in the Noise Element of the General Plan. The County does not address vibration the municipal code. However, the FTA's *Transit Noise and Vibration Impact Assessment* (FTA, 2018) has identified the human annoyance response to vibration levels as 80 VdB and building damage with a threshold of 0.2 in/sec PPV for non-engineered timber buildings.[9]

State

Noise Standards

The California Department of Health Services (DHS) has established guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. These guidelines for land use and noise exposure compatibility are shown in **Table 3.10-1**. In addition, Section 65302(f) of the California Government Code requires each county and city in the state to prepare and adopt a comprehensive long-range General Plan for its physical development, with Section 65302(g) requiring a noise chapter to be included in the General Plan. The noise chapter must: (1) identify and appraise noise problems in the community, (2) recognize Office of Noise Control guidelines, and (3) analyze and quantify current and projected noise levels.

TABLE 3.10-1
COMMUNITY NOISE EXPOSURE LEVEL (CNEL)

Land Use	Normally Acceptable[a]	Conditionally Acceptable[b]	Normally Unacceptable[c]	Clearly Unacceptable[d]
Single-family, Duplex, Mobile Homes	50–60	55–70	70–75	above 75
Multi-Family Homes	50–65	60–70	70–75	above 75
Schools, Libraries, Churches, Hospitals, Nursing Homes	50–70	60–70	70–80	above 80
Transient Lodging – Motels, Hotels	50–65	60–70	70–80	above 80
Auditoriums, Concert Halls, Amphitheaters	—	50–70	—	above 65
Sports Arena, Outdoor Spectator Sports	—	50–75	—	above 70
Playgrounds, Neighborhood Parks	50–70	—	67–75	above 72
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50–75	—	70–80	above 80
Office Buildings, Business and Professional Commercial	50–70	67–78	above 75	—
Industrial, Manufacturing, Utilities, Agriculture	50–75	70–80	above 75	—

NOTES:
All CNEL measurements are expressed in dBA.
[a] Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.
[b] Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
[c] Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
[d] Clearly Unacceptable: New construction or development should generally not be undertaken.
SOURCE: OPR, 2003 (in coordination with the California DHS)

9 FTA, Transit Noise and Vibration Impact Assessment, Section 12.2.2, May. 2018.

The State of California also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the state pass-by standard is consistent with the federal limit of 80 dBA. The state pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by state and local law enforcement officials.

Vibration Standards

There are no state vibration standards applicable to the proposed project. Moreover, according to the California Department of Transportation (Caltrans) *Transportation- and Construction-Induced Vibration Guidance Manual* (2013), there are no official Caltrans standards for vibration. However, this manual provides guidelines for assessing vibration damage potential to various types of buildings, ranging from 0.08 to 0.12 in/sec PPV for extremely fragile historic buildings, ruins, and ancient monuments to 0.50 to 2.0 in/sec PPV for modern industrial/commercial buildings.

Local

County of Orange

Section 4-6-4 and 4-6-5 of the Orange County Municipal Code provides exterior and interior noise standards, respectively, to the entire territory of Orange County, including incorporated and unincorporated territory. The County's noise standards for exterior and interior noise levels are provided in **Table 3.10-2**.

TABLE 3.10-2
COUNTY OF ORANGE NOISE STANDARDS

Noise Zone[a]	Location	Noise Level	Time Period
1	Exterior	55 dB(A)	7 a.m.–10 p.m.
		50 db(A)	10 p.m.–7 a.m.
	Interior	55 dB(A)	7 a.m.–10 p.m.
		45 dB(A)	10 p.m.–7 a.m.

NOTE:
[a] The entire territory of Orange County, including incorporated and unincorporated territory, is hereby designated as "Noise Zone 1."
SOURCE: County of Orange, 2020.

The Orange County Municipal Code Section 4-6-7(e) exempts noise associated with construction, repair, remodeling, or grading of any real property, provided said activities take place between the hours of 7 a.m. to 8 p.m. on weekdays, including Saturday.

General Plan, Noise Element

The General Plan Noise Element of the County of Orange establishes noise/land use planning criteria for the unincorporated areas of the County. These noise guidelines and standards cover roadway noise, rail noise, and airport noise including military and civilian airports. The County has adopted noise standards for various land uses in terms of CNEL and L_{eq}. These standards are reproduced here as **Table 3.10-3** and **Table 3.10-4**. For residential land uses the County has established a maximum exterior noise level standard of 65 dB CNEL for private outdoor living areas and an interior standard of 45 dB CNEL. The County of Orange uses the 60 dB CNEL contour as a threshold for review of projects in order to screen projects and ensure that the 65 dB CNEL exterior and 45 dB CNEL interior criteria are met. In other words, projects located within the 60 dB CNEL contour are required to submit detailed acoustical studies ensuring compliance with the County noise standards.

TABLE 3.10-3
COUNTY OF ORANGE COMPATIBILITY MATRIX

Type of Use	>65 dB CNEL	60 to 65 dB CNEL
Residential	3a, b, e	2a, e
Commercial	2c	2c
Employment	2c	2c
Open Space		
Local	2c	2c
Community	2c	2c
Regional	2c	2c
Educational Facilities		
Schools K-12	2c, d, e	2c, d, e
Preschool, college, other	2c, d, e	2c, d, e
Places of Worship	2c, d, e	2c, d, e
Hospitals		
General	2a, c, d, e	2a, c, d, e
Convalescent	2a, c, d, e	2a, c, d, e
Groups Quarters	1a, b, c, e	2a, c, e
Hotels/Motels	2a, c	2a, c
Accessory Uses		
Executive Apartments	1a, b, e	2a, e
Caretakers	1a, b, c, e	2a, c, e

SOURCE: County of Orange, *Orange County General Plan*, Noise Element, n.d.

TABLE 3.10-4
COUNTY OF ORANGE COMPATIBILITY MATRIX – EXPLANATIONS AND DEFINITIONS

Action Required to Ensure Compatibility Between Land Use and Noise from External Sources	
1= Allowed if interior and exterior community noise levels can be mitigated. 2= Allowed if interior levels can be mitigated. 3= New residential uses are prohibited in areas within the 65 dB CNEL contour from any airport or air station; allowed in other areas of interior and exterior community noise levels can be mitigated. The prohibition against new residential development excludes limited "infill" development within an established neighborhood.	
Standards Required for Compatibility of Land Use and Noise	
a= Interior Standard: CNEL of less than 45 dB (habitable rooms only). b= Exterior Standard: CNEL of less than 65 dB from any source in outdoor living areas. c= Interior standard: Leq (H)=45 to 65 dB interior noise level, depending on interior use. d= Exterior Standard: Leq(h) of less than 65 dB in outdoor living areas. e= Interior Standard: As approved by the Board of Supervisors for sound events of short duration such as aircraft flyovers or individual passing railroad trains.	
Educational Facilities	
Schools K–12 Preschool, college, other Places of Worship	
Typical Use	**L_{eq} (h)***
Private Office, Church Sanctuary, College, Preschool, Schools (Grades K–12) Board Room, Conference Room, etc.	45
General Office, Reception, Clerical, etc.	50
Other Schools and Colleges	52
Bank Lobby, Retail Store, Restaurant, Typing Pool, etc.	55
Manufacturing, Kitchen, Warehousing, etc.	65

SOURCE: County of Orange. General Plan – Noise Element

City of Irvine

Table 3.10-5 summarizes Section 6-8-204, General Provisions, of the City's Municipal Code, which provides interior and exterior noise standards that apply to all properties within a designated zone located in the City.

The City Municipal Code Section 6.8.205.A limits construction activities between the hours of 7 a.m. to 7 p.m. Mondays through Fridays, and 9 a.m. to 6 p.m. on Saturdays. No construction activities shall be permitted outside of these hours or on Sundays and federal holidays, unless a temporary waiver is granted by the Chief Building Official or his or her authorized representative. Trucks, vehicles, and equipment that are making or are involved with material deliveries, loading, or transfer of materials, equipment service, maintenance of any devices or appurtenances for or within any construction project in the City shall not be operated or driven on City streets outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the City. Any waiver granted shall take impact upon the community into consideration. No construction activity will be permitted outside of these hours except in emergencies including maintenance work on the City rights-of-way that might be required.

TABLE 3.10-5
CITY OF IRVINE NOISE STANDARDS

Zone	Location	Time Period	Noise Levels for a Period Not Exceeding (minutes/hour) 30	15	5	1	0 (anytime)
Noise zone 1: All hospitals, libraries, churches, schools, and residential properties.	Exterior	7 a.m.–10 p.m.	55	60	65[a]	70	75
		10 p.m.–7 a.m.	50	55	60	65[a]	70
	Interior	7 a.m.–10 p.m.	—	—	55	60	65
		10 p.m.–7 a.m.	—	—	45	50	55
Noise zone 2: All professional office and public institutional properties.	Exterior	Anytime	55	60	65	70	75
	Interior	Anytime	—	—	55	60	65
Noise zone 3: All commercial properties excluding professional office properties.	Exterior	Anytime	60	65	70	75	80
	Interior	Anytime	—	—	55	60	65
Noise zone 4: All industrial properties.	Exterior	Anytime	70	75	80	85	90
	Interior	Anytime	—	—	55	60	65

NOTES:
[a] This standard does not apply to multifamily residence private balconies. Multifamily developments with balconies that do not meet the 65 CNEL are required to provide occupancy disclosure notices to all future tenants regarding potential noise impacts.
[b] It shall be unlawful for any person at any location within the City to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any property within designated noise zones either within or without the City to exceed the applicable noise standard.
[c] Each of the noise standards specified above shall be reduced by five dB(A) for impact, or predominant tone noise or for noises consisting of speech or music.
[d] In the event that the noise source and the affected property are within different noise zones, the noise standards of the affected property shall apply.

SOURCE: City of Irvine 2020

General Plan, Noise Element

As shown in **Table 3.10-6**, the City has established noise guidelines in the Noise Element of the City's General Plan that are used for planning purposes. These guidelines are based, in part, on the community noise compatibility guidelines established by the California State Governor's Office of Planning and Research and are intended for use in assessing the compatibility of various land use types with a range of noise levels. Page F-11 of the Noise Element provides the guidelines of land use compatibility for community noise sources. The CNEL noise levels for specific land uses are classified into four categories: (Zone A) "clearly compatible" (Zone B) "normally compatible" (Zone C) "normally incompatible" and (Zone D) "clearly incompatible." A CNEL value of 70 dBA is considered the dividing line between a "normally compatible" and "normally incompatible" noise environment for noise sensitive land uses, including residences, transient lodgings, schools, and libraries.

TABLE 3.10-6
CITY OF IRVINE LAND USE NOISE COMPATIBILITY

Land Use Categories	Uses	Energy Average (CNEL, dB)						
		≤	55	60	65	70	75	80>
RESIDENTIAL	Single-Family	A	A	B	B	C	D	D
RESIDENTIAL	Mobile Home	A	A	B	C	C	D	D
COMMERCIAL Regional	Hotel, Motel, Transient Lodging	A	A	B	B	C	C	D
COMMERCIAL Regional, Community	Commercial retail, Bank, Restaurant, Movie theater	A	A	A	A	B	B	C
COMMERCIAL Recreation INSTITUTIONAL General	Amphitheater, Concert Hall, Auditorium, Meeting hall	B	B	C	C	D	D	D
COMMERCIAL Recreation	Children's amusement park, Miniature golf, Go-cart track, Health club, Equestrian center	A	A	A	B	B	D	D
COMMERCIAL Community INDUSTRIAL General	Automobile service station, Auto dealer, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
INSTITUTIONAL General	Hospital, Church, Library, School classrooms	A	A	B	C	C	D	D
OPEN SPACE	Parks	A	A	A	B	C	D	D
OPEN SPACE	Golf course, Nature centers, Cemeteries, Wildlife reserves, Wildlife habitat	A	A	A	A	B	C	C
AGRICULTURAL	Agriculture	A	A	A	A	A	A	A

NOTES:

ZONE A Clearly Compatible	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements
ZONE B Normally Compatible	New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.
ZONE C Normally Incompatible	New construction or development should normally be discouraged. If new construction or development does proceed, a detailed analysis or noise reduction requirements must be made and needed noise insulation features must be included in the design.
ZONE D Clearly Incompatible	New construction or development should generally not be undertaken.

SOURCE: City of Irvine General Plan, Noise Element, 2015.

Additionally, the Proposed Project is subject to the following policies provided in the Noise Element of the General Plan:

Mobile Noise

Policy (c): Ensure that all proposed development projects are compatible with the existing and projected noise level by using the Land Use Noise Compatibility Matrix (see Table 3.10-6).

Policy (d): Require noise studies to be prepared in accordance with the City's environmental review procedure for all projects that are not "clearly compatible" with the future noise level at the site.

Policy (f): Require noise studies to identify all the mitigation measures necessary to reduce noise levels to meet the City's Municipal Code CNEL standard (see **Table 3.10-5**) and Single Event Noise Standard.

Stationary Noise

Policy (a): Require any new construction to meet the City Noise Ordinance standards as a condition of building permit approval.

Policy (b): Require developers to depict, on any appropriate development application review (zone change, subdivisions, conditional use permit, site plan, and building plans), any potential noise sources known at the time of submittal and mitigation measures that ensure these noise sources meet the City Noise Ordinance standards. Such sources include, but are not limited to, the following:

- Truck pickup and loading areas.
- Mechanical and electrical equipment such as air conditioning, swimming pool pumps and filters, and spa pumps.
- Exterior nuisances such as speaker boxes and outdoor public address systems.

Policy (c): Condition subdivision approval of the projects adjacent to any developed/occupied uses by requiring the developer to submit a construction-related noise mitigation plan to the Director of Community Development for review and approval prior to issuance of grading permits. The plan must depict the location of construction equipment and how the noise from this equipment will be mitigated during construction of the project, through the use of such methods as following:

- Temporary noise attenuation fences.
- Preferential location of equipment.
- Use of current technology and noise suppression equipment.

Noise Abatement

Policy (a): Coordinate efforts to reduce noise impacts with appropriate public and government agencies.

3.10.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from CEQA Guidelines Appendix G are used as thresholds of significance to determine the impacts of the proposed project as related to noise and vibration. The proposed project would have a significant impact if it would:

1. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
2. Generate excessive groundborne vibration or groundborne noise levels.
3. Expose people residing or working in the project area to excessive noise levels for a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport.
4. Result in a cumulatively considerable impact to noise and vibration.

The proposed project site is located with the jurisdiction of the Orange County. However, the receptors that would be impacted by the construction and operation of the proposed project are located within the City of Irvine. Therefore, this analysis uses the City of Irvine's thresholds to determine significance.

Methodology

On-Site Construction Noise

On-site construction noise impacts were evaluated by determining the noise levels generated by the different types of construction activity anticipated, calculating the construction-related noise level at nearby sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise) at those receptors. More, specifically, the following steps were undertaken to assess construction-period noise impacts:

1. Typical noise levels for each type of construction equipment were obtained from the FHWA's Construction Noise Handbook (FHWA 2006);
2. Distances between construction site locations (noise sources) and surrounding sensitive receptors were measured using Project architectural drawings and site plans and Google Earth;
3. The construction noise level was then calculated, in terms of hourly Leq, for sensitive receptor locations based on the standard point source noise-distance attenuation factor of 6.0 dBA for each doubling of distance.

Off-Site Roadway Noise (Construction)

Roadway noise impacts have been evaluated using the Caltrans Technical Noise Supplement (TeNS) method based on the traffic data provided in the Project's Construction Transportation Impact Analysis (Fehr & Peers, 2020). The Caltrans TeNS method allows for the definition of roadway configurations, barrier information (if any), and receiver locations.

Groundborne Vibration (Construction and Operations)

Groundborne vibration impacts were evaluated by identifying potential vibration sources, measuring the distance between vibration sources and surrounding structure locations, and making a significance determination based on the significance thresholds described below.

Impact Analysis

Temporary or Permanent Increase of Ambient Noise Levels

Impact 3.10-1: The proposed project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Construction

On-Site Construction Noise

Construction of the proposed project is estimated to require approximately 41 months (weather permitting) and would require the use of heavy equipment during the various construction phases at the proposed project site. During each stage of development, there would be a different mix of equipment. As such, construction activity noise levels at and near the proposed project area would fluctuate depending on the particular type, number, and duration of use of the various pieces of construction equipment. Construction is currently anticipated to begin in the fall of 2022 with the potential of overlap for a number of phases of construction.

Per Chapter 2, *Project Description*, additional geotechnical work may or may not occur, and the intensity of any geotechnical work is unknown at this time. There are three potential geotechnical tests that could occur: borings, test pits, or trenches. The geotechnical work would be associated with the damn upgrades and would most likely occur in the reservoir area, at a distance of 330 feet (100 meters) or more from the nearest sensitive uses. Because the intensity of any work that will occur is unknown, the analysis determines the maximum intensity of geotechnical work that can occur concurrently and independent from the reservoir work. The *Irvine Ranch Water District Syphon Reservoir Geotechnical Investigations Project Initial Study/Mitigated Negative Declaration* was used to determine the equipment and workers that would be used to conduct the additional geotechnical investigations.

Individual pieces of construction equipment anticipated during Project construction could produce maximum noise levels of 75 dBA to 85 dBA L_{max} at a reference distance of 50 feet from the noise source, as shown in **Table 3.10-7**. These maximum noise levels would occur when equipment is operating at full power. The estimated usage factor for the equipment is also shown in Table 3.10-7, which are based on FHWA's Construction Handbook (FHWA 2006). Typical or average construction noise levels account for the estimated usage factors as shown.

TABLE 3.10-7
CONSTRUCTION EQUIPMENT NOISE LEVELS

Construction Equipment	Estimated Usage Factor %	Noise Level at 50 Feet (dBA, Lmax)
Backhoe	40%	78
Bore/Drill Rig	40%	78
Cement/Mortar Mixers	40%	79
Compactor	20%	83
Cranes	16%	81
Dozer	40%	82
Excavator	40%	81
Grader	40%	85
Pavers	50%	77
Pick-up Truck	40%	75
Pumps	50%	81
Roller	20%	80
Rubber Tired Dozer	40%	82
Rubber Tired Loader	40%	79
Rollers	20%	80
Scraper	40%	84
Support Truck	40%	76
Tractor/Loader/Backhoe	25%	80
Water Truck	10%	80

SOURCE: FHWA 2006

Construction activity would result in the loudest noise levels at ground-level sensitive land uses nearest to the proposed project area that have a direct line-of-sight to construction activities. This is because the first tier of buildings immediately surrounding the proposed project site would act as a noise barrier to other sensitive receptors located beyond these buildings. Therefore, construction-related noise levels are only presented for receptors closest to the proposed project site, as shown in Figure 3.10-2. Specifically, the nearest off-site noise sensitive receptors include the following:

- R1: The Crean Lutheran High School Athletic Complex, located between Portola Parkway and the toe of the existing dam, approximately 55 feet from the proposed project site.
- R2 and R3: Residential neighborhoods located on the southwest side of Portola Parkway, are as close as 180 feet from the proposed access road construction. Construction of the new proposed dam, reservoir and treatment facilities would occur farther away from these sensitive receptors, approximately 700 feet.
- R4: Crean Lutheran High School, located on the south side of Portola Parkway, east of Sand Canyon Road. This property line of the school is located approximately 140 feet from the proposed access road construction.

Noise from construction activities would be generated by the operation of vehicles and equipment involved during various stages of construction: site excavation, grading, facilities construction and paving. The noise levels generated by construction equipment would vary depending on factors such as the type and number of equipment, the specific model (horsepower rating), the construction activities being performed, and the maintenance condition of the equipment. Construction noise associated with the proposed project was analyzed using a mix of typical construction equipment, estimated durations, and construction phasing, based on construction equipment data provided by IRWD and assumptions derived from similar projects. **Table 3.10-8** shows the estimated construction noise levels that would occur at the nearest off-site sensitive uses during a peak day of construction activity at the proposed project site. Details are provided in **Appendix D**.

TABLE 3.10-8
ESTIMATE OF CONSTRUCTION NOISE LEVELS (L_{EQ}) AT EXISTING OFF-SITE SENSITIVE RECEIVER LOCATIONS

	Receiver (Distance in feet from construction activity)			
Construction Phase [a, b]	**R1 (55 feet) dBA, Leq**	**R2 (330 feet) dBA, Leq**	**R3 (180 feet) dBA, Leq**	**R4 (140 feet) dBA, Leq**
Vegetation Clearing Access Routes/Intersection Improvements	87	73	78	80
Access Routes/Intersection Improvements	86	71	76	78
Excavation of Sediment/Existing Dam: *Mobilization, site prep/Staging Areas*	84	69	74	76
Excavation of Sediment/Existing Dam: *Upstream Excavation and Foundation Treatment*	87	72	77	79
Excavation of Sediment/Existing Dam: *Dam Excavation and Foundation Treatment*	88	73	78	81
Excavation of Sediment/Existing Dam: *Dam Excavation and Foundation Treatment* Construction of Dam/Spillway/Reservoir: *Install Inlet/Outlet*	89	74	79	81
Construction of Dam/Spillway/Reservoir: *Install Embankment to Bottom of Blanket Drain*	89	74	79	81
Construction of Dam/Spillway/Reservoir: *Install Blanket Drain*	79	64	69	71
Construction of Dam/Spillway/Reservoir: *Install Chimney/Remaining Embankment*	89	74	79	81
Construction of Dam/Spillway/Reservoir: *Install Chimney/Remaining Embankment* *Spillway Construction*	89	75	80	82
Construction of Dam/Spillway/Reservoir: *Spillway Construction* Construction of Treatment Facility Wetlands/Riparian Installation	84	69	74	76

	Receiver (Distance in feet from construction activity)			
Construction Phase [a, b]	**R1 (55 feet) dBA, Leq**	**R2 (330 feet) dBA, Leq**	**R3 (180 feet) dBA, Leq**	**R4 (140 feet) dBA, Leq**
Construction of Dam/Spillway/Reservoir: *Spillway Construction* Construction of Treatment Facility Wetlands/Riparian Installation Installation of Recreation Facilities	88	73	78	80
Construction of Treatment Facility Wetlands/Riparian Installation Installation of Recreation Facilities	87	72	77	79
Construction of Treatment Facility Installation of Recreation Facilities	86	71	76	79
Construction of Treatment Facility	79	64	69	71
Demobilization	77	64	68	70
Geotechnical Exploration [c] (minimum of 330 feet [100 meters] from nearest receptor)				
Borings (at 330 feet)	60	60	60	60
Test Pits (at 330 feet)	60	60	60	60
Trenches (at 330 feet)	61	61	61	61

NOTES:

a Construction schedule provided by the project applicant.
b Detailed construction noise calculations are provided in Appendix D.
c Based on Irvine Ranch Water District Syphon Reservoir Geotechnical Investigations Project Initial Study/Mitigated Negative Declaration, February 2019.

SOURCE: ESA 2021

As shown in Table 3.10-8, construction noise levels are estimated to reach a maximum of 89 dBA L_{eq} at the nearest sensitive receptor (R1). Existing residences and school facilities in the vicinity of the proposed project area would be exposed to temporary and sporadic increased noise from nearby construction activities. Weather permitting, the overall construction would last for approximately 36 to 41 months. However, since equipment operates intermittently and moves around the site, noise from operation of construction equipment would be sporadic and temporary during the construction period. Construction noise would be noticeable during the operation of heavy grading equipment working at the site (sporadically over the duration of construction), especially during the vegetation clearing, excavation, and construction period.

The City has not established numerical thresholds for construction noise; however, per the City Municipal Code, Section 6-8-205, construction shall only occur between the hours of 7 a.m. to 7 p.m. Mondays through Fridays, and 9 a.m. to 6 p.m. on Saturdays. The proposed project construction activities would comply with the hours allowed by the City and the duration of construction would be short term. If the proposed project's construction work is needed to be conducted outside of the allowable hours, IRWD will work with the appropriate entity to secure a variance/waiver. Thus, a significant noise impact would not occur during project construction and construction noise impacts would be less than significant.

Off-Site Construction Noise

Delivery and haul truck trips would occur throughout the construction period. Trucks traveling to and from the project area would be required to travel along the haul route approved by the City for the proposed project. The following two haul routes are being proposed for the project:

- **Haul Route 1:** SR-133, north on Irvine Boulevard, and east on Sand Canyon Avenue for trucks traveling inbound and westbound on Sand Canyon Avenue and south on Irvine Boulevard to SR-133 for trucks traveling outbound.
- **Haul Route 2:** I-5, east on Sand Canyon Avenue for trucks traveling inbound and westbound on Sand Canyon Avenue to I-5 for trucks traveling outbound.

Table 3.10-9 shows the estimated construction traffic noise levels that would occur at the nearest off-site sensitive uses along the proposed haul routes. Details are provided in Appendix D. Sensitive noise receptors along the haul route are located approximately 40 to 80 feet from the edge of the roadways. Construction traffic noise levels generated by truck trips would range from approximately 57.5 dBA, L_{eq} to 72.7 dBA, L_{eq}. Detailed traffic noise calculations are provided in Appendix D. Construction truck trips would be required to comply with the City's allowable hours as described above and would be temporary in nature. Therefore, construction activities would comply with the City's noise standard, and impacts would be less than significant.

TABLE 3.10-9
ESTIMATE OF CONSTRUCTION TRAFFIC NOISE LEVELS (L_{EQ}) AT EXISTING OFF-SITE SENSITIVE RECEIVER LOCATIONS

	Roadway Segment (Distance in feet from construction activity)			
Construction Phase	**Portola Pkwy, between SR-133 and Paragon (60 feet) dBA, Leq**	**Sand Canyon Ave, between Portola Pkwy and Irvine Blvd (40 feet) dBA, Leq**	**Irvine Blvd, between San Canyon Ave and Native Spring (55 feet) dBA, Leq**	**SR-133, between Irvine Blvd and SR-241 (80 feet) dBA, Leq**
Vegetation Clearing Access Routes/Intersection Improvements	70.7	71.6	72.0	71.2
Access Routes/Intersection Improvements	62.5	63.4	63.9	63.1
Excavation of Sediment/Existing Dam: *Mobilization, site prep/Staging Areas*	58.4	59.1	59.8	59.1
Excavation of Sediment/Existing Dam: *Upstream Excavation and Foundation Treatment*	61.9	62.6	63.3	62.6
Excavation of Sediment/Existing Dam: *Dam Excavation and Foundation Treatment*	61.9	62.6	63.3	62.6
Excavation of Sediment/Existing Dam: *Dam Excavation and Foundation Treatment* Construction of Dam/Spillway/Reservoir: *Install Inlet/Outlet*	70.9	71.8	72.3	71.5
Construction of Dam/Spillway/Reservoir: *Install Embankment to Bottom of Blanket Drain*	70.4	71.2	71.7	70.9
Construction of Dam/Spillway/Reservoir: *Install Blanket Drain*	70.4	71.2	71.7	70.9
Construction of Dam/Spillway/Reservoir: *Install Chimney/Remaining Embankment*	70.4	71.2	71.7	70.9
Construction of Dam/Spillway/Reservoir: *Install Chimney/Remaining Embankment* *Spillway Construction*	71.4	72.2	72.7	71.9
Construction of Dam/Spillway/Reservoir: *Spillway Construction* Construction of Treatment Facility Wetlands/Riparian Installation	70.1	70.9	71.4	70.7

Construction Phase	Roadway Segment (Distance in feet from construction activity)			
	Portola Pkwy, between SR-133 and Paragon (60 feet) dBA, Leq	**Sand Canyon Ave, between Portola Pkwy and Irvine Blvd (40 feet) dBA, Leq**	**Irvine Blvd, between San Canyon Ave and Native Spring (55 feet) dBA, Leq**	**SR-133, between Irvine Blvd and SR-241 (80 feet) dBA, Leq**
Construction of Dam/Spillway/Reservoir: *Spillway Construction* Construction of Treatment Facility Wetlands/Riparian Installation Installation of Recreation Facilities	70.5	71.4	71.9	71.1
Construction of Treatment Facility Wetlands/Riparian Installation Installation of Recreation Facilities	69.3	70.1	70.6	69.8
Construction of Treatment Facility Installation of Recreation Facilities	68.6	69.4	69.9	69.1
Construction of Treatment Facility	67.9	68.8	69.2	68.4
Demobilization	57.5	58.2	58.9	58.3

NOTES:

Construction schedule and truck traffic information provided by the project applicant.
Detailed traffic noise calculations are provided in Appendix D.

SOURCE: ESA 2021

Operation

Operation of the proposed project would not increase the average daily traffic (ADT) volumes along the major thoroughfares within the project vicinity. Additionally, the proposed inlet and outlet pipelines that would supply and drain the reservoir would be located underground and would not result in any operational noise. The primary pumps used for water distribution are already existing and located off-site. Operation of the proposed project would introduce small pumps located on the site within the proposed treatment facilities. A proposed masonry block wall building would house the storage tanks, metering pumps, and control system. The small pumps located on-site would not generate noise above ambient conditions at sensitive receptor property lines. Therefore, impacts from the operations of the proposed project would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Groundborne Vibration or Groundborne Noise Levels

Impact 3.10-2: The proposed project would not generate excessive groundborne vibration or groundborne noise levels.

Construction

Construction activities for the proposed project have the potential to generate low levels of groundborne vibration as the operation of heavy equipment (i.e., backhoe, dozer, grader, loader, and haul trucks, etc.) generates vibrations that propagate though the ground and diminish in intensity with distance from the source. No high-impact activities, such as pile driving or blasting, would be used during the proposed project's construction. In order to evaluate potential structural damage, the nearest off-site sensitive buildings to the project area were identified. The residential buildings located on the south side of Portola Parkway are approximately from 300 feet from the proposed project boundary line. Groundborne vibrations from construction activities very rarely reach the levels that can damage structures, but they may be perceived in buildings very close to a construction site.

The PPV vibration velocities for several types of construction equipment that can generate perceptible vibration levels are identified in **Table 3.10-10**. Based on the information presented in Table 3.10-10, vibration velocities could range from 0.0014 to 0.0083 in/sec PPV at 300 feet from the source of activity.

TABLE 3.10-10
VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

	Approximate PPV (in/sec)						
Equipment	25 Feet	50 Feet	60 Feet	75 Feet	100 Feet	200 Feet	300 Feet
Vibratory Roller	0.2100	0.0853	0.0673	0.0503	0.0346	0.0141	0.0083
Large Bulldozer	0.0890	0.0361	0.0285	0.0213	0.0147	0.0060	0.0035
Loaded Trucks	0.0760	0.0309	0.0244	0.0182	0.0125	0.0060	0.0035
Jackhammer	0.0350	0.0142	0.0112	0.0084	0.0058	0.0051	0.0030
Small Bulldozer	0.0030	0.0012	0.0010	0.0007	0.0005	0.0023	0.0014

SOURCE: FTA 2018; ESA 2021

Proposed construction activities would occur throughout the project area and would not be concentrated at the point closest to the nearest structure. Based on the vibration levels presented in Table 3.10-10, at a distance of 300 feet from the proposed project area, the maximum vibration level would be up to approximately 0.0083 in/sec PPV for a vibratory roller, which would not exceed the significance threshold of 0.2 in/sec PPV. The geotechnical work would be associated with the damn upgrades and would most likely occur in the reservoir area, at a distance of 330 feet (100 meters) or more from the nearest sensitive uses, which would generate vibration levels below 0.2 in/sec PPV at sensitive receptor locations. Therefore, the use of all construction equipment would not result in a groundborne vibration velocity level above 0.2 inches per second at the nearest off-site structure. Therefore, impacts would be less than significant.

With respect to human annoyance, the nearest residential buildings located within 300 feet from the proposed project site would be exposed to vibration levels below the 80 VdB threshold for human annoyance. Therefore, impacts would be less than significant.

Operation

Sources of groundborne vibration would be unchanged from the existing conditions. Additionally, operational vibration impacts of the improvements at the new proposed reservoir would be consistent with the existing vibration velocity levels and with the existing ambient vibration velocity levels. As such, operational vibration impacts of the proposed Syphon Reservoir improvements would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Excessive Noise Levels Near Airports

Impact 3.10-3: The proposed project would not expose people residing or working in the project area to excessive noise levels within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport.

The proposed project area is not located within the vicinity of a private airstrip. Further, the nearest airport to the project area is the John Wayne Airport, located approximately 7.7 miles to the southwest of the project area. The proposed project is not located within an airport land use plan or within 2 miles of a public airport or public use airport. Therefore, the proposed project would have no impact related to public or private airport/airstrip noise levels.

Mitigation Measures

None required

Significance Determination

No Impact

Cumulative Impacts

Impact 3.10-4: Concurrent construction and operation of the proposed project and related projects in the geographic scope would not result in cumulative impacts to noise and vibration.

CEQA Guidelines require a discussion of cumulative impacts of a project "when the project's incremental effect is cumulatively considerable" (2011 CEQA Guidelines, Section 15130). As defined by Section 15065 (a)(3) "cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (2011 CEQA Guidelines, Section 15065 (a)(3)). These cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines Section 15355).

Two cumulative projects within 1,000 feet of the proposed project site have been identified, which include the Gateway Community Park / City of Irvine Master Parks Plan and the Truck Route Roadway Rehabilitation (CIP 311902) Project. Should all three projects undergo construction at the same time, the projects would be required to comply with the construction hours allowed by the City or comply with City restrictions imposed if a variance to the allowable construction hours for either project is issued. As previously discussed, the proposed project construction and operation would comply with the City's noise standard, and impacts would be less than significant. Therefore, the proposed project, when combined with the identified cumulative projects, would not cause a cumulatively considerable noise impact. With regard to groundborne vibration, the construction vibration levels generated by the proposed project would be substantially below the FTA thresholds. Vibration level diminish rapidly from the source and the range of vibration concern is usually limited to 50 feet from the vibration source; thus, the proposed project, when combined with the identified cumulative projects, would not cause a cumulatively considerable vibration impact. As a result, cumulative impacts would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

3.10.4 References

California Department of Transportation (Caltrans). 2013. *Technical Noise Supplement (TeNS)*, September.

City of Irvine. 2020. *City of Irvine Municipal Code*. Chapter 2, Noise. Available at https://library.municode.com/ca/irvine/codes/code_of_ordinances?nodeId=TIT6PUWO_DIV8PO_CH2NO. Accessed June 2, 2020.

County of Orange. n.d. *Orange County General Plan*. Noise Element. Available at https://www.ocpublicworks.com/civicax/filebank/blobdload.aspx?blobid=8616. Accessed June 18, 2020.

County of Orange. n.d. *Orange County Municipal Code*. Division 6, Noise Control. Available at https://library.municode.com/ca/orange_county/codes/code_of_ordinances?nodeId=TIT4HESAANRE_DIV6NOCO_ART1GEPR_S4-6-6INNOST. Accessed June 2, 2020.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual*, September.

Fehr & Peers. 2020. *Methodologies and Assumptions Memorandum for Irvine Ranch Water District (IRWD) Syphon Reservoir Construction Transportation Impact Analysis*, May 18.

Irvine Ranch Water District (IRWD). 2018. *Construction Schedule Assumptions*, May.

This page intentionally left blank

3.11 Recreation

This section evaluates the potential for recreation impacts that may result from construction and operation of the proposed project. This section includes: the existing recreational opportunities and facilities in the proposed project vicinity; a summary of applicable regulations related to recreation; and an evaluation of the potential impacts of the proposed project related to recreation in and around the proposed project site, including cumulative impacts.

3.11.1 Environmental Setting

The proposed project site is located in unincorporated County of Orange, within the City of Irvine's sphere of influence. The City and County recreational facilities below characterize the environmental setting of the proposed project area.

Local Parks and Recreation Facilities

The City of Irvine recreational facilities and services include public parks, private parks, an aquatic center, athletic complexes, a nature center, a fine arts center and landscaped recreational trails. Regional parks and open space areas within the City are also available to Irvine residents. Other recreation opportunities within a short traveling distance for Irvine residents include golf courses, bikeways, public beaches, local mountains, natural parks, and deserts (City of Irvine 2015).

The City of Irvine General Plan Parks and Recreation Element categorizes City park facilities into five categories: regional and open space, regional parks, community parks, public neighborhood parks, and private neighborhood parks (City of Irvine 2015). Private neighborhood parks are identified in the Parks and Recreation Element as "able to serve the immediate development or specific planned community in which they are located. Private parks are owned and maintained by homeowner associations or maintenance district" (City of Irvine 2015). The majority of park facilities in the proposed project vicinity are public and private neighborhood parks located in a neighborhood known as Stonegate, which begins southwest of the proposed project site across Portola Parkway and extends to Irvine Boulevard (**Figure 3.11-1**). The City of Irvine maintains Stonegate Park in the project vicinity (City of Irvine 2019a). Private neighborhood parks in the vicinity of the proposed project include Mockingbird Park, Egret Park, Goldfinch Park, Meadowlark Park, Hummingbird Park and Swallows Park (City of Irvine 2017; Villages of Irvine 2020). All public neighborhood parks are available to the public, while private neighborhood parks have varying degrees of public access. **Table 3.11-1** describes the amenities that are available at parks and recreation facilities in the vicinity of the proposed project. Additionally, the Crean Lutheran High School Athletic Complex is located in close proximity to the proposed project site at 6301 Portola Parkway, Irvine CA and is privately owned and operated. The athletic complex is not available to the public.

SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 3.11-1
Parks and Recreation Facilities

ESA

TABLE 3.11-1
PUBLIC PARKS AND RECREATION FACILITIES IN THE PROJECT VICINITY

Name	Location	Description/Amenities
Stonegate Park	280 Honors, Irvine	Softball/youth baseball/soccer field, full basketball courts, tennis courts, sand volleyball, shade structures, barbecues and picnic areas, child play area
Mockingbird Park*	Medallion, Irvine	Jr. Olympic pool with spa and wading pool, half basketball court, shade structures, barbecues and picnic areas, child play area
Egret Park*	45 Ovation, Irvine	Jr. Olympic pool with Spa and wading pool, tennis courts, half basketball court, shade structures, barbecues and picnic areas, child play area
Goldfinch Park*	217 Shelbourne, Irvine	Shade structures, barbecues and picnic areas
Meadowlark Park*	Medford, Irvine	Shade structures, barbecues and picnic areas
Hummingbird Park*	Majesty, Irvine	Lap pool with spa and wading pool, shade structures, barbecues and picnic areas, child play area
Swallows Park*	Encore, Irvine	Jr. Olympic pool with spa and wading pool, shade structures, barbecues and picnic areas, child play area
Orange County Great Park	8000 Great Park Blvd, Irvine	Great Park Sports Complex, Great Park Balloon and Carousel rides, outdoor agricultural classes, playgrounds, 1.5 miles of walking/biking space
Limestone Canyon Nature Preserve	Silverado	Scenic wilderness area with guided tours and open access days for hiking and mountain biking.
Whiting Ranch Wilderness Park	26701 Portola Parkway, Foothill Ranch	23 trails totaling approximately 17 miles of graded roads and single-track trails for hikers, mountain bikers and equestrians. Connectivity to other trails in the OC Parks Regional Trails system.

NOTE:
* These private neighborhood parks are privately maintained and have varying degrees of public accessibility.

SOURCE: City of Irvine 2019; Villages of Irvine 2020; OC Parks 2020

Orange County Parks also maintains several regional parks in the proposed project area. The nearest regional parks include the Orange County Great Park (OCGP), the Limestone Canyon Nature Preserve and Whiting Ranch Wilderness Park. The OCGP, located approximately 3.5 miles to the south of the proposed project site, is the largest park in the City. Currently, the OCGP includes 1,300 acres, 450 acres of which are developed and more than 230 acres that are funded and in progress of development. The OCGP currently includes recreation facilities to support the arts, gardening, agriculture, sports and fitness, and events and festivals (City of Irvine 2017; City of Irvine 2020).

Limestone Canyon Nature Preserve is located approximately 2 miles northeast of the proposed project site within the County of Orange Open Space Reserve (OSR) lands. Whiting Ranch Wilderness Park is located approximately 4.2 miles southeast of the proposed project in areas north of the Foothill Ranch community. While there is an extensive network of trails within both Limestone Canyon Nature Preserve and Whiting Ranch Wilderness Park, the trails in the Limestone Canyon Nature Preserve and Whiting Ranch Wilderness Park do not connect to trails in the vicinity of Syphon Reservoir and the proposed project site (County of Orange 2015; City of Irvine 2017).

Interconnected City bikeways in the vicinity of the proposed project are used for recreation and commuting. City bikeways in the vicinity of the proposed project include the Portola Trail Bikeway, the Sand Canyon Trail Bikeway and the Jeffrey Open Space Trail Bikeway (see Figure 3.11-1). Bikeways are discussed in further detail in Chapter 3.12, Transportation, of this EIR.

3.11.2 Regulatory Framework

Federal

No federal regulations related to recreation are applicable to the proposed project.

State

No state regulations related to recreation are applicable to the proposed project.

Local

County of Orange

General Plan, Land Use Element

The Land Use Element included in the County of Orange General Plan contains official County policies on the location and character of land uses necessary for orderly growth and development. The Land Use Element has a 2025 horizon year and describes objectives, policies, and land use patterns for all unincorporated territory in the County of Orange. The Land Use Plan further establishes development criteria and standards including population density and building intensity. The Land Use Element complements the Recreation Element by incorporating its land use recommendations in policies and programs, however the Land Use Element does not supersede the Recreation Element.

The County of Orange Land Use Element Map designates lands within the proposed project site as Open Space Reserve (OSR) and Public Facilities (4). The OSR land use designation identifies "lands of scenic and natural attraction, and areas of ecological, cultural, historical and recreational significance that are permanently preserved as and restricted to open space and compatible uses." Permitted uses within OSR lands include riding and hiking trails (County of Orange 2015). The Public Facilities (4) land use designation identifies "major facilities built and maintained for public use." Permitted uses include water facilities.

General Plan, Recreation Element

The Recreation Element outlines a comprehensive strategy for meeting Orange County's existing and future recreation needs, set forth in an integrated framework of recreation goals, objectives, policies and programs, as well as a "master plan" for each of three components: The Local Parks Component, the Regional Riding and Hiking Trails Component; and the Regional Recreation

Facilities Component (County of Orange 2012). Goals and objectives that are applicable to existing and planned recreation facilities that are in the proposed project area are as follows:

> **Local Parks Goal 2:** Develop local park sites to provide recreational facilities designed to meet the active recreational needs and preserve natural resources of each community within unincorporated Orange County.

City of Irvine

City of Irvine General Plan, Parks and Recreation Element

The Parks and Recreation Element (Element K) of the City of Irvine General Plan includes an inventory and categorizations for all public recreational facilities within the City, and provides objectives and policies related to the provision and use of recreation facilities (City of Irvine 2015). The current Parks and Recreation Element contains the following objectives and policies that are applicable to the proposed project:

> **Objective K-1 Recreational Opportunities:** Provide for a broad spectrum of recreational opportunities and park facilities, in either public or private ownership, to accommodate a variety of type and sizes of functions.
>
> > **Policy K-1(b):** Encourage the development of special areas in community parks that will enhance recreational and leisure opportunities in the City.
>
> **Objective K-3 Park Location:** Locate park and recreation facilities for safe and easy access by their intended users.
>
> > **Policy K-3(c):** Use the latest adopted Community Parks Master Plan as a guideline for future siting of community parks … Link parks and trails to other open space.

City of Irvine General Plan, Conservation and Open Space Element

The 2015 update to the City of Irvine Conservation and Open Space Element (Element L) provides long-term guidance for the preservation of significant natural resources and open space areas (City of Irvine 2015). Included in the Conservation and Open Space Element are specific objectives and policies for preserving, managing, and using natural and manmade resources. The following objectives and policies are applicable to the proposed project:

> **Objective L-9 Recreation Areas:** Develop and maintain a network of recreational areas that provide a variety of recreational opportunities, and which link and integrate other conservation and open space areas into the land use fabric of the City.

City of Irvine Parks Master Plan

The Parks Master Plan provides guidance for development and maintenance of public parks, which include community parks, neighborhood parks and special use sites accounting for more than 530 acres of park land, in addition to other recreation resources that affect park planning and use. Other recreation resources for which guidance is outlined in the Parks Master Plan include more than 6,500 acres of open space wetlands, oak woodlands, grasslands and coastal sage scrub, on-street and off-street bikeways, and hundreds of private city parks.

The 2017 update to the Parks Master Plan shifts focus away from new development, as was emphasized in the 1988 Community Parks Master Plan, toward the ongoing maintenance and enhancement of park resources in the City of Irvine. The goal of the Parks Master Plan is to help the City continue to provide its residents with high-quality parks, recreation facilities, open spaces, programs and services over the coming decade and beyond (City of Irvine 2017).

3.11.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from Appendix G of the CEQA Guidelines are used as thresholds of significance to determine the impacts of the proposed project as related to recreation. The proposed project would have a significant impact if it would:

1. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.
2. Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.
3. Result in a cumulatively considerable impact to recreation.

Methodology

Recreation information for the proposed project area was derived from various sources and compiled in this chapter to develop a comprehensive understanding of existing park and recreational opportunities as well as constraints that could occur as a result of the proposed project. Information sources include the County of Orange General Plan, City of Irvine General Plan, and the City of Irvine Parks Master Plan.

Impact Analysis

Increase in Use of Recreational Facilities

Impact 3.11-1: The proposed project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

The nearest public recreational facilities to the proposed project include Stonegate Park, located approximately 1,800 feet from the project site, and the Portola Trail Bikeway located on the western portion of Portola Parkway, approximately 500 feet from the project site. Additionally, there are 7 private neighborhood parks that are available to the immediate Stonegate community. The nearest regional parks to the proposed project are the Orange County Great Park, Limestone Canyon Nature Preserve, and Whiting Ranch Wilderness Park. The closest of the three regional parks is Limestone Canyon Nature Preserve, approximately two miles from the project site. As stated previously above, trails at Limestone Canyon Nature Preserve do not connect to the proposed project site. No other regional parks are considered to be close enough to the proposed project to be affected by its recreational visitors. The proposed project does not include any increase in residential units that would increase the permanent residential base of the City of Irvine or larger Orange County. Since demand for parks is typically based on the permanent residential population, and because no population increase would occur as part of the proposed project, the proposed project would not result in an increase in demand/use on existing parks that could result in substantial physical deterioration.

As stated in Chapter 2, *Project Description*, during project design, IRWD will consider passive recreational facilities compatible with the project site. Recreational facilities may include a proposed walking trail along existing access roads at the project site. A potential trail extension may be installed east from the existing Highline Canal and would be located on ridges or other relatively gradual-sloped terrain as shown on Figure 2-2. The new proposed walking trail would have the potential to draw local residents to the area that could indirectly increase the use of public parks in the vicinity of the proposed project. While use of existing bicycle paths would not increase as a result of the proposed project since bicycles are not allowed on the proposed project site, pedestrians could increasingly use bike paths to access the proposed recreation facilities at the project site. Nonetheless, it is assumed that implementation of passive recreation opportunities at the proposed project site would only draw users from the local community in and around the project area, mostly from the Stonegate community and other adjacent neighborhoods. Additionally, IRWD would moderate the use of a recreation trail at Syphon Reservoir by restricting entrance to daily or seasonal use, further reducing the potential for nearby public recreation facilities to be impacted by an increase in visitors to the project site. The nearest private recreational facility is the Crean Lutheran High School Athletic Complex. While private users of the Athletic Complex could use the proposed recreation trail, the private Athletic Complex would not be available to new users of the proposed recreation trail. Thus, the Athletic Complex facilities would not be indirectly impacted by any increase in visitors that may occur as a result of the proposed project. As a result, impacts related to physical deterioration of nearby recreational facilities would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Expansion of Recreational Facilities

Impact 3.11-2: The proposed project could include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

Construction

Construction of the proposed project could involve implementation of a passive recreation trail in a manner that is compatible with the project site, as shown in Figure 3.11-1. A large portion of the proposed walking trail would follow the existing dirt access road along the Highline Canal in the south and southwest portions of the proposed project site. The proposed walking trail traverses through coastal sage scrub and disturbed coastal sage scrub communities. The existing Highline Canal would be backfilled for installation of the proposed walking trail. Construction of a trail would occur through grading and compacting of native material. No existing vegetation would be impacted by installation of a trail along existing roads or the Highline Canal. A potential trail extension may be installed east from the existing Highline Canal and would be located on ridges or other relatively gradual-sloped terrain. This area contains coastal sage scrub and disturbed coastal sage scrub communities. The potential impacts related to constructing passive recreation facilities are evaluated throughout this Draft EIR, with notable impacts summarized below.

As described in Section 3.3, *Biological Resources*, construction of the proposed project would result in impacts to special-status species and sensitive natural communities that would be potentially significant. In 2019, habitat areas immediately adjacent to the existing Highline Canal and associated dirt access road were surveyed for sensitive biological species occurrences. The surveys recorded three least Bell's vireo territories, three California gnatcatcher occurrences, and one yellow-breasted chat occurrence during 2019 surveys in the vicinity of the Highline Canal. Surveys conducted in the vicinity of the north-northwest areas of the project site, where the proposed trail would extend from the Highline Canal to an existing northern access road, observed one least Bell's vireo territory, one California gnatcatcher occurrence, and one yellow-breasted chat occurrence. Implementation of Mitigation Measure BIO-1 through BIO-5 would ensure that impacts to special-status species would be reduced to less than significant levels; implementation of Mitigation Measure BIO-6 would reduce impacts to sensitive natural communities and riparian habitat to less than significant levels; and implementation of Mitigation Measures BIO-3 and BIO-5 would reduce impacts to wildlife movement and nursery sites to less than significant levels. The proposed project would not conflict with the provisions of the NCCP/HCP, or local policies and ordinances with implementation of Mitigation Measures BIO-1 and BIO-2. Final design would determine the appropriateness and location of the proposed walking trail on existing access roads and any other optional recreational facilities. Operation and maintenance of the proposed walking trail would be included in the Resource Management Plan required as part of Mitigation Measure BIO-5. Coordination and approval from regulatory agencies, including USFWS and CDFW, would be required for onsite recreational components.

As described in Section 3.4, *Cultural Resources*, construction of the proposed walking trail along the Highline Canal would occur in close proximity to a historic-period archaeological site. Although the archaeological site has not been evaluated for eligibility for listing in the California Register, impacts to potentially significant cultural resources as a result of construction of recreational facilities would be potentially significant. Implementation of Mitigation Measure CR-1 would result in avoidance of this resource, and Mitigation Measure CR-2 through CR-4 would ensure that construction activities are monitored and assessed for unanticipated discoveries. With implementation of Mitigation Measures CR-1 through CR-4, impacts would be reduced to less than significant levels. Construction of the proposed recreational facilities would not otherwise have an adverse physical effect on the environment. Therefore, impacts would be less than significant with mitigation.

Operation

Operation of the proposed project could result in use of a proposed recreational trail shown on Figure 3.11-1. The potential impacts of operating the proposed passive recreational facilities are evaluated throughout this Draft EIR, with notable impacts summarized below. Impacts to biological resources during operation and maintenance activities related to the proposed walking trail could result in indirect impacts to special-status wildlife species and local wildlife movement (see Section 3.3, *Biological Resources*). With implementation of Mitigation Measure BIO-5, impacts would be reduced to less than significant levels. Further, implementation of Mitigation Measure CR-4 would ensure that any cultural resources encountered during maintenance of the proposed recreational facilities are not significantly impacted. Operation and maintenance of the proposed recreational facilities would not otherwise have an adverse physical effect on the environment. Therefore, impacts would be less than significant with mitigation.

Mitigation Measures

Implement Mitigation Measures BIO-1 through BIO-6 and CR-1 through CR-4

Significance Determination

Less than Significant Impact with Mitigation

Cumulative Impacts

Impact 3.11-3: Concurrent construction and operation of the proposed project and related projects in the geographic scope would not result in cumulative impacts to recreation.

The cumulative projects to be considered in the analysis of cumulative impacts are listed in Table 3-1, Related Projects for Cumulative Analysis, and illustrated on Figure 3-1, Cumulative Project Locations, in Chapter 3 of this Draft EIR. The only cumulative projects that could have impacts to recreation when combined with the proposed project, and that could result in cumulatively considerable impacts, are large scale development projects or other proposed uses that may conflict with recreation policies within the City of Irvine and County of Orange. Since there are no major plans for development at the recreation facilities described in Table 3.11-1, it is assumed that any operation and maintenance at the facilities included in Table 3.11-1 would be small-scale. Therefore, the existing facilities do not meet the criteria for cumulative projects.

The City is in the process of conceptual planning for large scale development of a new recreation facility, Gateway Community Park (Cumulative Project 3 in Table 3-1), on land adjacent to the western boundary of the project site. Conceptual planning and community outreach for the Gateway Community Park have been ongoing since the year 2003, and the current goal for completion is 2021 (City of Irvine 2019b). Plans include the potential development of a 70-acre park at the terminus of the Jeffrey Open Space Trail that could include a community center, gymnasium, hiking trails, an 18-hole disc golf course, a dog park, picnic areas, and other amenities (City of Irvine 2017). Due to the proximity and size of the project, construction and operation of Gateway Community Park in combination with the proposed project would have the potential to result in cumulatively considerable impacts to recreation.

Construction and Operation

The City of Irvine designates the site of Gateway Community Park project for Open Space (Recreation) land use, and City zoning designates the site for recreation (City of Irvine 2014; City of Irvine 2015). As such, construction of the Gateway Community Park alone would not conflict with recreation policies within the City. In fact, Gateway Community Park would achieve City plans and policies related to linking trails to open space areas and providing a range of recreation facilities in the City. The proposed project would implement the recreation trail, including the potential connections to Gateway Community Park, in compliance with City and County plans and policies related to recreation. Gateway Community Park would attract new recreation visitors. However, since attracting new recreation visitors is the intention of the project, Gateway Community Park components would be developed with the capacity to provide for the additional visitors and would not be impacted by any physical deterioration. The proposed project itself would not attract new visitors other than from the local community. As a result, there would be no deterioration of recreational facilities. Further, the proposed project and the Gateway project would not combine to create cumulative effects regarding deterioration of recreational facilities. Therefore, when considered together with Cumulative Project 3, the proposed project would not impact City plans and policies for recreation and would not have cumulatively considerable impacts on recreation.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

3.11.4 References

City of Irvine. 2014. Zoning Map. Available at http://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=13672. Accessed May 28, 2020.

City of Irvine. 2015. *City of Irvine General Plan*, amended June 2015. Available at https://www.cityofirvine.org/community-development/current-general-plan. Accessed May 11, 2020.

City of Irvine. 2017. *City of Irvine Parks Master Plan.* Available at http://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=29900. Accessed May 11, 2020.

City of Irvine. 2019a. City of Irvine Parks & Facilities Inventory. Available at http://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=29899. Accessed May 11, 2020.

City of Irvine. 2019b. *Irvine Ranks No. 6 Among U.S. Parks.* Available at https://www.cityofirvine.org/economic-development/irvine-ranks-no-6-among-us-parks. Accessed May 26, 2020.

City of Irvine. 2020. Orange County Great Park Web Site. Available at https://www.cityofirvine.org/orange-county-great-park. Accessed May 13, 2020.

County of Orange. 2015. *County of Orange General Plan Land Use Element,* Amended October 2015. Available at: http://www.ocpublicworks.com/civicax/filebank/blobdload.aspx?blobid=55705. Accessed May 12, 2020.

County of Orange. 2012. *County of Orange General Plan Recreation Element*, Amended 2012. Available at https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=24960. Accessed May 12, 2020.

OC Parks. 2020. Whiting Ranch Wilderness Park Web Site. Available at https://www.ocgov.com/gov/occr/ocparks/parks/limestone/default.asp. Accessed May 29, 2020.

Villages of Irvine. 2020. Villages of Irvine Web Site. Available at: https://www.villagesofirvine.com/villages-neighborhoods/stonegate/parks/. Accessed May 12, 2020.

This page intentionally left blank

3.12 Transportation

This section evaluates the potential for impacts related to transportation generated by construction and operation of the proposed project. This section includes: a description of the existing transportation and circulation conditions regionally and in and around the proposed project site; a summary of applicable regulations related to transportation; and an evaluation of the potential impacts of the proposed project related to transportation and traffic in and around the project site, including cumulative impacts. The analysis in this section is based in part on the Transportation Impact Analysis prepared for the proposed project (Fehr & Peers 2020a) and included as **Appendix E** to this Draft EIR.

3.12.1 Environmental Setting

Regional Setting

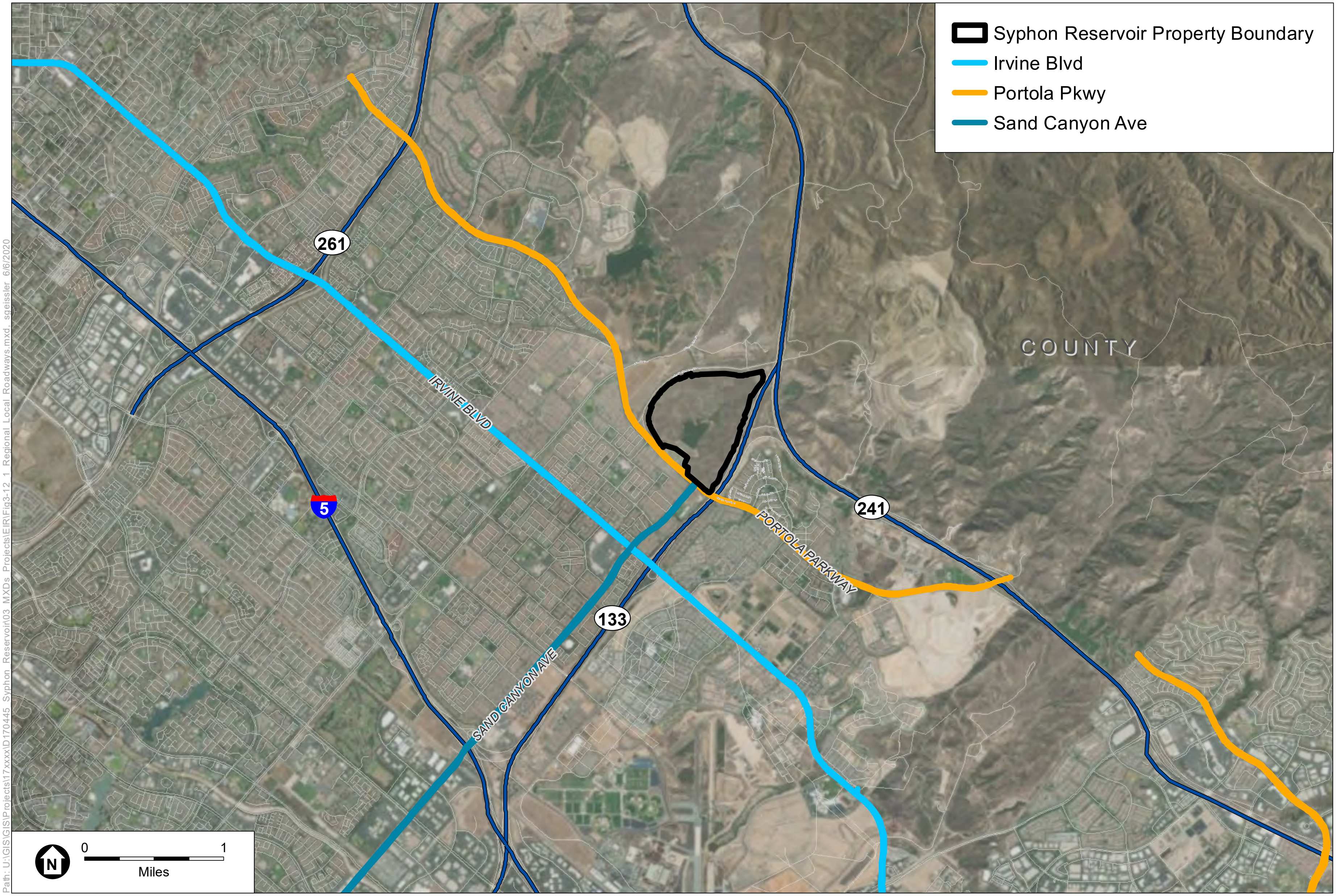
The proposed project would be implemented at the existing Syphon Reservoir site located in unincorporated County of Orange just northeast of the City of Irvine, California. The regional transportation system is comprised of an interconnected network of roadways, local transit systems, and pedestrian and bicycle facilities. Freeways and toll roads in the general vicinity of the proposed project site include the Laguna Freeway/Eastern Transportation Corridor East Leg (State Route [SR-] 133) directly east of the project site, the Eastern Transportation Corridor West Leg (SR-261) to the northwest, the Foothill Transportation Corridor (SR-241) to the east and north, and the Santa Ana Freeway (Interstate [I-] 5). Major arterials include Portola Parkway directly south of the project site, Sand Canyon Avenue to the south, and Irvine Boulevard to the southwest (City of Irvine 2015). A series of major arterial roads within the community connect to collector roads that function to link neighboring land uses. **Figure 3.12-1** depicts regional highways and arterial roads in the vicinity of the proposed project.

SR-133 is a 14-mile-long north–south state highway that provides regional access to the project area, running between Laguna Beach and Irvine in the vicinity of the proposed project. SR-133 has an on- and off-ramp at Irvine Boulevard approximately 0.7 miles south of the proposed project site.

SR-261 is a 6-mile-long north–south state highway that provides regional access to the project area, running between Anaheim Hills and Irvine in the vicinity of the proposed project. SR-261 has an on- and off-ramp at Portola Parkway approximately 2.6 miles northwest of the proposed project site.

SR-241 is a 24-mile-long north–south state highway that provides regional access to the project area, running between Ladera Ranch and Irvine in the vicinity of the proposed project. SR-241 has an on- and off-ramp approximately 2 miles southeast of the project site and connects to SR-133 approximately 0.5 miles east of the proposed project site.

I-5 is a major north–south interstate highway that provides regional access to the project area, running through Irvine in the vicinity of the proposed project. I-5 connects to SR-133 approximately 2.9 miles south of the proposed project site.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 3.12-1
Regional and Local Roadways

ESA

Local Roadways

The proposed project site is located on the northeast side of Portola Parkway between Bee Canyon Access Road and Sand Canyon Avenue. Various roadways surrounding the proposed project site provide local access as identified in Figure 3.12-1. The following roadways provide both local access to the proposed project site and connect to the regional arterials and highways described above:

Portola Parkway is designated as both a Primary Highway and a Major Highway in the City of Irvine Master Plan of Arterial Highways. This four- to six-lane split roadway traverses in a northwest/southeast direction along the southern boundary of the proposed project site. The portion of the roadway that is directly south of the proposed project site has four lanes (two in each direction). There is no on-street parking allowed on this portion of the roadway. The posted speed limit on Portola Parkway ranges from 50 to 55 miles per hour, and 25 miles per hour near the Crean Lutheran Athletic Complex. Notable features along Portola Parkway include bike lanes on both the northbound and southbound sides of the roadway, and a separated sidewalk, known as the Portola Side Path, on the southbound side of the roadway. There is no sidewalk on the northbound side.

Sand Canyon Avenue is designated as both a Primary Highway and Major Highway in the City of Irvine Master Plan of Arterial Highways. This four- to six-lane split roadway traverses in northeast/southwest direction and is one of the major roads in Orange County, running from the existing Syphon Reservoir to I-5. There is no on-street parking allowed on either side of Sand Canyon Avenue. The posted speed limit is 55 miles per hour and 25 miles per hour near Crean Lutheran High School south of Portola Parkway. Sand Canyon Avenue includes bike lanes and sidewalks on both the northbound and southbound sides.

Irvine Boulevard is designated as a Major Highway in the City of Irvine Master Plan of Arterial Highways. This six-lane split roadway traverses in northwest/southeast direction, running from SR-55 to the City of Lake Forest. The posted speed limit is 55 miles per hour. The roadway includes bike lanes and sidewalks on both the northbound and southbound sides.

Traffic Volumes

Orange County Transportation Authority (OCTA) collects information on average daily traffic counts on arterial roadways and freeways from the County, the 34 cities within the County, and the California Department of Transportation (Caltrans) on an annual basis. OCTA reviews the traffic volumes and adjusts the data as necessary to reflect weekday traffic. This information is published on an annual basis on a Traffic Flow Map (OCTA 2019a) that shows Average Daily Traffic (ADT) in thousands of vehicles per day. ADT for the major arterial roadways and freeways in the immediate vicinity of the proposed project is shown in **Table 3.12-1**.

TABLE 3.12-1
EXISTING ROADWAY VOLUMES IN THE PROJECT AREA ('000S OF VEHICLES PER DAY)

Roadway Segment	ADT
Portola Parkway (Between Jeffrey Rd and Sand Canyon Ave)	19,000
Sand Canyon Avenue (Between Irvine Blvd and Portola Pkwy)	16,000
Irvine Boulevard (Between Jeffrey Rd and Sand Canyon Avenue)	25,000
I-5 (SR-133 Junction)	201,000
SR-133 (SR-241 Junction)	46,700
SR-261 (Portola Parkway Exits)	37,900
SR-241 (SR-133 Junction)	39,200

ADT = Average Daily Traffic

SOURCE: Caltrans 2018; OCTA 2019a

Public Transportation

The City of Irvine is served by Metrolink train service and the OCTA bus service. Metrolink is a commuter rail service operated by the Southern California Regional Rail Authority. Multiple stops during the morning and evening commuting period are provided at stations located in Irvine, Laguna Niguel, Tustin and San Juan Capistrano. The nearest train station to the proposed project site is the Irvine Metrolink, approximately 3.6 miles south of the proposed project site. The nearest bus route that services the project area is OCTA Community Route 167, which runs northwest and southeast on Irvine Boulevard (OCTA 2020). The nearest bus stop is the Irvine-Jeffrey stop at the intersection of Irvine Boulevard and Jeffrey Road approximately 0.9 miles southwest of the project site. Regular service hours for OCTA Community Route 167 are from approximately 5 a.m. to 8:30 p.m. Monday through Friday, with hourly service times at each stop.

Bicycle and Pedestrian Transportation

The City of Irvine has an extensive trail system that includes pedestrian and bike trails within open space corridors and along regional trails. The County maintains a coordinated system of trails, including bikeways, equestrian trails and hiking trails within the cities. Bikeways comprise the most extensive part of the City's trail network. The biking network in Irvine connects with other trails and paths in adjacent communities and throughout Orange County. The three categories of bikeways are:

- Class I (Bicycle Path): provides a completely separated right-of-way for the exclusive use of bicycles and pedestrians with crossflow by motorists minimized;
- Class II (Bicycle Lane): provides a striped lane for one-way bicycle travel on a street or highway; and
- Class III: (Bicycle Route): provides for shared use with pedestrian or motor vehicle traffic.

The City of Irvine contains 54 miles of off-street Class I bicycle trails and 301 miles of on-street Class II bicycle lanes within the City. The closest bike paths to the proposed project site include the Portola Trail Bikeway (Class I), the Sand Canyon Trail Bikeway (Class I), and the Jeffrey

Open Space Trail Bikeway (Class I) as shown on Figure 3.11-1 in Section 3.11, Recreation (City of Irvine 2011; City of Irvine 2015a).

3.12.2 Regulatory Framework

The development and regulation of the transportation network in the vicinity of the proposed project primarily involves state and local jurisdictions. All roads within the proposed project area are under the jurisdiction of state and local agencies. Applicable state and local laws and regulations related to traffic and transportation issues are discussed below.

Federal

There are no federal regulations applicable to the proposed project.

State

California Department of Transportation (Caltrans)

Caltrans manages interregional transportation, including management and construction of the California highway system. In addition, Caltrans is responsible for permitting and regulation of the use of state roadways. The project area includes four highways that fall under Caltrans' jurisdiction: SR-133, SR-261, SR-241, and I-5.

Caltrans' construction practices require temporary traffic control planning "when the normal function of a roadway, or private road open to public travel, is suspended" (FHWA 2012). In addition, Caltrans requires that permits be obtained for transportation of oversized loads and licenses be obtained for transportation of certain materials.

Senate Bill No. 743

Approved in 2013, Senate Bill (SB) 743 amended the CEQA Guidelines to provide an alternative to level of service (LOS) for evaluating transportation impacts. In accordance with Senate Bill (SB) 743, the new CEQA Guidelines Section 15064.3, subdivision (b) was adopted in December 2018 by the California Natural Resources Agency. These revisions to the CEQA Guidelines criteria for determining the significance of transportation impacts are primarily focused on projects within transit priority areas and shift the focus from automobile delay to reduction of greenhouse gas emissions, creation of multimodal networks, and promotion of a mix of land uses. Automobile delay, as measured by LOS and other similar metrics, generally no longer constitutes a significant environmental effect under CEQA. The intent of this legislation is to balance the need for traffic LOS standards with the need to build infill housing and mixed-use commercial developments within walking distance of mass transit facilities, downtowns, and town centers. In doing so, this legislation aims to provide greater flexibility to local governments to balance these sometimes competing needs. However, a jurisdiction may still adopt LOS as a performance standard for analyzing traffic conditions and maintaining throughput on its highway system. The Governor's Office of Planning and Research (OPR) has adopted changes to the CEQA Guidelines that identify vehicle miles traveled (VMT) as the most appropriate metric to evaluate a project's transportation impacts. Vehicle miles traveled, or VMT, is a measure of the total number of miles driven to or from a development and is sometimes expressed as an average per trip or per person. OPR stated that lead agencies, including the City of Irvine, had until July 1, 2020 to implement the new VMT requirements. On June 23, 2020, the City of Irvine adopted the *CEQA VMT Impact Analysis Guidelines* (City of Irvine 2020), which identifies the screening criteria, analysis requirements, thresholds, and mitigation options for VMT analysis associated with the operation of new projects in the City of Irvine. According to the City of Irvine's adopted *Guidelines*, projects generating fewer than 250 weekday daily trips do not meet the daily trip screening threshold and are excluded from further VMT impact analysis. Neither OPR nor the City of Irvine have adopted specific VMT metrics or thresholds of significance for construction-related traffic. Many jurisdictions in Southern California consider construction-related traffic to cause adverse but not lasting intersection deficiencies because, while sometimes inconvenient, construction-related traffic efforts are temporary.

Local

County of Orange

Orange County Congestion Management Plan

OCTA is the County's Congestion Management Agency. OCTA is responsible for developing the Orange County Congestion Management Program (CMP). The CMP contributes to federal Congestion Management Process requirements, which is a systematic and regionally-accepted approach for managing congestion. The federal Congestion Management Process provides accurate, up-to-date information on transportation system performance and assesses alternative strategies for congestion management that meet state and local needs. The CMP is also intended to serve as a systematic process that provides for consistent and effective integrated monitoring and management of the multimodal transportation system.

The goals of Orange County's CMP are to support regional mobility objectives by reducing traffic congestion, to provide a mechanism for coordinating land use and development decisions that support the regional economy, and to support gas tax funding eligibility. To meet these goals, the CMP contains a number of policies designed to monitor and address system performance issues. OCTA developed the policies that makeup Orange County's CMP in coordination with local jurisdictions, Caltrans, and the South Coast Air Quality Management District (SCAQMD).

The CMP requires that a traffic impact analysis be conducted for any project generating 2,400 or more daily trips, or 1,600 or more daily trips for projects that directly access the CMP Highway System. Per the CMP guidelines, this number is based on the need to analyze any impacts that will be three percent or more of the existing CMP highway system facilities' capacity. The CMP Highway System includes specific roadways, which include State Highways and Super Streets, which are now known as Smart Streets, and CMP arterial monitoring locations/intersections. The CMP Highway System arterial in the vicinity of the proposed project includes Irvine Boulevard. The CMP arterial monitoring locations/intersections in the vicinity of the project area include SR-133 Northbound/Irvine Boulevard, SR-133 Southbound/Irvine Boulevard, SR-261 Northbound/Irvine Boulevard, and SR-261 Southbound/Irvine Boulevard (OCTA 2019b). The proposed project would not generate 1,600 or more daily trips, or increase daily trips by three percent or more, on the CMP Highway System.

Orange County Commuter Bikeways Strategic Plan

OCTA adopted the 2009 Commuter Bikeways Strategic Plan (CBSP) on May 22, 2009 to encourage the enhancement of Orange County's regional bikeways network, in order to make bicycle commuting a more viable and attractive travel option. The CBSP is intended to create a comprehensive blueprint of the existing bikeways in the county, as well as propose new facilities to complete a network of bikeways. The CBSP identifies Class I Bikeways along Portola Parkway, Sand Canyon Boulevard, and Jeffrey Road. The projects described in the CBSP are a compilation of projects planned by Orange County Cities and the County of Orange. The CBSP is a long-range, financially unconstrained planning document (OCTA 2012).

Southern California Association of Governments

In April 2016, the Southern California Association of Governments (SCAG) adopted its 2016 Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS). The 2016 RTP/SCS presents the transportation vision for the SCAG region through the year 2040 and provides a long-term investment framework for addressing the region's transportation and related challenges. The RTP/SCS focuses on maintaining and improving the transportation system through a balanced approach and discusses long-term emission reduction strategies for rail and trucks, expanding the region's high speed and commuter rail systems, expanding active transportation, leveraging technological advances for transportation, addressing further regional reductions in greenhouse gas emissions, and making the region more resilient to climate change. The plan is subject to numeral performance measures to monitor its progress toward achieving social equity and environmental justice; these measures include accessibility to parks and natural lands, roadway noise impacts, air quality impacts and public health impacts (SCAG 2016).

City of Irvine

General Plan, Circulation Element

The City of Irvine's current General Plan was last amended in 2015. The Circulation Element describes the nature and extent of the existing circulation network, and identifies trends, issues, and public policies relating to the development of a balanced, multi-modal circulation system for the City. The circulation system has been designed to create a hierarchy of roadways, reinforce boundaries of planning areas, respond to conservation, noise, air pollution, and wildlife preservation policies, and satisfy General Plan and Strategic Business Plan objectives.

The Circulation Element classifies Arterial Highways in the City primarily by the number of lanes within the roadway. The Arterial Highways in the vicinity of the proposed project site are classified as either Major Highways, which have six to eight lanes, or Primary Highways, which have four lanes (City of Irvine 2015b). The roadway portions that are in the vicinity of the project site are as follows: Portola Parkway is designated as a Primary Highway; Sand Canyon Avenue is designated as a Primary Highway; and Irvine Boulevard is designated as a Major Highway.

The following objectives and policies in the Circulation Element would be applicable to the proposed project's intersection improvements:

Objective B-2 Roadway Design: Develop a vehicular circulation system consistent with high standards of transportation engineering safety and with sensitivity to adjoining land uses.

Policy (g): Include mitigation measures in the approval of all proposed developments to minimize negative impacts of the automobile.

Policy (h): Properly space and interconnect traffic signals in order to minimize the number of traffic signals, and the acceleration/deceleration that produces significantly higher vehicular emissions and noise levels.

Policy (i): Utilize traffic control device systems that are understandable, attractive, simple, uniform, and visible.

Objective B-3 Pedestrian Circulation: Establish a pedestrian circulation system to support and encourage walking as a mode of transportation.

Policy (b): Require development to provide safe, convenient, and direct pedestrian access to surrounding land uses and transit stops. Issues such as anticipated interaction between pedestrians and vehicles, proposed infrastructure improvements and design standards shall be considered.

Policy (c): Design and locate land uses to encourage access to them by nonautomotive means.

Objective B-4 Bicycle Circulation: Plan, provide and maintain a comprehensive bicycle trail network that together with the regional trail system, encourages increased use of bicycle trails for commuters and recreational purposes.

Policy (d): Require bicycle trail linkages between residential areas, employment areas, schools, parks, community facilities, commercial centers, and transit facilities.

Policy (g): Require traffic control devices and traffic signal phasing for bicycle crossing, turning, and through movements.

City of Irvine Active Transportation Plan and Bicycle Transportation Plan

The 2015 Active Transportation Plan provides an integrated set of recommendations for increasing the levels of walking and bicycling in the City of Irvine. The plan also discusses adopted plans and policies related to bicyclists and pedestrians in the city of Irvine, such as municipal codes and the City's Bicycle Transportation Plan, describes the existing pedestrian bicycle network, and provides opportunity areas for growing the active transportation network.

The Bicycle Transportation Plan includes a collision analysis to assess bicycle patterns and trends in the City. The City determined that safety is a major concern for bicyclists and pedestrians, as there was an average of 58.6 bicycle-related collisions per year and an average of 38.8 pedestrian-related collisions per year in the City from 2008 to 2012 (City of Irvine 2015a). In general, bicycle and pedestrian collisions occurred most frequently from Tuesday to Friday during daylight hours. A summary of the collision data includes a list of key City roadways where a higher number of bicycle and pedestrian collisions have occurred. Portola Parkway, which is the southern adjacent road to the proposed project site, is not included in the list of roadways, which have had the most collision occurrences. However, the Portola Parkway/Sand Canyon Avenue and Portola Parkway/Jeffrey Road intersections are identified as High Stress Segments. In the 5-year data period, the collision map indicates that approximately 4 bicycle collisions occurred at the Portola Parkway/ Sand Canyon Avenue intersection and approximately 2 bicycle collisions occurred at the Portola Parkway/ Jeffrey Road intersection. No collisions involving pedestrians occurred in close proximity to the proposed project site (City of Irvine 2011; City of Irvine 2015a).

City of Irvine Municipal Code

Section 6-3-565 of the City of Irvine's Municipal Code designates streets and portions of streets within the City as truck routes. In the vicinity of the proposed project, truck routes are designated on Sand Canyon Avenue, Laguna Freeway (all SR-133 designated portions), Irvine Boulevard (from Culver Drive to the eastern City limit), and I-5.

Pursuant to Section 5-10-203 of the City of Irvine Municipal Code, under Chapter 2 Encroachment Regulations, the proposed project would be required to obtain a Traffic/Hauling permit from the Chief Building Official, unless explicitly exempted by conditions outlined under Section 5-10-204, "Exemptions from Permit Requirements." The proposed project would include construction activities that may cause, place or maintain an encroachment in a public street, which warrants the above mentioned permit and approval from the City.

Section 5-10-246 of the City's Municipal Code outlines restrictions and procedures for Construction Traffic Control. Notably, all detours caused by project construction within the City streets shall have a detour plan approved by the City prior to construction. Detours shall be defined as the closure of any part of the traveled right-of-way.

Chapter 5, Vehicular Traffic, Parking Regulations, Section 6-3-569 of the City's Municipal Code, outlines permit conditions and procedures for project construction vehicles exceeding allowable load restrictions. The Extra Large Legal Size Transportation Permit, in accordance with California Vehicle Code Sections 35780 and 35784, must be approved by the Director of Public Works to authorize operation of a vehicle exceeding the maximum load on restricted use roadways. The permit may be for such lengths of time, up to a 12 months, and for such number of operations, limited or unlimited, as the Director of Public Works may deem advisable.

Section 6-3-567(A) of the City's Municipal Code outlines the restricted use of certain streets for vehicles in excess of 14,000 pounds gross weight. Jeffrey Road, which intersects with Portola Parkway northwest of the proposed project site, is designated as a restricted use roadway. Due to this restriction and the fact that other unrestricted parallel local roadways would provide more direct access to the project site (e.g., Sand Canyon Avenue), this segment of Jeffrey Road would not be used or affected during project construction.

Section 6-3-567(B) of the City's Municipal Code outlines the restricted use of certain streets for vehicles in excess of 6,000-pound gross weight. No roads in the vicinity of the proposed project site are designated as a restricted roadway in Section 6-3-567(B).

City of Irvine Transportation Design Procedures

The *City of Irvine Transportation Design Procedures* (TDPs) establish uniform policies and procedures to assist with the design and review of transportation-related features of development projects in the City of Irvine (City of Irvine 2007). At the request of the City of Irvine, the proposed intersection improvements at Sand Canyon Avenue and Portola Parkway were evaluated for consistency with the following TDPs: TDP 1, which recommends lengths of left-turn pockets; TDP 14, which identifies recommended lengths for driveways to projects based on the number of peak hour trips entering a project site; and TDP 15, which identifies recommendations for vehicle stacking and gate-stacking at project sites.

3.12.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from CEQA Guidelines Appendix G are used as thresholds of significance to determine the impacts of the proposed project as related to transportation and traffic. The proposed project would have a significant impact if it would:

1. Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.
2. Conflict or be inconsistent with CEQA Guidelines Section 15064.3(b).
3. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
4. Result in inadequate emergency access.
5. Result in cumulatively considerable impacts to transportation and traffic.

Methodology

Analysis of traffic-related impacts of the proposed project rely on methodologies and analysis included in detail in the Transportation Impact Analysis (TIA) prepared for this proposed project (Fehr & Peers 2020a). The TIA includes an operational analysis of eight intersections along Sand Canyon Avenue and Irvine Boulevard that would be used by construction-related traffic to access the project site. However, that analysis is based on transportation performance metrics (i.e., delay, LOS) that are no longer used to determine a CEQA transportation impact per SB 743 and CEQA Guidelines Section 15064.3, subdivision (b), and therefore is not included in the impact discussion. Operational considerations at the intersection of Sand Canyon Avenue and Portola Parkway, which would be modified as part of the proposed project, are included in the impact discussion to disclose whether any hazardous conditions would be introduced as a result of project modifications. Additionally, in order to comply with SB 743, the TIA includes a VMT analysis. The TIA is included as Appendix E to this document.

Due to existing settings associated with the COVID-19 pandemic and closures of schools in the project area in 2020, intersection counts for the proposed project were estimated using previous intersection counts from the year 2018, as provided by the City of Irvine. A growth factor of 2 percent per year was applied to these previous 2018 counts to develop 2020 intersection volumes for the AM and PM peak hours. Information included in the Transportation Impact Analysis includes lane configurations, signal phasing, land uses in the study area, existing pedestrian and bicycle facilities, and transit services.

Impact Analysis

Circulation Programs, Plans, Ordinances, and Policies

Impact 3.12-1: The proposed project could conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.

Construction

As described in Section 2.4.4 of this Draft EIR, the proposed project would involve improvements at the Sand Canyon Avenue/Portola Parkway intersection to allow for vehicle access to the proposed project site by construction and maintenance workers. Construction at the intersection would occur over approximately four to five months prior to the new proposed reservoir improvements and would require up to 42 daily vehicle trips. While the proposed intersection work would not involve closure of any roadways, temporary lane closures could create delays and/or detours for bikers and pedestrians traveling along the Portola Trail and for vehicles traveling through the intersection. To ensure that impacts related to the circulation system do not occur as a result of the proposed project, IRWD would implement **Mitigation Measure TRA-1**, which would require the preparation and implementation of a Traffic Control Plan. The Traffic Control Plan would include, but not be limited to, signage, striping, delineated detours, flagging operations, changeable message signs, delineators, arrow boards, and K-Rails that will be used during construction to guide motorists, bicyclists, and pedestrians safely through the construction area and allow for adequate emergency access and circulation to the satisfaction of the City. The Traffic Control Plan would be coordinated with the City of Irvine, as necessary, as well as with emergency responders, which include fire departments, police departments, and ambulances that have jurisdiction within the proposed project area. Therefore, with implementation of Mitigation Measure TRA-1, impacts to circulation system during the initial intersection improvement phase of the proposed project would be reduced to a less-than-significant level.

Construction of the remaining components of proposed project would increase the number of vehicles using local roadways on a daily basis and could affect performance of the circulation system. After the proposed intersection improvements and access road construction is complete as described above, construction of the proposed project is expected to occur over approximately 36 months, weather permitting. The primary impacts from the movement of construction vehicles would include short-term and intermittent impacts on roadway capacities due to slower moving vehicles. Traffic-generating construction activities would consist of the daily arrival and departure of constructions workers, trucks hauling equipment and materials to the construction site, the hauling of excavated soils, and importing of new fill and concrete. Trucks leaving roadways onto construction sites would slow traffic and could result in hazards to fast moving traffic.

On any given work day, between 10 and 46 workers would be required onsite for construction of the proposed project. The total number of workers would vary depending on the construction schedule developed by the construction contractors. Excavation of soils/materials and the removal of the existing dam from the project site would require up to 74 daily vehicle trips for a period of approximately 7 to 9 months. Weather permitting, construction of the new proposed dam, spillway and expanded reservoir would be completed within approximately 14 months. Up to approximately 232 daily trips per day for approximately 3 to 4 months would be required for haul trucks, equipment delivery, and employee vehicles during this construction phase. This 3- to 4-month period represents the heaviest period of daily construction vehicle trips that would be generated by the proposed project. Approximately 0.1 million cubic yards of rock, gravel, and other materials would be imported to the site during this construction phase. Weather permitting, construction of the new proposed treatment facilities would last approximately 12 months and would require an estimated peak of 104 construction vehicle trips per day. Installation of proposed wetlands and riparian habitat would occur over a period of 12 months and would include up to 50 construction vehicle trips during peak days. Installation of proposed recreation facilities would occur over a period of 3 months and would require up to 30 construction vehicle trips per day. Demobilization activities would occur over approximately 1 month and would require up to 44 construction vehicle trips during peak days (Fehr & Peers 2020b).

As described above, peak construction trip generation would occur during construction of the new proposed dam, spillway and reservoir (up to 232 daily construction vehicle trips). Trip generation outside of this phase would be greatly reduced with approximately 30 daily to 104 daily trips being generated. Thus, during construction the number of daily round trips on local roadways would not be expected to exceed 232 total construction vehicle trips per day. As shown in Table 3.12-1, workers and haul/delivery trips are likely to use main arterial roadways with existing daily roadway volumes ranging from 16,000 ADT to 25,000 ADT, such as Portola Parkway between Jeffrey Boulevard and Sand Canyon Avenue (19,000 ADT), Sand Canyon Avenue between Irvine Boulevard and Portola Parkway (16,000 ADT), and Irvine Boulevard between Jeffrey Road and Sand Canyon Avenue (25,000 ADT). Relative to the numbers of vehicles that travel on local roadways and freeways during weekdays as shown in Table 3.12-1, an additional 232 vehicle trips would represent a temporary increase of 1.2 percent in ADT on Portola Parkway, 1.5 percent on Sand Canyon Avenue, and 0.9 percent on Irvine Boulevard. Similarly, workers and haul/delivery trips are likely to use nearby freeways with daily freeway volumes ranging from 37,900 ADT to 46,700 ADT, such as SR-261 at Portola Parkway on- and off-ramps (37,900 ADT), SR-241 at the SR-133 junction (39,200 ADT), and SR-133 at the SR-241 junction (46,700 ADT). An additional 232 vehicle trips would represent a temporary increase of 0.6 percent in ADT on SR-261, 0.5 percent on SR-241, and 0.5 percent on SR-133. Further, the above estimates and calculated percentages assume that all construction vehicles would use each roadway/freeway. In reality, trips would be somewhat dispersed depending on which routes are actually followed by trucks and employees during construction. Therefore, impacts would be less than significant on local circulation system performance from construction-related trips.

Operation

Operation of the new proposed reservoir would involve daily safety and maintenance checks of the site, similar to existing conditions (see Chapter 2, Project Description). As a result, operation of the project would not introduce new permanent trips to the project site. Maintenance of the proposed wetland/riparian area would be required for approximately 5 years after construction is complete to ensure success of the vegetated areas, and would result in infrequent trips to the project site. In the first two years, approximately 2 crews of 6 workers would be required for 40 days of maintenance. In years 3 through 5, maintenance would taper off and would require approximately 1 crew of 6 people over 30 days. As a result, operational vehicle trips during the first five years of maintenance would equal 12 to 24 round trips for 30 to 40 days per year. After the new proposed wetland/riparian area is established, operation would consist of daily trips which would not add any additional trips to the existing condition. The increased traffic volume that would result from operating the proposed project would have a nominal impact on local circulation system performance. As a result, impacts would be considered a less-than-significant impact on circulation system performance.

Mitigation Measures

TRA-1: Traffic Control Plan. Prior to the start of construction, IRWD shall require the construction contractor to prepare and have approved a Traffic Control Plan. The Traffic Control Plan will show all signage, striping, delineated detours, flagging operations, and any other devices that will be used during installation of the improvements at the intersection of Sand Canyon Avenue and Portola Parkway to guide motorists, bicyclists, and pedestrians safely through the construction area and allow for adequate access and circulation to the satisfaction of the City of Irvine, as applicable. The Traffic Control Plan shall be prepared in accordance with the City of Irvine's traffic control guidelines and will be prepared to ensure that emergency access will not be restricted. Additionally, the Traffic Control Plan will ensure that congestion and traffic delays are not substantially increased as a result of the construction activities. Further, the Traffic Control Plan will include detours or alternative routes for bicyclists using on-street bicycle lanes as well as for pedestrians using adjacent sidewalks.

IRWD shall also notify local emergency responders of any planned partial or full lane closures required for project construction. Emergency responders include fire departments, police departments, and ambulances that have jurisdiction within the project area. Written notification and disclosure of lane closure location must be provided at least 30 days prior to the planned closure to allow emergency response providers adequate time to prepare for lane closures.

Significance Determination

Less than Significant Impact with Mitigation

Compliance with CEQA Guidelines Section 15064.3

Impact 3.12-2: The proposed project would not conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b).

Construction

As explained above, neither OPR nor the City of Irvine have adopted specific VMT metrics or thresholds of significance for construction-related traffic. Temporary construction-related traffic impacts, while inconvenient, are generally considered to cause adverse but less than significant impacts. However, the City of Irvine VMT thresholds were applied to the proposed project in the TIA in an effort to document the potential impacts that may occur. It was determined in the TIA that all phases of construction would generate fewer than 250 daily weekday trips. Screening criteria in the City of Irvine's adopted *CEQA VMT Impact Analysis Guidelines* exclude projects generating fewer than 250 weekday daily trips from further VMT impact analysis. Therefore, construction of the proposed project would meet the City of Irvine's daily trip screening threshold, and the proposed project requires no further VMT impact analysis. Impacts are considered less than significant.

Operation

The City's identified significance criteria is for the operation of new projects to generate 15 percent less VMT per capita (or per employee) compared to existing conditions, which is consistent with the OPR Technical Advisory recommendations. If the project VMT rate would exceed the respective thresholds adopted by the City, then the proposed project would create a significant impact. However, as described above for Impact 3.12-1, trips generated during the first 5 years of operation and maintenance activities would be minimal and would generate fewer than 250 daily weekday trips. Therefore, screening criteria in the City of Irvine's adopted *CEQA VMT Impact Analysis Guidelines* exclude the project from further VMT impact consideration. Impacts are considered less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Design Hazards

Impact 3.12-3: The proposed project would not substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

The proposed project would construct a two-lane private roadway from the northern side of the Sand Canyon Avenue and Portola Parkway intersection on the project site to allow vehicle access during project construction and maintenance/operations. This improvement assumes the northbound approach at Sand Canyon Avenue and Portola Parkway would be modified from two left-turn lanes and two right-turn lanes to one left-turn lane, one shared through/left-turn lane, and two right-turn lanes. The southbound approach would be constructed with one shared left/through/right-turn lane. Split phasing (a traffic signal operation that gives a green phase for all vehicle movements of one direction followed by a green phase for all movements of the opposite direction) would be incorporated for the northbound and new southbound approaches during construction and typical operations. The proposed lane and signal changes would be implemented in a manner that is consistent with City of Irvine traffic control regulations to ensure that intersection modifications do not create additional hazards impacts for vehicles traveling on the northbound, eastbound, or westbound roadways

In an effort to identify whether the proposed intersection modification would result in hazardous conditions for vehicles entering the proposed private roadway, the TIA evaluated the proposed intersection improvements for consistency with the City of Irvine TDPs' recommended design features for left-turn lane pocket lengths (TDP 1), driveway lengths (TDP 14), and vehicle stacking and gate-stacking at project sites (TDP 15). The TIA determined that TDP 1 is not applicable to the proposed project. The analysis for TDP 14 and TDP 15 is provided below.

TDP 14

TDP 14 identifies recommended lengths for driveways to projects based on the number of peak hour trips entering a project site. The proposed project would construct a 2-lane private access road from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the project site. The access road would exceed 1,500 feet from the Sand Canyon Avenue and Portola Parkway intersection to the project site. Signage indicating the use as a private road would be installed at the intersection and along the roadway. As a private road, access control would be maintained with a gate at least 500 feet away from the intersection. During the construction period, this gate would remain open during hours of construction and closed when no construction is occurring. Following construction, the gate would remain closed and only IRWD staff would have access to open the gate. The gate location would provide an area for vehicles to turn around if they do not have access beyond the gate. Based on peak hour traffic into the project site, TDP 14 recommends a driveway of at least 50 feet. The access road length (greater than 1,500 feet) and distance to the gate (at least 500 feet) would exceed the recommendation of 50 feet based on TDP 14.

TPD 15

TPD 15 provides recommendations for vehicle stacking and gate-stacking at project sites based on different types of land uses. The proposed access road gate would remain open during hours of construction and closed when no construction is occurring. With an open gate, the private roadway and internal staging on-site would accommodate vehicle queuing that may be associated with a peak construction activity day. Following construction, the gate would remain closed and only IRWD staff would have access to open the gate. Since trips by IRWD staff would be nominal and are not considered to have a significant effect on the future intersection operations, the proposed gate location and gate operations would meet the nominal inbound traffic volume during future operations.

In addition to the TPD analysis presented above, the TIA includes an evaluation of whether the proposed intersection modification would result in any hazardous conditions for pedestrians, bicyclists, and public transit. The proposed project would reconstruct pedestrian and bicycle facilities to maintain existing access while following City of Irvine requirements to ensure that no additional hazards are created. No new pedestrian facilities or bicycle facilities are planned at the project site that would be affected by the proposed project. No transit routes currently run through the Sand Canyon Avenue and Portola Parkway intersection. Additionally, the proposed project would not affect existing bus pullouts along any roadways in the TIA study area. The proposed intersection modification was found to be consistent with the policies identified in the City of Irvine General Plan Objective B-3: Pedestrian Circulation and Objective B-4: Bicycle Circulation, as well as with plans, guidelines, and policies related to transit.

Therefore, impacts related to potential design hazards due to implementation of the proposed access road and intersection modifications at Sand Canyon Avenue and Portola Parkway would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Emergency Access

Impact 3.12-4: The proposed project could result in inadequate emergency access.

Construction

The proposed project is located approximately 2.5 miles from Orange County Fire Station 27 (Portola Springs Station), which is located at 12400 Portola Springs in the City of Irvine (OCFA 2020). As described in Section 2.4.4 of this Draft EIR, the primary access point for construction traffic is proposed to occur from the Portola Parkway/Sand Canyon Avenue intersection. The existing intersection consists of a "tee" intersection, where Sand Canyon Avenue ends at the intersection with Portola Parkway. Proposed construction would modify the existing intersection to allow for construction vehicles and future IRWD operation and maintenance vehicles to access the project site through the northern side of the intersection onto IRWD property. The proposed 2-lane roadway would be graded north of the intersection and would connect to the northern side of the intersection. Proposed modifications within the intersection would include construction of traffic signals, lane striping, and signage to accommodate the northern access road. Cross walks and associated pedestrian signals would also be modified to facilitate safe pedestrian crossing in both directions. The proposed intersection improvements would not require closure of either Sand Canyon Avenue or Portola Parkway; however, temporary lane closures may be required. The proposed intersection improvements and construction of the access road would be completed first, prior to other construction phases, and construction activity would occur for approximately

4 to 5 months, weather permitting. It is anticipated that up to 42 total vehicle trips per day would occur to and from the project site during peak construction activity related to the access road and intersection (Fehr & Peers 2020b).

As described in Impact 3.12-1, construction of the proposed project would not substantially increase traffic amounts in the surrounding circulation systems, as peak daily vehicle trips generated during construction would be temporary, and minor in comparison to existing traffic amounts. While the proposed intersection work described above would not involve closure of any roadways, temporary lane closures could interfere with emergency access. To ensure that impacts related to emergency access do not occur as a result of the proposed project, IRWD would implement Mitigation Measure TRA-1 as described previously. Implementation of Mitigation Measure TRA-1 would require IRWD to prepare a Traffic Control Plan, which would be coordinated with the City of Irvine, as necessary, as well as with emergency responders, which include fire departments, police departments, and ambulances that have jurisdiction in the proposed project area. The mitigation measure also requires that IRWD notify emergency responders of any partial or full lane closures at least 30 days prior to impacts. With implementation of Mitigation Measure TRA-1, impacts would be reduced to a less-than-significant level.

Operation

As described above in Impact 3.12-1, the proposed project would not include operation and maintenance activities that would generate a substantial amount of vehicle trips that would impact the surrounding circulation system. Due to the relatively limited amount of vehicle trips associated with operation and maintenance of the proposed project facilities, it is reasonable to assume these trips would not interfere with emergency access. Additionally, at completion of the proposed modifications to the Portola Parkway/Sand Canyon Avenue intersection, the proposed project would result in an improvement to emergency access to the proposed project site compared to existing conditions. Since the proposed project site currently only has two access points, Bee Canyon Access Road and the driveway to Crean Lutheran Athletic Complex, implementation of the new access road would allow emergency vehicles to access the project site in the event that the two existing access points are inaccessible. Further, the new proposed access road, constructed as a result of project implementation, would allow emergency vehicles to access the project site, in the event that emergency access is needed for users of the proposed walking trail or any other area where employees are accessing the site. Therefore, the project would provide a benefit to onsite emergency access, and as a result, no impacts related to inadequate emergency access would occur.

Mitigation Measures

Implement Mitigation Measure TRA-1

Significance Determination

Less than Significant Impact with Mitigation

Cumulative Impacts

Impact 3.12-5: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to transportation.

The cumulative projects to be considered in the analysis of cumulative projects are listed in Table 3-1 and illustrated on Figure 3-1 in Section 3 of this Draft EIR. Cumulative projects 4, 6, 7, 18 and 19 have the potential to temporarily affect transportation in the vicinity of the proposed project.

Construction and Operation

The potential for cumulative transportation impacts exists where there are multiple projects proposed in common geographic area that have overlapping construction schedules and/or project operations that together could result in a substantial contribution to increased traffic levels (due to material delivery and worker commutes) throughout the surrounding roadway network. The construction-related traffic trips associated with all of the cumulative projects would be short-term and temporary in nature. One public facility project, the Eastwood Recycled Water Pump Stations Project (Cumulative Project 18) has a construction schedule that would overlap with construction of the proposed project. Cumulative Project 18 is considered an "equipping project" that would primarily install additional pumps to accommodate the proposed improvements at Syphon Reservoir. Construction of Cumulative Project 18 would not require substantial amounts of construction equipment or vehicle trips and would not affect transportation routes or the circulation system. Some of the larger developments, including Cumulative Projects 4, 6 and 7 which are ongoing residential developments and would involve an additional 587, 1,146, and 1,060 units/condominiums, respectively, would permanently affect traffic in the area due to a greater number of people living in the area and traveling to/from the residences in their cars. The permanent increase in daily trips associated with new large-scale residential development (Cumulative Projects 4, 6 and 7) are part of the planned growth within the City of Irvine and would not be expected to increase stress on traffic systems and transportation routes that would reduce the effectiveness of the circulation system.

Construction of the proposed project, along with the identified related projects in the geographic scope, could affect traffic and circulation in the region. These projects could be constructed simultaneously in areas proximate to or overlapping geographically with the proposed project. This proposed project has the potential to result in a cumulative impact to traffic due to the proposed intersection modification and the number of construction-related vehicle traffic on roadways in proximity to the proposed project site. As required by Mitigation Measure TRA-1, IRWD would implement a Traffic Control Plan for the proposed project as necessary to reduce construction-related effects of the project to less-than-significant levels. The Traffic Control Plan should also take into consideration the effects other construction activities occurring simultaneously in the same geographic area. Mitigation Measure TRA-1 would require IRWD to coordinate all construction activities with emergency service providers to ensure adequate access to emergency services is maintained during construction. As a result, the proposed project's incremental contribution to traffic and transportation would not be cumulatively considerable with implementation of mitigation measures.

The proposed project would only contribute to local traffic during the construction phase of the project, as operation- and maintenance-related traffic would be minimal as explained above. Therefore, the proposed contribution to cumulative transportation and traffic impacts would not be cumulatively considerable and would be considered less than significant.

Mitigation Measures

Implement Mitigation Measure TRA-1

Significance Determination

Less than Significant Impact with Mitigation

3.12.4 References

California Department of Transportation (Caltrans). 2018. Caltrans Traffic Census Program. *Traffic Volumes: Annual Average Daily Traffic (AADT)* Data Spreadsheet. Available at https://dot.ca.gov/programs/traffic-operations/census. Accessed May 12, 2020.

City of Irvine. 2007. *City of Irvine Transportation Design Procedures.* Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=10062. Accessed September 30, 2020.

City of Irvine. 2011. *Final Bicycle Transportation Plan*. Available at http://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=18746. Accessed May 5, 2020.

City of Irvine. 2015a. *City of Irvine Active Transportation Plan*. Available at https://alfresco.cityofirvine.org/alfresco/guestDownload/direct?path=/Company%20Home/Shared/PW/Active%20Transportation%20Plan/IrvineATP%20TW%20-%20Final.pdf. Accessed May 12, 2020.

City of Irvine. 2015b. General Plan (Amended), Circulation Element. Available at https://www.cityofirvine.org/community-development/current-general-plan. Accessed May 5, 2020.

City of Irvine. 2020. *City of Irvine CEQA Manual.* Volume 3. Appendix I, *VMT Impact Analysis Guidelines*. Adopted June 23, 2020. Available at: http://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=32553. Accessed September 30, 2020.

Fehr & Peers. 2020a. *Draft Irvine Ranch Water District Syphon Reservoir Improvement Project Transportation Impact Analysis*. Dated September, 2020.

Fehr & Peers. 2020b. *Methodologies and Assumptions Memorandum for Irvine Ranch Water District Syphon Reservoir Construction Transportation Impact Analysis*, May 18.

Federal Highway Administration (FHWA). 2012. Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways 2009 Edition Including Revision 1 dated May 2012 and Revision 2 Dated May 2012. Available at https://mutcd.fhwa.dot.gov/pdfs/2009r1r2/mutcd2009r1r2edition.pdf. Accessed May 5, 2020.

Orange County Fire Authority (OCFA). 2020. OCFA Fire Stations Web Site. Available at https://www.ocfa.org/aboutus/firestations.aspx. Accessed May 11, 2020.

Orange County Transit Authority (OCTA). 2012. *OCTA Commuter Bikeways Strategic Plan (CBSP) 2012 Addendum.* Available at https://www.octa.net/pdf/2009CommuterBikewaysStrategicPlanAddendum.pdf. Accessed May 12, 2020.

OCTA. 2019a. 2019 Traffic Flow Map. Available at https://www.octa.net/pdf/2019-ADT.pdf. Accessed May 14, 2020.

OCTA. 2019b. *Orange County Congestion Management Program*. Available at https://www.octa.net/pdf/2019CMP.pdf?n=201911. Accessed May 5, 2020.

OCTA. 2020. System Map. Available at http://www.octa.net/ebusbook/RoutePdf/SystemMap.pdf. Accessed May 5, 2020.

Office of Planning and Research (OPR). 2018. *Technical Advisory on Evaluating Transportation Impacts in CEQA*, December 2018. Available at https://www.opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf. Accessed June 17, 2020.

Southern California Association of Governments (SCAG), 2016. *Regional Transportation Plan/Sustainable Communities Strategy*. Available at http://scagrtpscs.net/Documents/2016/final/f2016RTPSCS.pdf. Accessed May 14, 2020.

3.13 Tribal Cultural Resources

This section addresses the tribal cultural resources impacts associated with construction and operation of the proposed project. This section includes: a description of the tribal cultural resources in the proposed project area; a summary of applicable regulations related to tribal cultural resources; and an evaluation of the potential impacts of the proposed project related to the tribal cultural resources on the proposed project site and in the surrounding area, including cumulative impacts. The results of the Native American consultation conducted by IRWD for purposes of compliance with CEQA requirements prompted by Assembly Bill (AB) 52 are located in **Appendix F** of this Draft EIR.

3.13.1 Environmental Setting

Prehistoric Setting

The chronology of coastal Southern California is typically divided into three general time periods: Early Holocene (11,000 to 8,000 before present [B.P.]), Middle Holocene (8,000 to 4,000 B.P.), and Late Holocene (4,000 B.P. to A.D. 1769). Within this general timeframe, the archaeology of Southern California is generally described in terms of cultural "complexes." A complex is a specific archaeological manifestation of a general mode of life, characterized archaeologically by technology, particular artifacts, economic systems, trade, burial practices, and other aspects of culture.

Early Holocene (11,000 to 8,000 B.P.)

While it is not certain when humans first came to California, their presence in Southern California by about 11,000 B.P. has been well documented. At Daisy Cave, on San Miguel Island, cultural remains have been radiocarbon dated to between 11,100 and 10,950 years B.P. (Byrd and Raab 2007). On the mainland, radiocarbon evidence confirms occupation of the Orange County and San Diego County coasts by about 9,000 B.P., primarily in lagoon and river valley locations (Gallegos 2002). During the Early Holocene, the climate of Southern California became warmer and more arid and the human population, residing mainly in coastal or inland desert areas, began exploiting a wider range of plant and animal resources (Horne and McDougall 2003).

The primary Early Holocene cultural complex in coastal Southern California was the San Dieguito Complex. The people of the San Dieguito Complex (approximately 10,000 to 8,000 B.P.) inhabited the chaparral zones of southwestern California, exploiting the plant and animal resources of these ecological zones (Moratto 1984; Warren 1968). Leaf-shaped and large-stemmed projectile points are typical of San Dieguito Complex material culture.

Middle Holocene (8,000 to 4,000 B.P.)

During the Middle Holocene, there is evidence for the processing of acorns for food and for the increased importance of hunting (Horne and McDougall 2003). The processing of plant foods, particularly acorns, increased, a wider variety of animals were hunted, and trade with neighboring regions intensified (Horne and McDougall 2003). Major technological changes appeared as well, particularly with the advent of the bow and arrow, which largely replaced the use of the dart and atlatl.

The Middle Holocene La Jolla Complex (approximately 8,000 to 4,000 B.P.) is essentially a continuation of the San Dieguito Complex. La Jolla groups lived in chaparral zones or along the coast, often migrating between the two. Coastal settlement focused around the bays and estuaries of coastal Orange and San Diego counties. La Jolla peoples produced large, coarse stone tools, but also produced well-made projectile points, and milling slabs. The La Jolla Complex represents a period of population growth and increasing social complexity, and it was also during this time period that the first evidence of the grinding of seeds for flour appears, as indicated by the abundance of millingstones in the archaeological record (Horne and McDougall 2003).

Late Holocene (4,000 B.P. to A.D. 1769)

During the Late Holocene, native populations of Southern California were becoming less mobile and populations began to gather in small sedentary villages with satellite resource-gathering camps. Evidence indicates that the overexploitation of larger, high-ranked food resources may have led to a shift in subsistence, towards a focus on acquiring greater amounts of smaller resources, such as shellfish and small-seeded plants (Byrd and Raab 2007). In coastal Southern California, conditions became drier and many lagoons were transformed into saltwater marshes. Because of this, populations abandoned mesa and ridge tops to settle nearer to permanent freshwater resources (Gallegos 2002). Trading reached its zenith during this time period, with asphaltum (tar), seashells and steatite being exchanged from Southern California to the Great Basin.

Ethnographic Setting

According to Bean and Smith (1978), the Gabrielino, with the exception of the Chumash to the north, “were the wealthiest, most populous, and most powerful ethnic nationality in aboriginal Southern California.” Prior to European colonization, the Gabrielino occupied a diverse area that included: the watersheds of the Los Angeles, San Gabriel, and Santa Ana rivers; the Los Angeles basin; and the islands of San Clemente, San Nicolas, and Santa Catalina (Kroeber 1925). The Gabrielino language was part of the Takic branch of the Uto-Aztecan language family (Kroeber 1925). The Gabrielino subsisted on a variety of resources in several ecological zones. Acorns, sage, and yucca were gathered throughout the inland areas whereas shellfish, fish, as well as a variety of plants and animals were exploited within the marshes and along the coast. Deer and various kinds of small mammals were hunted on an opportunistic basis. Their material culture reflected the subsistence technology. Lithic tools such as arrow points and modified flakes were used to hunt and process animals. A variety of ground stone grinding implements, such as the mortar, pestle, mano, and metate, were used to process both plant and animal remains for food (Bean and Smith 1978).

The settlement patterns of the Gabrielino, and other nearby groups, such as the Juaneño and Luiseño, were similar and they often interacted through marriage, trade and warfare. The seasonal availability of water and floral and faunal resources dictated seasonal migration rounds with more permanent villages and base camps being occupied primarily during winter and spring months. In the summer months, the village populations divided into smaller units that occupied seasonal food procurement areas. The more permanent settlements tended to be near major waterways and food sources and various secular and sacred activities, such as food production and storage and tool manufacturing, were conducted at these areas (Bean and Smith 1978).

3.13.2 Regulatory Framework

Federal

There are no applicable federal regulations for this issue area.

State

Native American Heritage Commission

Public Resources Code (PRC) Section 5097.91 established the Native American Heritage Commission (NAHC), the duties of which include inventorying places of religious or social significance to Native Americans and identifying known graves and cemeteries of Native Americans on private lands. PRC Section 5097.98 specifies a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a county coroner.

Assembly Bill 52 and Related Public Resources Code Sections

AB 52 was approved by California State Governor Edmund Gerry “Jerry” Brown, Jr. on September 25, 2014. The act amended California PRC Section 5097.94, and added PRC Sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3.

The primary intent of AB 52 is to include California Native American Tribes early in the environmental review process and to establish a new category of resources related to Native Americans that require consideration under CEQA, known as tribal cultural resources. PRC Section 21074(a)(1) and (2) defines tribal cultural resources as “sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe” that are either included or determined to be eligible for inclusion in the California Register or included in a local register of historical resources, or a resource that is determined to be a tribal cultural resource by a lead agency, in its discretion and supported by substantial evidence. On July 30, 2016, the California Natural Resources Agency adopted the final text for tribal cultural resources update to CEQA Guidelines Appendix G, which was approved by the Office of Administrative Law on September 27, 2016.

PRC Section 21080.3.1 requires that within 14 days of a lead agency determining that an application for a project is complete, or a decision by a public agency to undertake a project, the lead agency provide formal notification to the designated contact, or a tribal representative, of California Native American Tribes that are traditionally and culturally affiliated with the geographic area of the project (as defined in PRC Section 21073) and who have requested in writing to be informed by the lead agency (PRC Section 21080.3.1(b)). Tribes interested in consultation must respond in writing within 30 days from receipt of the lead agency’s formal notification and the lead agency must begin consultation within 30 days of receiving the tribe's request for consultation (PRC Sections 21080.3.1(d) and 21080.3.1(e)).

PRC Section 21080.3.2(a) identifies the following as potential consultation discussion topics: the type of environmental review necessary; the significance of tribal cultural resources; the significance of the project's impacts on the tribal cultural resources; project alternatives or appropriate measures for preservation; and mitigation measures. Consultation is considered concluded when either: (1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or (2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached (PRC Section 21080.3.2(b)).

If a California Native American tribe has requested consultation pursuant to Section 21080.3.1 and has failed to provide comments to the lead agency, or otherwise failed to engage in the consultation process, or if the lead agency has complied with Section 21080.3.1(d) and the California Native American tribe has failed to request consultation within 30 days, the lead agency may certify an EIR or adopt an MND (PRC Section 21082.3(d)(2) and (3)).

PRC Section 21082.3(c)(1) states that any information, including, but not limited to, the location, description, and use of the tribal cultural resources, that is submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public without the prior consent of the tribe that provided the information. If the lead agency publishes any information submitted by a California Native American tribe during the consultation or environmental review process, that information shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public.

Local

There are no applicable local regulations for this issue area.

3.13.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from Appendix G of the CEQA Guidelines are used as thresholds of significance to determine the impacts of the proposed project as related to tribal cultural resources. The proposed project would have a significant impact if it would:

1. Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:
   a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or

b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

2. Result in cumulatively considerable impacts to tribal cultural resources.

Methodology

Potential impacts to tribal cultural resources were assessed on the basis of a cultural resources assessment prepared for the project, which included a records search at the South Central Coastal Information Center (SCCIC) and pedestrian field survey (summarized in Section 3.4, *Cultural Resources*; ESA 2019); a search of the Sacred Lands File (SLF) at the NAHC; and Native American consultation conducted under AB 52.

The NAHC maintains a confidential SLF which contains sites of traditional, cultural, or religious value to the Native American community. The NAHC was contacted on May 21, 2018 to request a search of the SLF. The NAHC responded to the request in a letter dated May 23, 2018 indicating negative results.

In compliance with AB 52, on May 24, 2019, IRWD submitted outreach letters to the tribes on their AB 52 Master List. Contacted tribes included the Gabrieleño Band of Mission Indians – Kizh Nation, the Juaneño Band of Mission Indians – Acjachemen Nation, and the Torres-Martinez Desert Cahuilla Indians. The letters included a description of the proposed project and an invitation to consult under AB 52. Two responses were received.

By letter dated June 6, 2019, Mr. Michael Mirelez, Cultural Resources Coordinator for the Torres-Marinez Desert Cahuilla Indians, indicated that they would defer to tribes closer to the proposed project area.

Via email and letter, Mr. Andrew Salas, Chairman of the Gabrieleño Band of Mission Indians – Kizh Nation, indicated that the tribe wished to engage in consultation. On June 27, 2019, IRWD conducted consultation via telephone with the tribe. Mr. Salas provided historic maps, documents, and other reference materials confirming the tribe's association with the proposed project area. He also discussed tribal ancestry in the broader vicinity of the proposed project, and indicated that the proposed project area falls along a prominent travel route for the tribe. Given the sensitivity of the project area to the tribe, Mr. Salas requested Native American monitoring during ground disturbing activities.

Impact Analysis

Tribal Cultural Resource Identified in the CRHR

Impact 3.13-1a: The proposed project could cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).

Construction

A records search at the SCCIC, an archaeological field survey, a SLF search at the NAHC, and consultation with the Gabrieleño Band of Mission Indians – Kizh Nation, conducted pursuant to AB 52, did not identify any tribal cultural resources that are listed in or eligible for listing in the California Register, or in a local register of historical resources as defined in PRC Section 5020.1(k). However, through consultation, the Gabrieleño Band of Mission Indians – Kizh Nation indicated that the area is sensitive for resources important to the tribe and requested Native American monitoring of ground disturbing activities. Archaeological and Native American monitoring are included as Mitigation Measure CR-3 in Section 3.4, *Cultural Resources*. With implementation of Mitigation Measure CR-3, potential impacts to tribal cultural resources would be reduced to a less-than-significant level during project construction.

Operation

While potential impacts to tribal cultural resources are most likely to occur during project construction, operation and maintenance activities, particularly those activities that involve ground disturbance, do have the potential to encounter previously undocumented archaeological resources. Unanticipated encounters with archaeological resources that are tribal cultural resources could result in potentially significant impacts. Mitigation Measure CR-4 in Section 3.4, *Cultural Resources*, which requires appropriate treatment of unanticipated discoveries, would ensure that any resources encountered during operation and maintenance of the proposed project are not significantly impacted. As a result, potential impacts to tribal cultural resources during operation and maintenance of the proposed project would be reduced to a less-than-significant level.

Mitigation Measures

Implement Mitigation Measures CR-3 and CR-4

Significance Determination

Less than Significant Impact with Mitigation

Tribal Cultural Resource Determined to be Significant

Impact 3.13-1b: The Proposed Project could cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Construction

As indicated above, a records search at the SCCIC, an archaeological field survey, a Sacred Lands File search at the NAHC, and consultation with the Gabrieleño Band of Mission Indians – Kizh Nation, conducted pursuant to AB 52, did not identify any tribal cultural resources determined by a lead agency to be significant as outlined in PRC Section 50204.1. However, through consultation, the Gabrieleño Band of Mission Indians – Kizh Nation indicated that the area is sensitive for resources important to the tribe and requested Native American monitoring of ground disturbing activities. Archaeological and Native American monitoring are included as Mitigation Measure CR-3 in Section 3.4, *Cultural Resources*. With implementation of Mitigation Measure CR-3, potentially significant impacts to tribal cultural resources would be reduced to a less-than-significant level during project construction.

Operation

While potential impacts to tribal cultural resources are most likely to occur during project construction, operation and maintenance activities, particularly those activities that involve ground disturbance, do have the potential to encounter previously undocumented archaeological resources. Mitigation Measure CR-4 in Section 3.4, *Cultural Resources*, which requires appropriate treatment of unanticipated discoveries, would ensure that any resources encountered during operation and maintenance of the proposed project are not significantly impacted. As a result, potentially significant impacts to tribal cultural resources during operation and maintenance of the proposed project would be reduced to a less-than-significant level.

Mitigation Measures

Implement Mitigation Measures CR-3 and CR-4

Significance Determination

Less than Significant Impact with Mitigation

Cumulative Impacts

Impact 3.13-2: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to tribal cultural resources.

The cumulative projects to be considered in the analysis of cumulative impacts are listed in Table 3-1, Related Projects for Cumulative Analysis, and illustrated on Figure 3-1, Cumulative Project Locations, in Chapter 3 of this Draft EIR. The geographic area of analysis of cumulative impacts for tribal cultural resources includes the area bounded by those projects listed in Table 3-1 and generally corresponds to the portion of Orange County along the front of the Santiago Hills in the vicinity of the project, as well as adjacent mountains and lowlands to the east and west, respectively. This geographic scope of analysis is appropriate because the resources within this area are expected to be similar to those that occur on the proposed project area because of their proximity, their similarities in environments and landforms, and their location within the same Native American tribal territories. The projects listed in Table 3-1 include a range of project types, including residential and commercial development, and park construction and improvements, that could contain tribal cultural resources. Of particular note is the proposed Gateway Community Park, which is to the west and directly adjacent to the project. Cumulative impacts to tribal cultural resources could occur if other related projects, in conjunction with the proposed project, had or would have impacts on cultural resources that, when considered together, would be significant.

Construction and Operation

No tribal cultural resources were identified as part of the district's government-to-government notification and consultation efforts with interested Native American groups conducted pursuant to AB 52. Given that no tribal cultural resources have been identified within or immediately adjacent to the project site, the proposed project would not cause a substantial adverse change in the significance of a known tribal cultural resource. However, project related ground-disturbing activities have the potential to encounter previously unknown archaeological resources, some of which may have significance to Native American tribes. Mitigation measures provided in Section 3.4, *Cultural Resources*, which include Mitigation Measure CR-3 for archaeological and Native American monitoring, and Mitigation Measure CR-4 for appropriate treatment of unanticipated discoveries, will ensure that impacts to tribal cultural resources, if encountered, would be less than significant. Given the required mitigation for the current project, and required adherence to state and local laws for other projects in the cumulative region, cumulative impacts to tribal cultural resources would be less than significant.

Mitigation Measures

Implement Mitigation Measures CR-3 and CR-4

Significance Determination

Less than Significant Impact with Mitigation

3.13.4 References

Bean, L.J., and C.R. Smith. 1978. Gabrielino, in *California*, edited by R.F. Heizer, pp. 538–549, *Handbook of North American Indians*, Vol. 8, W. C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Byrd, Brian F., and Mark L. Raab. 2007. Prehistory of the Southern Bight: Models for a New Millennium, in *California Prehistory: Colonization, Culture, and Complexit*y, edited by Terry L. Jones and Kathryn A. Klar, pp. 215–227.

Gallegos, Dennis. 2002. Southern California in Transition: Late Holocene Occupation of Southern San Diego County, in *Catalysts to Complexity: Late Holocene Societies on the California Coast*, edited by Jon M. Erlandson and Terry L. Jones, pp. 27–40. Perspectives in California Archaeology Vol. 6, Cotsen Institute of Archaeology, University of California, Los Angeles.

ESA. 2019. *Cultural Resources Assessment Report for the Syphon Reservoir Improvement Project (Confidential), County of Orange, California*, January 2019.

Horne, Melinda C., and Dennis P. McDougall. 2003. *Cultural Resources study for the City of Riverside General Plan 2025 Update Program EIR, prepared for Cotton Bridges and Associates Urban and Environmental Consultants, on behalf of the City of Riverside Planning Department*, prepared by Applied Earthworks, Inc.

Kroeber, A.L. 1925 *Handbook of the Indians of California*. New York: Dover Publications, Inc., 1925, reprinted 1976.

Moratto, Michael J. 1984. *California Archaeology*. Orlando, FL: Academic Press, Inc.

Warren, Claude N. 1968. Cultural Traditions and Ecological Adaptation on the Southern California Coast. *Archaic Prehistory in the Western United States*, edited by Cynthia Irwin-Williams. Eastern New Mexico University Contributions in *Anthropology* 1(3):1–14.

This page intentionally left blank

3.14 Wildfire

This section addresses the wildfire impacts associated with construction and operation of the proposed project. This section includes: a description of the wildfire history and conditions in the proposed project area; a summary of applicable regulations related to wildfire; and an evaluation of the potential impacts of the proposed project to wildfire, including cumulative impacts.

3.14.1 Environmental Setting

Fire Environment

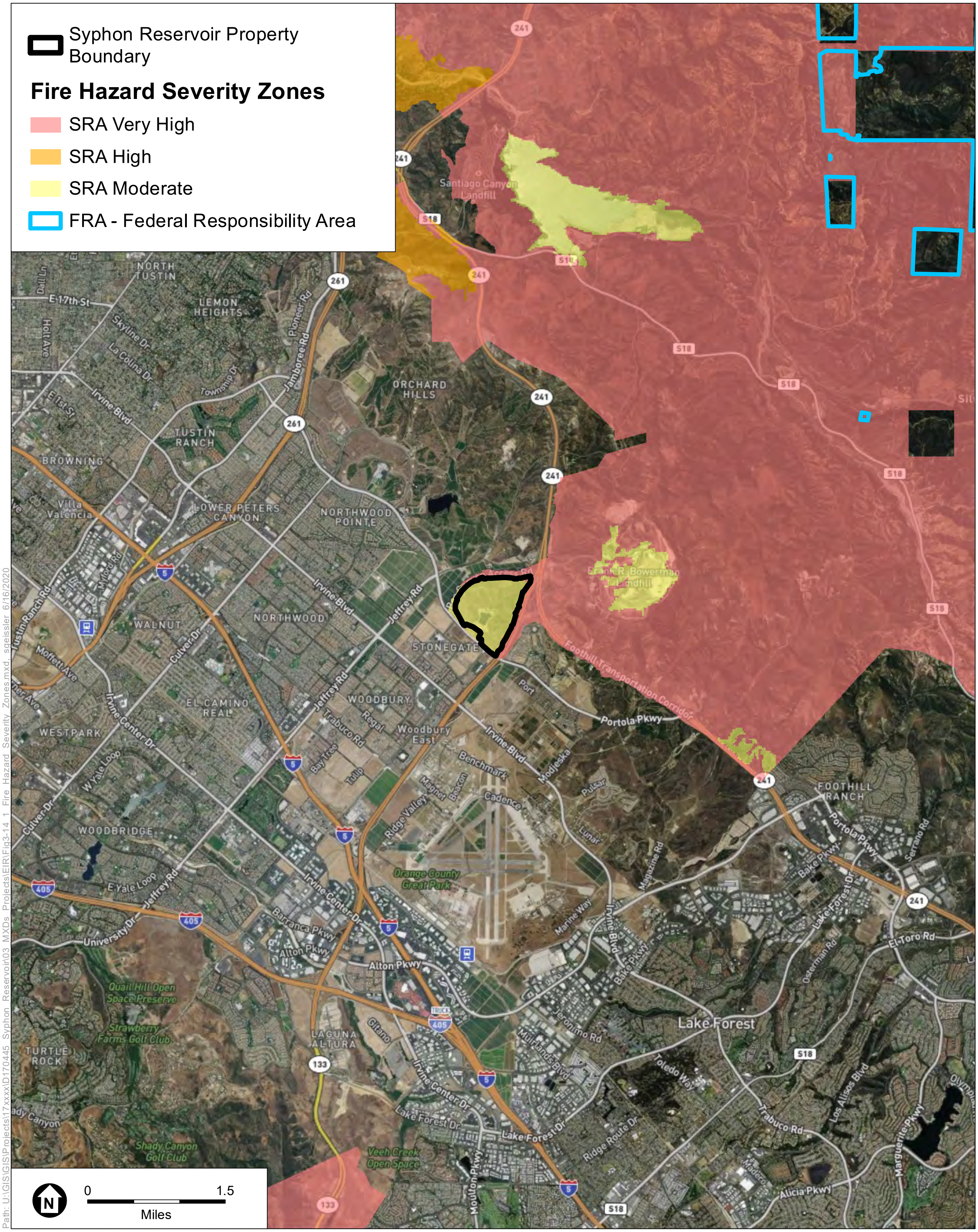
Fire environments are dynamic systems and include many types of environmental factors and site characteristics. Fires can occur in any environment where conditions are conducive to ignition and fire movement. The three major components of fire environment are vegetation (fuels), climate, and topography. The state of each of these components and their interactions with each other determines the potential characteristics and behavior of a fire at any given moment. It is important to note that wildland fire may transition to urban fire if structures are receptive to ignition. Understanding the existing wildland vegetation and fuel conditions on and around the project site is necessary to understand the fire environment.

The climate of Southern California, including the project site, has been characterized by fire climatologists as the worst fire climate in the United States with high winds (Santa Ana) occurring during autumn after a six-month drought period each year (J.E. Keeley 2004).

As defined by the Public Resources Code (PRC) 4126, State Responsibility Areas are State and privately owned forest, watershed, and rangeland for which the primary financial responsibility of preventing and suppressing wildland fires rests with the State. State Responsibility Areas, by definition, do not include any lands within city limits. The proposed project lies entirely within a State Responsibility Area. Adjacent to the project site is the City of Irvine which is located in a Local Responsibility Area.

For State Responsibility Areas, CAL FIRE maps fire hazard severity zones based on factors such as fuel, slope, and fire weather to identify the degree of fire hazard throughout California (e.g., moderate, high, or very high). CAL FIRE also provides recommendations for fire hazard severity zones within Local Responsibility Areas but the responsibility for mapping Local Responsibility Areas lies within the local jurisdiction responsible for fire management and control within the Local Responsibility Area. While fire hazard severity zones do not predict when or where a wildfire will occur, they do identify areas where wildfire hazards could be more severe and therefore are of greater concern.

Fire hazard severity zones in and around the proposed project site are shown on **Figure 3.14-1**. According to the mapping completed by CAL FIRE, the proposed project site is located in an area determined to be a Moderate Fire Hazard Severity Zone, immediately surrounded by a Very High Fire Hazard Severity Zone as shown in Figure 3.14-1. The area west of the proposed project site in the City of Irvine does not include fire hazard areas while a portion of the undeveloped land northeast of the proposed project site is a Local Responsibility Area Very High Fire Hazard Severity Zone (CAL FIRE 2020a).



SOURCE: CalFire, 2008; Open Street Map, 2020.

Syphon Reservoir Improvement Project

Figure 3.14-1
Fire Hazard Severity Zones

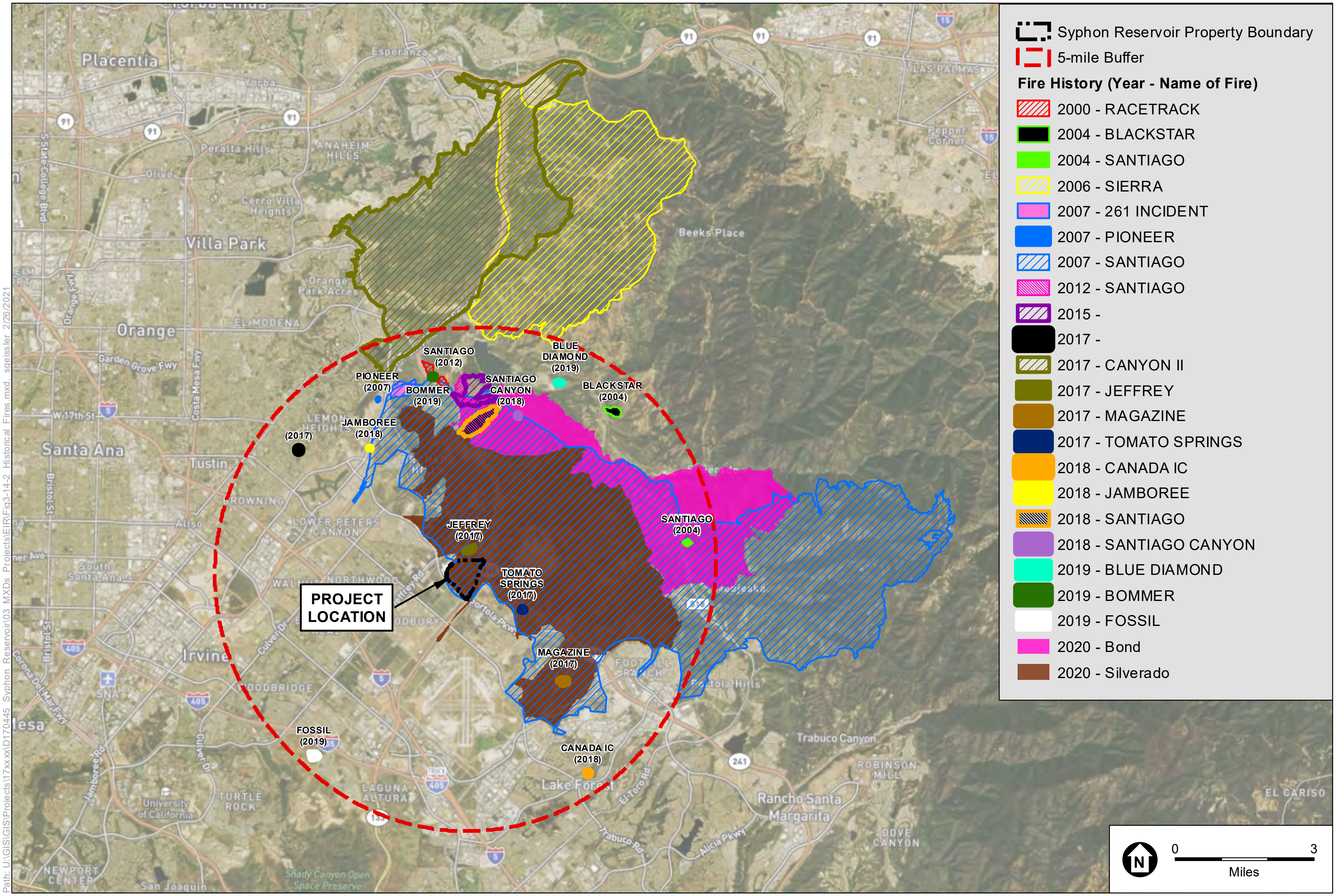
ESA

Site Characteristics

The proposed project site terrain is hilly with ridgelines and terraced slopes, leading downwards towards the reservoir bottom. The land on the proposed project site is currently zoned as general agriculture and includes upland and wetland vegetation communities. The proposed project site is located within a wildland-urban interface: the zone between developed and undeveloped areas. The proposed project site represents the easternmost boundary of the City of Irvine, with open space, native vegetated areas, and the Cleveland National Forest to the east. Significant regional geographic features around the area include the Santa Ana Mountains to the northeast. The climate in the region is Mediterranean, with dry summers and moderately wet winters (City of Irvine 2015a). However, the region has experienced severe drought conditions in recent years.

Fire History

Fire history information can provide an understanding of fire frequency, fire type, most vulnerable locations, and significant ignition sources. The fire history data for the area surrounding the project site is based on CAL FIRE's California Statewide Fire Map that displays fires through 1950 and CAL FIRE's Fire Resource Assessment Program (FRAP) database that assesses the amount and extent of California's forests and rangelands, analyzes their conditions and identifies alternative management and policy guidelines (CAL FIRE 2020b). These tools show there is significant wildfire potential in the region and the potential for the proposed project site to be subject to occasional wildfire encroachment, most likely originating from the open space areas near the proposed project site. According to data available from CAL FIRE's California Statewide Fire Map, there have been 18 fires within a five-mile radius of the proposed project site since 2000, as seen in **Figure 3.14-2**. Of these, the largest include the Santiago Fire of 2007, the Silverado Fire of 2020, and the Sierra Fire of 2006 (CAL FIRE 2020c). The Santiago Fire of 2007 covered an area of 28,517 acres and burned through the proposed project site. At the time it was the most disastrous fire to occur in Orange County in the past 30 years (OCFA 2007). From October 26, 2020 to November 7, 2020, the Silverado Fire burned 12,466 acres predominantly within the same footprint that was burned during the 2006 Santiago Fire. The fire spread throughout the project site and some portions of the fire reached as far south as Irvine Boulevard, prompting area-wide emergency evacuations. One month following the Silverado fire, the Bond Fire burned 6,686 acres northeast of the project site in Silverado Canyon. The December 2020 Bond Fire is the most recent wildfire to occur within a five-mile radius of the project site. The fire lasted 15 days and did not spread as far west as the project site (CAL FIRE 2020c).



SOURCE: Calfire, 2020; ESRI, 2021.

Syphon Reservoir Improvement Project

Figure 3.14-2
Historical Fires

ESA

Vegetation (Fuels)

Approximately 18 vegetation and land cover types were identified onsite as part of the biological resources analysis in this Draft EIR (see Section 3.3 *Biological Resources*, Table 3.3-1). The upland portions of the proposed project area primarily exhibit forms of coastal sage scrub and non-native herbaceous communities with variable levels of native versus non-native plant species cover. The most prevalent forms include the California sagebrush alliance and non-native herbaceous cover/California sagebrush alliance (i.e., communities intermixed with both native and non-native species) in the upland areas. Woody riparian vegetation (e.g., arroyo willow and mule fat) and patches of tules occur around the open water in the existing reservoir in areas that are occasionally inundated. Brush and grassland habitats are highly flammable while other vegetation, such as riparian communities or forest understory, are less flammable due to their perennially higher plant moisture content, fuel arrangement, ignition resistance, compact structure, and available shading from overstory tree canopies.

The majority of the proposed project site was burned in the October 2020 Silverado Fire, and much of the vegetation on-site was destroyed by the fire. Since native natural communities such as coastal sage scrub are adapted to fire, it is anticipated most of the vegetation should regrow to pre-fire conditions or similar, though it is possible the habitat quality may be degraded by opportunistic non-native invasive plant species. To provide a conservative assessment, this analysis presents the wildfire conditions at the time the Notice of Preparation (NOP) was published and analyzes proposed project impacts to wildfire against those conditions.

Emergency Response

The City of Irvine Office of Emergency Management maintains the Evacuation Plan for the City (City of Irvine 2019a). The Evacuation Plan identifies Evacuation Management Zones, which include primary evacuation routes within each zone. The project site is within Zone 6A; State Route 133 to the southeast and Portola Parkway to the west are labelled as possible evacuation routes (City of Irvine 2020). However, these routes would not necessarily be used during an evacuation as the circumstances may dictate alternate routes (City of Irvine 2019a).

3.14.2 Regulatory Framework

Federal

No federal regulations related to wildfire are applicable to the proposed project.

State

California Fire Code (California Code of Regulations Title 24, Part 9)

The California Fire Code is found in Title 24, Part 9 of the CCR, as a subsect of the California Building Code (CBC). The California Fire Code combines the Uniform Fire Code with amendments necessary to address California's unique needs. The California Fire Code (Title 24, Part 9 of the CCR) establishes regulations to safeguard against the hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures, and premises. The California Fire Code also establishes requirements intended to provide safety for and assistance to firefighters and emergency responders during emergency operations. The provisions of the California Fire Code apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure throughout California. The California Fire Code includes regulations regarding fire-resistance-rated construction, fire protection systems such as alarm and sprinkler systems, fire service features such as fire apparatus access roads, means of egress, fire safety during construction and demolition, and wildland-urban interface areas.

Typical fire safety requirements of the California Fire Code include: the installation of sprinklers in all high-rise buildings; the establishment of fire resistance standards for fire doors, building materials, and particular types of construction; and, the clearance of debris and vegetation within a prescribed distance from occupied structures in wildfire hazard areas. The California Fire Code applies to all occupancies in California, except where more stringent standards have been adopted by local agencies.

Cal/Occupational Safety and Health Administration (OSHA) Regulations (CCR Title 8)

Cal/OSHA has primary responsibility for developing and enforcing workplace safety regulations in California. Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Title 29 of the Code of Federal Regulations (CFR). Cal/OSHA standards are generally more stringent than federal regulations. The use of hazardous materials in the workplace require employee safety training, safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation.

California Public Resources Code

The California Public Resources Code (PRC) was established in 1939 by the California Code Commission. The PRC contains law relating to natural resources, the conservation, utilization, and supervision thereof, along with mines and mining, oil and gas, and forestry. The following sections of the PRC are relevant to the proposed project:

PRC 4427

During any time of the year when burning permits are required in an area pursuant to this article, no person shall use or operate any motor, engine, boiler, stationary equipment, welding equipment, cutting torches, tarpots, or grinding devices from which a spark, fire, or flame may originate, which is located on or near any forest-covered land, brush-covered land, or grass-covered land, without doing both of the following:

(a) First clearing away all flammable material, including snags, from the area around such operation for a distance of 10 feet.

(b) Maintain one serviceable round point shovel with an overall length of not less than forty-six (46) inches and one backpack pump water-type fire extinguisher fully equipped and ready for use at the immediate area during the operation.

This section does not apply to portable power saws and other portable tools powered by a gasoline-fueled internal combustion engine.

PRC 4428

No person, except any member of an emergency crew or except the driver or owner of any service vehicle owned or operated by or for, or operated under contract with, a publicly or privately owned utility, which is used in the construction, operation, removal, or repair of the property or facilities of such utility when engaged in emergency operations, shall use or operate any vehicle, machine, tool or equipment powered by an internal combustion engine operated on hydrocarbon fuels, in any industrial operation located on or near any forest, brush, or grass-covered land between April 1 and December 1 of any year, or at any other time when ground litter and vegetation will sustain combustion permitting the spread of fire, without providing and maintaining, for firefighting purposes only, suitable and serviceable tools in the amounts, manner and location prescribed in this section.

(a) On any such operation a sealed box of tools shall be located, within the operating area, at a point accessible in the event of fire. This fire toolbox shall contain: one backpack pump-type fire extinguisher filled with water, two axes, two McLeod fire tools, and a sufficient number of shovels so that each employee at the operation can be equipped to fight fire.

(b) One or more serviceable chainsaws of three and one-half or more horsepower with a cutting bar 20 inches in length or longer shall be immediately available within the operating area, or, in the alternative, a full set of timber-felling tools shall be located in the fire toolbox, including one crosscut falling saw six feet in length, one double-bit ax with a 36-inch handle, one sledge hammer or maul with a head weight of six, or more, pounds and handle length of 32 inches, or more, and not less than two falling wedges.

(c) Each rail speeder and passenger vehicle, used on such operation shall be equipped with one shovel and one ax, and any other vehicle used on the operation shall be equipped with one shovel. Each tractor used in such operation shall be equipped with one shovel.

(d) As used in this section:

    (1) "Vehicle" means a device by which any person or property may be propelled, moved, or drawn over any land surface, excepting a device moved by human power or used exclusively upon stationary rails or tracks.

    (2) "Passenger vehicle" means a vehicle which is self-propelled and which is designed for carrying not more than 10 persons including the driver, and which is used or maintained for the transportation of persons, but does not include any motortruck or truck tractor.

PRC 4431

During any time of the year when burning permits are required in an area pursuant to this article, no person shall use or operate or cause to be operated in the area any portable saw, auger, drill, tamper, or other portable tool powered by a gasoline-fueled internal combustion engine on or near any forest-covered land, brush-covered land, or grass-covered land, within 25 feet of any flammable material, without providing and maintaining at the immediate locations of use or operation of the saw or tool, for firefighting purposes one serviceable round point shovel, with an overall length of not less than 46 inches, or one serviceable fire extinguisher. The Director of Forestry and Fire Protection shall by administrative regulation specify the type and size of fire extinguisher necessary to provide at least minimum assurance of controlling fire caused by use of portable power tools under various climatic and fuel conditions.

The required fire tools shall at no time be farther from the point of operation of the power saw or tool than 25 feet with unrestricted access for the operator from the point of operation.

PRC 4442

(a) Except as otherwise provided in this section, no person shall use, operate, or allow to be used or operated, any internal combustion engine which uses hydrocarbon fuels on any forest-covered land, brush-covered land, or grass-covered land unless the engine is equipped with a spark arrester, as defined in subdivision (c), maintained in effective working order or the engine is constructed, equipped, and maintained for the prevention of fire pursuant to Section 4443.

(b) Spark arresters affixed to the exhaust system of engines or vehicles subject to this section shall not be placed or mounted in such a manner as to allow flames or heat from the exhaust system to ignite any flammable material.

(c) A spark arrester is a device constructed of nonflammable materials specifically for the purpose of removing and retaining carbon and other flammable particles over 0.0232 of an inch in size from the exhaust flow of an internal combustion engine that uses hydrocarbon fuels or which is qualified and rated by the United States Forest Service.

(d) Engines used to provide motive power for trucks, truck tractors, buses, and passenger vehicles, except motorcycles, are not subject to this section if the exhaust system is equipped with a muffler as defined in the Vehicle Code.

(e) Turbocharged engines are not subject to this section if all exhausted gases pass through the rotating turbine wheel, there is no exhaust bypass to the atmosphere, and the turbocharger is in effective mechanical condition.

(f) Motor vehicles when being operated in an organized racing or competitive event upon a closed course are not subject to this section if the event is conducted under the auspices of a recognized sanctioning body and by permit issued by the fire protection authority having jurisdiction.

California Building Code

The CBC includes regulations that are consistent with nationally recognized standards of good practice, intended to facilitate protection of life and property. Among other things, its regulations address the mitigation of the hazards of fire explosion, management and control of the storage, handling and use of hazardous materials and devices, mitigation of conditions considered hazardous to life or property in the use or occupancy of buildings, and provisions to assist emergency response personnel.

Chapter 7 of the CBC details the materials, systems, and assemblies used in the exterior design and construction of new buildings located within a Wildland-Urban Interface Fire Area. A Wildland-Urban Interface Area is defined in Section 702A as a geographical area identified by the areas of a fire hazard severity zones in accordance with Public Resources Code Sections 4201 through 4204 and Government Code Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires. Fire hazard severity zones are geographical areas classified as Very High, High, or Moderate in State Responsibility Areas or as Local Responsibility Areas as Very High Fire Hazard Severity Zones. Fire hazard severity zones, which are determined based on factors such as fuel, slope, and fire weather, do not predict when or where a wildfire will occur, but they do identify the degree of fire hazard (very high, high or moderate). The CBC details the materials, systems, and assemblies used for structural fire resistance and fire-resistance-rated construction separation of adjacent spaces to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings.

The City of Irvine, per Ordinance No. 16-07 adopted a building and fire code that is complicit with the CBC discussed above (City of Irvine 2019b).

Local

County of Orange and Orange County Fire Authority Local Hazard Mitigation Plan

The County of Orange and Orange County Fire Authority Local Hazard Mitigation Plan (OCLHMP) is a multi-jurisdiction plan developed jointly between the County of Orange, a local government, and the Orange County Fire Authority (OCFA), a Joint Powers Authority (County of Orange and Orange County Fire Authority 2015). The document focuses on mitigating all natural hazards impacting unincorporated areas of the County as well as County and OCFA-owned facilities. OCFA provides fire suppression and prevention services to the County unincorporated areas, as well as a variety of other jurisdictions and contracts under their Joint Powers Authority. As a result, fire mitigation strategies in this plan are inclusive of all areas served by the OCFA.

The mission of the OCLHMP is to promote sound public policy designed to protect residents, critical facilities, infrastructure, key resources, private property, and the environment from natural hazards in County unincorporated area, fire hazards in the OCFA service area, and County and OCFA owned facilities.

The OCLHMP discusses factors that exacerbate fire risk such as vegetation, weather, topography, and fuel hazards. The OCLHMP provides requirements involved in developments at the wildland urban interface, where the project resides. These include requiring the construction of fuel modification zones (firebreak, fuel break, or green belt) in unincorporated County areas.

The proposed project is located within unincorporated Orange County and would therefore, be subject to compliance with the OCLHMP. The OCLHMP identifies hazard mitigation measures to limit the impact of wildland fires in Orange County. The OCFA is the responsible agency for these mitigation measures which includes the list below.

- Implementation of a real-time remote sensing and fire detection platform to increase the ability to detect, respond to, and monitor wildland areas in Orange County.
- Increase communication, coordination and collaboration between Wildland-Urban Interface (WUI) property owners, local and county planners and fire prevention crews and officials to address risk, existing mitigation measures and federal assistance programs.
- Reduce the amount of combustible fuels within identified at-risk communities.

- Encourage implementation of wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability.
- Evaluate and implement roadway hardening measures on identified high risk roadways in wildland areas in Orange County.
- Enhance outreach and education programs aimed at mitigating Wildland-Urban Interface (WUI) hazards thereby reducing the exposure of stakeholders (public and private) to these hazards.
- Establish a countywide wildland fire prevention education "Task Force".
- Enhance efficiency of Wildland-Urban Interface/Intermix response and recovery activities.
- Development and dissemination of maps relating to the fire hazard to help educate and assist builders and home owners in being engaged in wildland/urban mitigation activities and to help guide emergency services during response.
- Inventory alternative firefighting water sources and encourage the development of additional sources.

County of Orange General Plan, Safety Element

The Safety Element, one of nine elements of the County of Orange General Plan, contains County policies on identified and potential hazards and safety considerations, their mitigation (i.e., reduction in damage and loss to real and personal property and minimization of adverse social and economic impacts) and implications for development (County of Orange 2005).

The Safety Element examines the threat of fire to urban areas, wildlands, and the urban/wildlands interface. Fire is a constant threat in all parts of the County. The Safety Element includes wildland fire defense planning the purpose of which is to prevent wildland fires from starting and, if unsuccessful, to minimize the damage to natural resources and structures once a wildland fire starts. The following goal, policies, and implementation measure in the Safety Element pertain to fire:

> **Goal 1:** Provide a safe living environment, ensuring adequate fire protection facilities and resources to prevent and minimize the loss of life and property fire.
>
> > **Policy 2:** To establish improved development standards for location of new construction, structural design, emergency vehicular access, and detection hardware.
> >
> > **Policy 3:** To improve building code regulations to provide increased built-in fire protection.
> >
> > **Policy 5:** To continue to improve the minimum water system design requirements for fire protection.
> >
> > **Policy 9:** To encourage improvement of fire defense systems in hazardous areas.
> >
> > > **Implementation Measure/Planning and Development**: OCFA reviews all land use proposals including subdivisions and site development permits for adequate site design and implementation to assure that fire safe construction materials, and fire detection and protection systems are incorporated into the proposal in order to achieve maximum fire protection and to minimize extent of loss associated with fire incidence.

Orange County Sheriff's Department's Emergency Management Division

The mission of the Orange County Sheriff's Department's Emergency Management Division is to promote, facilitate and support the County of Orange and the Operational Area efforts to prepare for, respond to and recover from disasters. The Emergency Management Division provides emergency management and preparedness services to the unincorporated areas of Orange County and supports the efforts of the Orange County Operational Area. There are currently over 100 jurisdictions in the Operational Area encompassing all County departments and agencies, public and private organizations and the general population within the boundaries of Orange County (Orange County Sheriff's Department 2020).

City of Irvine General Plan, Safety Element

The goal of the City of Irvine's General Plan, Safety Element is to minimize the danger to life and property from manmade and natural hazards, including fire hazards, flood hazards, non-seismic geologic hazards and air hazards (City of Irvine 2015b). The following Safety Element objectives and policies are applicable to the proposed project.

Objective J-1: Hazard Occurrence

Policy (c): Establish criteria for land development in hillside areas with emphasis on fire retardant materials, minimization of exposure risk to wildfire and adjacent structure fires, provision of access for firefighting personnel and equipment, and removal of combustible vegetation

Objective J-2: Disaster Response

Policy (b): Ensure that each development will have adequate emergency ingress and egress.

3.14.3 Impact Analysis and Mitigation Measures

Thresholds of Significance

The following criteria from Appendix G of the *CEQA Guidelines* are used as thresholds of significance to determine the impacts of the proposed project as related to wildfire. If located in or near State Responsibility Areas or lands classified as Very High Fire Hazard Severity Zone, the proposed project would have a significant impact if it would:

1. Substantially impair an adopted emergency response plan or emergency evacuation plan.
2. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.
3. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.
4. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.
5. Result in cumulatively considerable impacts to wildfire.

Methodology

The proposed project's potential impacts associated with wildfire are evaluated using a variety of resources, including CAL FIRE maps showing fire hazard severity zones, the FRAP database, and fire history. Vegetation data is provided in Section 3.3 Biological Resources. As described in Section 3.14.1, *Environmental Settings*, this analysis conservatively assumes that wildfire risk conditions (i.e. large amounts of flammable vegetation) that would exist during proposed construction activities would be similar to conditions that that existed prior to the Silverado Fire at the time the NOP was published.

Impact Analysis

Emergency Response Plan

Impact 3.14-1: The proposed project could substantially impair an adopted emergency response plan or emergency evacuation plan.

Construction

The proposed project site is located within a State Responsibility Area, Moderate Fire Hazard Severity Zone. The Evacuation Plan for the City of Irvine indicates the proposed project site is bounded by two evacuation routes: Portola Parkway to the west and SR-133 to the southeast. Construction of the proposed project involves intersection improvements at the Portola Parkway/Sand Canyon Avenue intersection. All other project construction would be located onsite and not on public rights-of-ways. The proposed project would modify the existing intersection and associated traffic lights to allow construction access through the intersection directly onto the project site. Cross walks and associated pedestrian signals would also be modified to facilitate safe pedestrian crossing in all directions. All proposed modifications would be implemented in accordance with City of Irvine requirements, including traffic control to ensure emergency access is maintained on both rights-of-ways. The proposed intersection modification would not involve closure of any roadways; however, temporary lane closures could be required, for example to allow for restriping of lanes or creating the curb cut and entrance to the proposed access road. As explained in Section 3.12, Transportation, to ensure that impacts related to the circulation system do not occur as a result of the proposed project, IRWD would implement **Mitigation Measure TRA-1** which would require the preparation and implementation of a Traffic Control Plan. The Traffic Control Plan would include, but not be limited to, signage, striping, delineated detours, flagging operations, changeable message signs, delineators, arrow boards, and K-Rails that would be used during construction to guide motorists, bicyclists, and pedestrians safely through the construction area and allow for adequate emergency access and circulation to the satisfaction of the City. The Traffic Control Plan would be coordinated with the City of Irvine, as necessary, as well as with emergency responders, which include fire departments, police departments, and ambulances that have jurisdiction within the proposed project area. Therefore, with implementation of Mitigation Measure TRA-1, impacts to circulation system during the initial intersection improvement phase of the project would be reduced to a less than significant level, and project construction would not impair or physically interfere with emergency response teams or an evacuation plan. Impacts would be less than significant with mitigation.

Operation

Operation and maintenance activities for the proposed project would be substantially similar to current conditions respective to emergency response and evacuation. No operation-related activities would occur within surrounding rights-of-ways or along evacuation routes. Once the proposed intersection improvements at Portola Parkway/Sand Canyon Avenue are complete, site access for operation and maintenance vehicles would be through the intersection onto IRWD property. The proposed project would not result in impacts on emergency response plans or emergency evacuation plans. As a result, no impact would occur.

Mitigation Measures

> Implement Mitigation Measure TRA-1: Traffic Control Plan (see Section 3.12, *Transportation*, for details)

Significance Determination

Less than Significant Impact with Mitigation

Exposure to Pollutant Concentrations

Impact 3.14-2: The proposed project could, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.

Construction

The proposed project site is located within a State Responsibility Area, Moderate Fire Hazard Severity Zone. The proposed project site includes slopes surrounding the existing reservoir that are susceptible to prevailing winds. Brush and grassland habitats within the proposed project site are highly flammable. During construction, equipment and on-site diesel fuel could pose a risk to wildfire with possible ignition sources such as internal combustion engines, gasoline-powered tools, and equipment that could produce a spark, fire, or flame. The use of spark-producing construction machinery within fire risk areas such as the proposed project site could expose temporary project workers and contractors to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire, resulting in a potentially significant impact. However, all personnel on the project site would have to comply with PRC Sections 4427, 4428, 4431, and 4442, which include regulations relating to the handling of combustible fuels and equipment that can exacerbate fire risks. During construction, strict adherence to these PRC sections would ensure that contractors are responsible for all monitoring and safety measures ensuring that any risk to exacerbate wildfire would be reduced. Additionally, all construction must comply with fire protection and prevention requirements specified by the California Code of Regulations (CCR) and Cal/OSHA. This includes various measures such as easy accessibility of firefighting equipment, proper storage of combustible liquids, no smoking in service and refueling areas, and worker training for firefighter extinguisher use. Furthermore, implementation of **Mitigation Measure WDF-1** would be required to ensure fire hazard reduction measures are implemented during proposed project activities to further reduce the potential for wildfire impacts on project workers. As a result, impacts would be reduced to a less than significant level with mitigation.

Operation

As discussed above, the proposed project is located within a State Responsibility Area, Moderate Fire Hazard Severity Zone, and includes slopes susceptible to prevailing winds. Brush and grassland habitats within the project site are highly flammable. The proposed project would involve expansion of the existing reservoir water storage capacity and water levels would effectively create more inundated area and fewer steep slopes susceptible to prevailing winds within the project area in winter and spring months when the reservoir is full. The reduction of flammable surface area within the Moderate Fire Hazard Severity Zone could prevent or reduce uncontrolled spread of wildfire. As the reservoir is drawn down in the summer months to satisfy recycled water needs in IRWD's service area, the surface area susceptible to wildfire risk would increase. However, the flammable vegetation removed during construction would continue to be absent within the limits of the high- water elevation, reducing the risk of wildfire. Operation-related activities would involve a limited number of maintenance trucks for inspections and material delivery. These trucks would be limited to established access roads and would have a low potential of producing sparks, fire, or flame, that could result in uncontrolled spread of wildfire. Nevertheless, due to the site topography and wildfire risk, operators of the proposed project site would comply with PRC Sections 4427, 4428, 4431, and 4442, which include regulations relating to the handling of combustible fuels and equipment that can exacerbate fire risks, and IRWD would require implementation of Mitigation Measure WDF-1. As a result, impacts would be reduced to a less than significant level with mitigation.

Mitigation Measures

> **WDF-1: Fire Hazard Reduction Measures.** During project implementation, IRWD shall require all spark arrestors on construction and maintenance equipment to be in good working order. Contractors shall require all vehicles and crews to have access to functional fire extinguishers at all times.

Significance Determination

Less than Significant Impact with Mitigation

Infrastructure that Exacerbates Wildfire Risk

Impact 3.14-3: The proposed project could require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.

The proposed project includes construction and operation of new proposed access roads and pipelines to support the expanded dam and reservoir. This new infrastructure does not pose additional risk to exacerbation of wildfires other than what is discussed in Impact 3.14-2 above. New electrical power lines, which could exacerbate fire risk, would not be installed as a result of the proposed project. All infrastructure installed as part of the project during operation and maintenance will adhere to CCR Title 24, the CBC, and County of Orange Safety Element, and would be required to implement fire reduction measures as outlined in Mitigation Measure WDF-1. Adherence to applicable laws and regulations and implementation of Mitigation Measure WDF-1 would reduce impacts to a less than significant level.

Mitigation Measures

Implement Mitigation Measure WDF-1

Significance Determination

Less than Significant Impact with Mitigation

Post-Fire Slope or Drainage

Impact 3.14-4: The proposed project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

Construction

As discussed in Chapter 2, Project Description, during construction of the proposed project, approximately 2.4 million cubic yards of material is proposed to be excavated from the project site. Approximately 2.2 million cubic yards of compacted material would be reused onsite for construction of the new proposed dam. Site alteration through movement of substantial quantities of soil and earth materials has the potential to result in landslides as a result of runoff or drainage changes during construction. Due to the bowl-shaped topography of the site and the project's planned sediment basins, it is unlikely that conditions of erosion would extend beyond the boundaries of the project site. As discussed in section 3.6, Geology and Soils, given that the size of the proposed project exceeds one acre the project would be required to comply with the *NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ) (Construction General Permit) and local stormwater ordinances. These state and local requirements were developed to ensure that erosion is controlled on construction sites. The Construction General Permit requires preparation and implementation of a SWPPP, which requires applications of BMPs to control runon and runoff from construction work sites. The BMPs would include, but would not be limited to, physical barriers to prevent erosion and sedimentation, construction of sedimentation basins, limitations on work periods during storm events, use of infiltration swales, protection of stockpiled materials, and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction. In the event that a wildland fire is followed by a rain event, and results in downstream flooding or landslides as a result of post-fire runoff, the BMP measures required to be implemented under the SWPPP would reduce the risk of runoff, post-fire slope instability, and drainage changes. With compliance with existing regulations, impacts would be less than significant.

Operation

Once constructed, the proposed project would be designed to withstand a variety of site conditions to maintain capacity for the purpose of water storage. For instance, criteria used to develop the new reservoir grading plan includes slopes no steeper than 4H:1V (a ratio of 4 units of horizontal length to 1 unit of vertical height) to promote slope stability. The inclinations of the natural hillside slopes surrounding the reservoir are typically 4H:1V, and thus the inclination of cut slopes would be similar to that of the natural slopes. With the wide fluctuations of reservoir levels anticipated during operation, the slopes around the new reservoir would undergo repeated cycles of wetting and drying. These fluctuations combined with the poor slope stability characteristics of the soil composition (Vaqueros and Sespe Formations) could result in some slope instability which could be exacerbated by wildland fires. In the event that a wildland fire is followed by a rain event and results in downstream flooding or landslides as a result of post-fire runoff, slope instability, or drainage changes, the result would be material moving downslope into the reservoir. Given that the reservoir is in a canyon closed off by the presence of the dam, these materials would be removed during periods when the reservoir has low water levels and would pose no risks to downstream flooding. Operation of the proposed project would not involve onsite personnel that could be put at risk should landslides or flooding occur as a result of wildland fires. Operation of the proposed project would be managed in a manner that would not result in runoff, post-fire slope instability, or drainage changes as a result of potential wildland fire. As a result, impacts would be less than significant.

Mitigation Measures

None required

Significance Determination

Less than Significant Impact

Cumulative Impacts

Impact 3.14-5: Concurrent construction and operation of the proposed project and related projects in the geographic scope could result in cumulative impacts to wildfire.

This section presents an analysis of the cumulative effects of the proposed project in combination with other present and reasonably foreseeable future projects that could generate cumulatively considerable impacts to wildfire.

As described in Table 3-1, *Related Projects for Cumulative Analysis*, there are numerous projects that would require vehicles that utilize combustible materials to complete construction, similar to the proposed project. Several of these projects are Capital Improvement Projects from the City of Irvine Department of Public Works. Projects 3, 9, 10, and 11 are within close proximity to the proposed project. Projects 10 and 11 are anticipated to be complete by December 2020 and would not occur at the same time as the proposed project which is anticipated to begin in Fall of 2022. Projects 3 and 9 could occur at the same time as the proposed project. Other projects further away as identified on Figure 3-1 that occur at the same time include Project 14 which involves the construction of a freeway interchange, Projects 17 and 18, which are IRWD pump stations, and Projects 4, 6, and 7 which are residential projects that are currently under construction and could still be in construction when the proposed project begin construction in Fall 2022. Significant cumulative impacts related to wildfire could occur if the incremental impacts of the project combined with the incremental impacts of one or more cumulative projects identified in Table 3-1, to substantially increase risk that people or the environment would be exposed to wildfire.

Cumulative projects would be subject to the same regulatory requirements discussed for the proposed project, including the adherence to emergency planning. That is, cumulative projects involving activities that could exacerbate wildfire risk (such as combustible fuel used for construction and during maintenance), impair emergency plans, or expose people to downstream post-fire landslides also would be required to adhere to the same established regulatory standards. While it is possible that the proposed project and cumulative projects could result in increased wildfire risk at the same time and in overlapping locations, the responsible party associated with each project would be required to control the safety of their own site conditions to the same established regulatory standards. The proposed project would be required to implement Mitigation Measure WDF-1 as discussed above that would further mitigate cumulative impacts.

For the above reasons, the combined effects of the construction of the proposed project in combination with cumulative projects would not have a cumulatively considerable contribution to a cumulative impact. Other cumulative construction projects would be required to provide appropriate traffic control, emergency access, and fire safety for their projects. No significant cumulative impact related to wildfire would occur with implementation of Mitigation Measure WDF-1

Mitigation Measures

Implement Mitigation Measure WDF-1

Significance Determination

Less than Significant Impact with Mitigation

3.14.4 References

California Department of Forestry and Fire Protection (CAL FIRE). 2020a. Fire Hazard Severity Zone Viewer. Available at https://egis.fire.ca.gov/FHSZ/. Accessed May 13, 2020.

CAL FIRE. 2020b. Fire and Resource Assessment Program. Available at https://frap.fire.ca.gov/. Accessed May 13, 2020.

CAL FIRE. 2020c. Incidents Overview. Available at https://www.fire.ca.gov/incidents/. Accessed February 26, 2021.

City of Irvine. 2015a. General Plan Introduction. Available at http://alfresco.cityofirvine.org/alfresco/guestDownload/direct?path=/Company%20Home/Shared/CD/Planning%20and%20Development/General%20Plan/Introduction%20-%20Aug%202015.pdf. Accessed May 13, 2020.

City of Irvine. 2015b. General Plan, Safety Element. Available at http://alfresco.cityofirvine.org/alfresco/guestDownload/direct?path=/Company%20Home/Shared/CD/Planning%20and%20Development/General%20Plan/11.%20Safety%20Element%20-%20Aug%202015.pdf. Accessed May 13, 2020.

City of Irvine. 2019a. City of Irvine Annex VIII Evacuation Plan, September. Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=32132. Accessed October 26, 2020.

City of Irvine. 2019b. Advisories & Code Updates. Important Notice Regarding the 2019 Building Standard. Available at https://www.cityofirvine.org/community-development/advisories-code-updates. Accessed March 3, 2021.

City of Irvine. 2020. Evacuation Zone Map. Available at https://cityofirvine.maps.arcgis.com/apps/webappviewer/index.html?id=c452152c1a5a46129dde513d8652e81e. Accessed October 26, 2020.

County of Orange. 2005. General Plan, Chapter IX, Safety Element. Available at https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=40234. Accessed May 13, 2020.

County of Orange and Orange County Fire Authority. 2015. Local Hazard Mitigation Plan. Available at https://www.smwd.com/DocumentCenter/View/2193/APPENDIX-H_OC-HMP-Final. Accessed May 13, 2020.

J.E. Keeley. 2004. J.E. Keeley, 2004. Invasive Plants and Fire Management in California Mediterranean-Climate Ecosystems.

Orange County Fire Authority (OCFA). 2007. After Action Report Santiago Fire. Available at https://www.ocfa.org/Uploads/Transparency/OCFA-AAR-Santiago%20Fire.pdf. Accessed May 31, 2020.

Orange County Sheriff's Department. 2020. Emergency Management. Available at https://www.ocsheriff.gov/commands-divisions/investigations-special-operations-command/emergency-management. Accessed May 13, 2020.

CHAPTER 4
CEQA Plus Considerations

This Draft EIR has been prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency (USEPA) to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA). Potential federal funding partners could include U.S. Bureau of Reclamation (USBR) or the State Water Resources Control Board (SWRCB) through the State Revolving Fund (SRF) Loan Program, both of which provide funding for construction of publicly-owned treatment facilities and water reclamation projects. This funding for capital improvements to wastewater treatment and water recycling facilities is authorized under the federal Clean Water Act. The CEQA-Plus requirements have been established by the USEPA and are intended to supplement the CEQA Guidelines with specific requirements for environmental documents acceptable to the USBR or SWRCB when reviewing applications for wastewater treatment facility loans. They are not intended to supersede or replace the CEQA Guidelines. In order to qualify for federal loan programs administered by the USBR or the SWRCB, the proposed project must comply with the following federal cross-cutting regulations:

- Archaeological and Historic Preservation Act
- Clean Air Act
- Coastal Barriers Resources Act
- Coastal Zone Management Act
- Endangered Species Act
- Environmental Justice Executive Order
- Farmland Protection Policy Act
- Fish and Wildlife Conservation Act
- Floodplain Management
- Magnuson-Stevens Fishery Conservation and Management Act
- Migratory Bird Treaty Act
- National Historic Preservation Act
- Protection of Wetlands
- Rivers and Harbors Act
- Safe Drinking Water Act
- Wild and Scenic Rivers Act

Compliance with the federal laws and relevant executive orders are described below in Sections 4.1 and 4.2. In summary, the proposed project complies with those laws and executive orders, with further evidence provided in other sections of this Draft EIR as cross-referenced below.

4.1 Federal Regulations

4.1.1 Archaeological and Historic Preservation Act

The Archaeological and Historic Preservation Act (AHPA) also known as the Archaeological Recovery Act was passed and signed into law in 1974. The AHPA required that Federal agencies provide for "… the preservation of historical and archeological data (including relics and specimens) which might otherwise be irreparably lost or destroyed as the result of … any alteration of the terrain caused as a result of any Federal construction project of federally licensed activity or program (Section 1)." (NPS 2020)

The impetus for AHPA was the destruction of archaeological sites throughout the country, frequently by actions funded or otherwise supported by Federal agencies, but not covered by the Reservoir Salvage Act, which required archeological salvage as part of dam projects (NPS 2020).

The AHPA built upon the national policy, set out in the Historic Sites Act of 1935, "… to provide for the preservation of historic American sites, buildings, objects, and antiquities of national significance …" The AHPA expanded the policy by focusing attention on significant resources and data, but does not require that they be shown to be of "national" significance. The connection between the 1935 statute and the AHPA is mentioned explicitly in the first section of the statute (NPS 2020).

Compliance with the National Historic Preservation Act (see below), and particularly the implementing regulations for Section 106, as discussed in Section 3.4 and 3.13 of this EIR, fulfill the requirements of the AHPA.

4.1.2 Clean Air Act

The federal Clean Air Act (CAA) requires the USEPA to identify National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. NAAQS have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM10, PM2.5, and lead. Pursuant to the 1990 FCAA Amendments, the USEPA classifies air basins (or portions thereof) as "attainment" or "nonattainment" for these criteria air pollutants, based on whether or not the NAAQS have been achieved. The CAA requires each state to prepare a State Implementation Plan (SIP), which is an air quality control plan that includes pollution control measures for states that violate the NAAQS. Clean Air Act compliance is described in Section 3.2 Air Quality. CEQA-Plus requirements include a CAA general conformity analysis for projects in a federal nonattainment area or an attainment area subject to a SIP. The South Coast Air Basin is designated under federal ambient air quality standards as nonattainment for ozone and fine particulate matter PM2.5 as explained in Section 3.2 *Air Quality*. As a result, a CAA general conformity analysis has been included in Section 3.2 *Air Quality*.

4.1.3 Coastal Barriers Resources Act

The Coastal Barriers Resources Act (CBRA) was enacted in 1982 to designate relatively undeveloped coastal barriers along the Atlantic, Gulf of Mexico, Great Lakes, U.S. Virgin Islands, and Puerto Rico coasts as part of the John H. Chafee Coastal Barrier Resources System (CBRS). Those areas became ineligible for most new federal expenditures and financial assistance in order to discourage development such as federal flood insurance (USFWS 2019). The goals of the CBRA are to minimize loss of human life by discouraging development in high risk areas, to reduce wasteful expenditure of federal resources, and to protect the natural resources associated with coastal barriers (USFWS 2020). There are no designated Coastal Barrier Resources System in California. Additionally, the proposed project does not propose any development associated with coastal barriers. Therefore, this Act is not applicable to the proposed project, and no impact would occur.

4.1.4 Coastal Zone Management Act

Section 307 of the Coastal Zone Management Act (CZMA) requires activities approved or funded by the federal government that affect any land or water use or natural resource of a state's coastal zone be consistent with the enforceable policies of the state's federally approved coastal management program. California's federally approved coastal management program consists of the California Coastal Act, the McAteer-Petris Act, and the Suisun Marsh Protection Act. The California Coastal Commission (CCC) implements the California Coastal Act and the federal consistency provisions of the CZMA for activities affecting coastal resources outside of San Francisco Bay. The proposed project does not lie within a State Coastal Zone and would not result in impact to coastal zone natural resources. Therefore, this Act is not applicable to the proposed project, and no impact would occur.

4.1.5 Endangered Species Act

The purpose of the Endangered Species Act (ESA) is to protect and recover imperiled wildlife and plant species and the habitats/ecosystems upon which they depend for survival. Section 10 provides a means whereby a nonfederal action with the potential to result in take of a listed species can be allowed under an incidental take permit. Application procedures are found at 50 CFR 13 and 17 for species under the jurisdiction of USFWS and 50 CFR 217, 220, and 222 for species under the jurisdiction of NMFS. To comply with the ESA, a project applicant analyzes the project's effects on threatened and endangered species, as well as any critical habitat designated for any of the species. The applicant uses biological assessments that have been prepared for the project, as well as any documents pertaining to the project's effects on listed species and designated critical habitat. If a listed species may be adversely affected by a project, USBR or SWRCB staff will confer with the USFWS to inform these agencies of project impacts to any federally listed species or critical habitat. If USFWS staff determine the project will adversely impact a federally listed species or designated critical habitat, formal consultation is initiated, where USEPA assumes the role as the lead agency. This EIR includes the documentation to disclose the proposed project's effects on special-status species and compliance with the federal ESA, including compliance with the Orange County Central & Coastal Subregions NCCP/HCP. Further details about the regional NCCP/HCP and ESA are discussed in

Section 3.3, *Biological Resources*, as well as the Biological Resources Technical Report included in Appendix C to this Draft EIR.

4.1.6 Farmland Protection Policy Act

The purpose of the Farmland Protection Policy Act (FPPA) is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. It additionally directs federal programs to be compatible with state and local policies for the protection of farmlands. For the purpose of the FPPA, farmland includes Prime Farmland, Unique Farmland, and Land of Statewide or Local Importance. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency (NRCS 2020). As discussed in Chapter 3.0, Environmental Setting, Impact Analysis, and Mitigation Measures, the proposed project is identified as "Other Land" on the CDC Farmland Map for Orange County. Other Land can include low density rural developments, brush, timber, wetland, and riparian areas not suitable for livestock grazing, confined livestock, poultry or aquatic facilities, strip mines, borrow pits, and water bodies smaller than 40 acres. Further, there is no Prime, Unique, or Farmland of Statewide Importance located in the project area, nor would the project convert any farmland to non-agricultural use. As such, the project would not impact farmland and would adhere to the FPPA.

4.1.7 Fish and Wildlife Conservation Act

The Fish and Wildlife Conservation Act declares that fish and wildlife are of ecological, educational, esthetic, cultural, recreational, economic, and scientific value to the United States. The purposes of this Act are to encourage all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities and to conserve and to promote conservation of non-game fish and wildlife and their habitats. Another purpose is to provide financial and technical assistance to the states for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife. Fish and Wildlife Conservation Act compliance is described in Section 3.3 Biological Resources.

4.1.8 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the principal law governing marine fisheries in the U.S. First enacted in 1976, it was adopted to create a U.S. fishery conservation zone out to 200 nautical miles off the U.S. coast, to phase out foreign fishing activities within this zone, to prevent overfishing, to allow overfished stocks to recover, and to conserve and manage fishery resources. MSA requires federal agencies to consult with the National Oceanic and Atmospheric Administration (NOAA) Fisheries when their actions or activities may adversely affect habitat identified by federal regional management councils as Essential Fish Habitat (EFH). The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA Fisheries, 2020). The proposed project would have no adverse impact on the marine environment or EFH in the Pacific

Ocean. The proposed project is located approximately 11 miles northwest of the Pacific Ocean, and no project component includes discharge to the Pacific Ocean which could potentially impact EFH's. Therefore, the MSA is not applicable to the proposed project, and no impact would occur.

4.1.9 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) is the domestic law that affirms, or implements, a commitment by the U.S. to four international conventions (with Canada, Mexico, Japan, and Russia) for the protection of a shared migratory bird resource. The MBTA makes it unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, or kill migratory birds. The law also applies to the removal of nests occupied by migratory birds during the breeding season. The MBTA makes it unlawful to take, pursue, molest, or disturb these species, their nests, or their eggs anywhere in the United States. Migratory Bird Treaty Act (MBTA) compliance is described in Section 3.3 Biological Resources.

4.1.10 National Historic Preservation Act

CEQA-Plus requires compliance with Section 106 of the National Historic Preservation Act (NHPA). Consultation with the State Historic Preservation Officer (SHPO) is required to demonstrate/confirm that Section 106 compliance has been achieved. This EIR and the administrative record includes the information and documentation that is required to provide to the SHPO to initiate the Section 106 consultation, including, (1) identification of the proposed project's Area of Potential Effects (APE), (2) cultural records searches for the APE at the appropriate Information Centers, (3) documentation of Native American consultation, (4) cultural resources field surveys of the APE, (4) evaluations of elements of the built environment in and around the APE that are eligible for the National Register of Historic Places, and (5) Determination of Eligibility for any cultural resources that cannot be avoided during project construction. Compliance with the NHPA is discussed in Section 3.4 Cultural Resources, and Section 3.13 Tribal Cultural Resources.

4.1.11 Rivers and Harbors Act

Section 9 of the Rivers and Harbors Appropriation Act of 1899 (33 U.S.C. 403; Chapter 425, March 3, 1899; 30 Stat. 1151), commonly known as the Rivers and Harbors Act of 1899, prohibits the construction of any bridge, dam, dike or causeway over or in navigable waterways of the U.S. without Congressional approval. Under Section 10 of the Act, the building of any wharfs, piers, jetties, and other structures is prohibited without Congressional approval, and excavation or fill within navigable waters requires the approval of the Chief of Engineers. The proposed project does not entail the construction of any wharfs, piers, or jetties, nor is the proposed project located on a federally designated navigable water. As such, this Act is not applicable to the proposed project, and no impact would occur.

4.1.12 Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was established to protect the quality of drinking water in the United States. The SDWA focuses on all waters actually or potentially designed for drinking uses, whether from above ground or underground sources. The principal federal agency involved in drinking water regulation is the USEPA. USEPA is responsible for implementing federal drinking water law and setting national drinking water requirements. The proposed project would increase the volume of recycled water the Syphon Reservoir, but would not involve potable water that would be regulated by the SDWA. Therefore, this Act is not applicable to the proposed project, and no impact would occur.

4.1.13 Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act was created in 1968 to protect and preserve the special character of certain rivers with outstanding natural, cultural and recreational values and recognize their appropriate use and development. Section 5(d)(1) of the Wild and Scenic Rivers Act lists interim protection measures for eligible or suitable rivers. For a river to be eligible for designation in the National Wild and Scenic River System, it must have one or more outstandingly remarkable river values. There are no Wild and Scenic Rivers located within the project area (National Wild and Scenic River System 2020). Therefore, this Act is not applicable to the proposed project, and no impact would occur.

4.2 Executive Orders

4.2.1 Floodplain Management, Executive Order No. 11988

Executive Order 11988 requires federal agencies avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative (FEMA 2020a). If a project has a potential impact to or within a floodplain, there is an eight-step process that agencies can carry out during their decision-making process on the project. The eight-step process includes: (1) determine if a proposed action is in the base floodplain or area which has a one percent or greater chance of flooding in any given year, (2) conduct early public review, (3) identify and evaluate practicable alternatives to locating in the base floodplain, (4) identify impacts of the proposed action, (5) develop measures to minimize the impacts and restore and preserve the floodplain if impacts cannot be avoided, (6) re-evaluate the alternatives, (7) present the findings and a public explanation, and (8) implement the action (FEMA 2020a).

As discussed in Section 3.9, Hydrology and Water Quality, the proposed project is located in a FEMA identified FIRM flood hazard area. However, project components are designed to handle 100-year flood events, and would comply with federal regulations pertaining to floodplain management. In the event of a dam breach, there is a risk of flooding for downstream communities that was analyzed in a feasibility study to assess geographic areas that could become potentially inundated if the dam were to breach. However, the dam would be compliant with all DSOD regulations. Refer to Section 3.9 Hydrology and Water Quality for further discussion of the proposed project components in the floodplain and potential impacts and mitigation measures.

4.2.2 Protection of Wetlands, Executive Order No. 11990, as Amended by Executive Order No. 12608

Under this Executive Order No. 11990, each Federal agency takes action to minimize the destruction, degradation, or modification of wetlands and enhance the natural and beneficial values of wetlands. The Executive Order also directs the avoidance of direct or indirect support of new construction in wetlands and public involvement throughout the wetlands protection decision-making process (HUD 2020). Impacts to wetlands in the project area are described in Section 3.3 Biological Resources.

4.2.3 Environmental Justice, Executive Order No. 12898

Under Executive Order 12898, federal agencies are directed to make achieving environmental justice a part of their mission by identifying and addressing, as appropriate, disproportionately high adverse human health or environmental effects of its activities on minority and low-income populations (FEMA 2020b). Per Executive Order 12898, each Federal agency must make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health, environmental, economic and social effects of its programs, policies, and activities on minority and low-income populations, particularly when such analysis is required by NEPA. The Executive Order emphasizes the importance of NEPA's public participation process, directing that each Federal agency shall provide opportunities for community input in the NEPA process. Agencies are further directed to identify potential effects and mitigation measures in consultation with affected communities. An Environmental Justice Analysis is included in Section 4.3 below for the proposed project per the guidelines set above to comply with federal cross cutting regulations required to receive federal funding.

4.3 Environmental Justice Analysis

The following section discusses the environmental justice issues pertaining to the proposed project and evaluates the potential for the proposed project to disproportionately affect minority and low-income populations. Data presented in this section was obtained from the 2010 U.S. Census by the U.S. Census Bureau.

4.3.1 Environmental Setting

Potentially Affected Populations

The study area for environmental justice effects includes areas that may experience adverse human health or environmental effects resulting from construction and operation of the proposed project. While the project is located entirely within Unincorporated Orange County this analysis includes census tracts in the City of Irvine and the City of Tustin given their proximity to the proposed project and physical relationship to potential project impacts. The census tracts included for the cities of Tustin and Irvine include downstream emergency inundation areas, and tracts that could be impacted by project-related localized air quality and traffic impacts. **Table 4-1** and **Table 4-2** list the census tracts potentially affected by the proposed project. The tracts are also shown in **Figure 4-1**.

TABLE 4-1
DEMOGRAPHIC INFORMATION FOR CENSUS TRACTS POTENTIALLY AFFECTED BY THE PROJECT (2010)

Census Tract	Black or African American Alone, Not Hispanic or Latino	Asian Alone, Not Hispanic or Latino	Hispanic or Latino (of Any Race)	Total Minority (Other than Non-Hispanic White)[a,b]
CT 524.17	1.05%	37.04%	6.96%	45.19%
CT 524.18	2.80%	45.12%	11.39%	***58.75%***
CT 524.21	1.33%	28.64%	8.67%	36.16%
CT 524.26	1.56%	26.47%	11.62%	36.80%
CT 525.05	2.14%	35.66%	13.28%	46.40%
CT 525.15	1.28%	52.78%	8.80%	***61.95% ****
CT 525.21	3.82%	37.90%	13.58%	***55.30%***
CT 525.25	1.91%	44.43%	8.86%	***55.65%***
CT 525.26	1.72%	38.09%	13.52%	48.82%
CT 525.27	2.07%	44.38%	9.59%	***55.68%***
CT 525.28	1.79%	39.03%	8.76%	47.59%
CT 755.15	2.58%	31.11%	37.94%	***58.78%***

NOTES:

CT = census tract

[a] Numbers in bold and italics represent tracts where greater than 50 percent of the total population is represented by minority population.
[b] Numbers with asterisk (*) represent tracts where the minority population is meaningfully greater than the total minority population of the city.

SOURCE: U.S. Census Bureau 2010.

TABLE 4-2
INCOME AND POVERTY FOR CENSUS TRACTS POTENTIALLY AFFECTED BY THE PROJECT (2010)

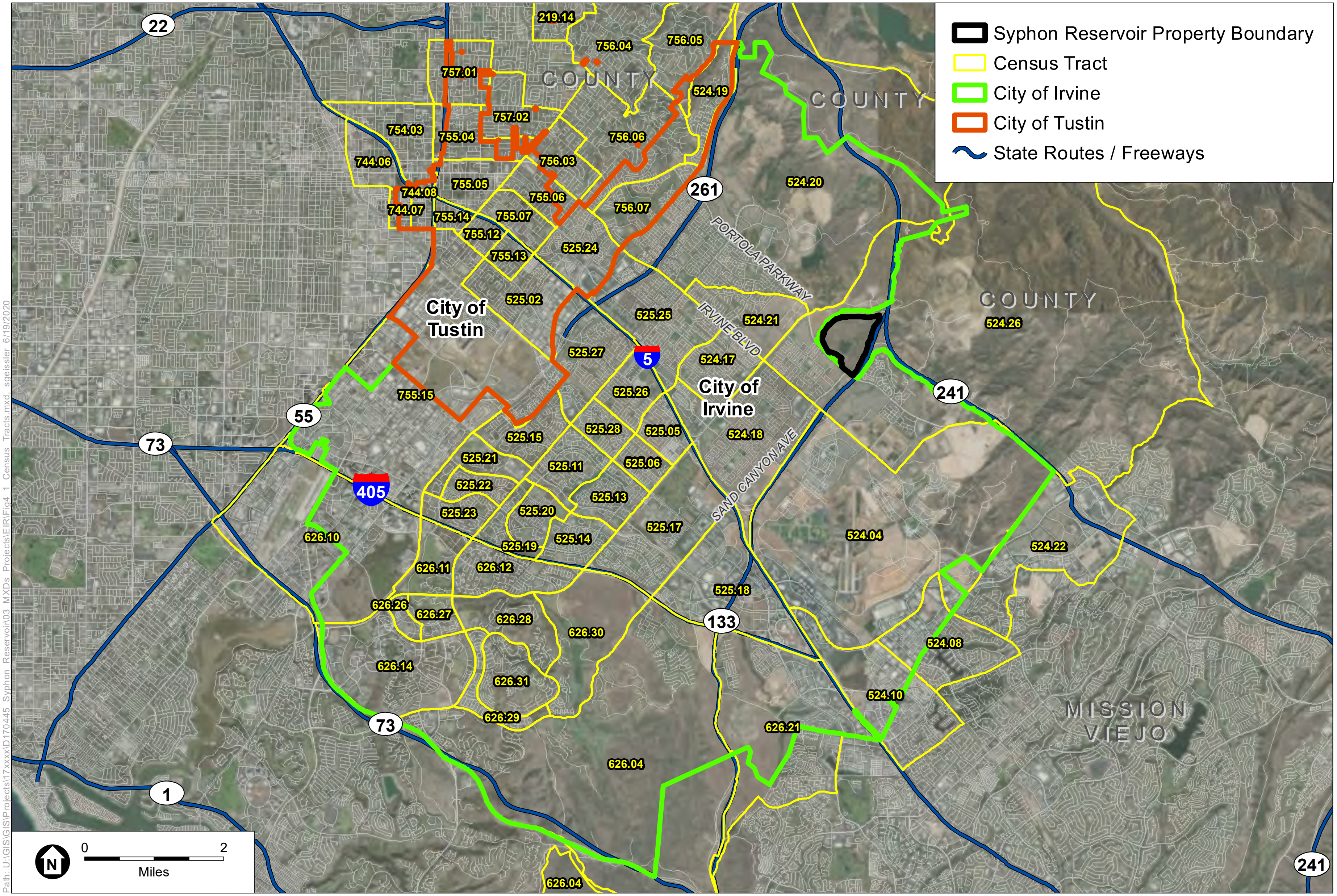
Geography	Mean Household Income	Percentage of Individuals with Family Income below Poverty Threshold[a]
CT 524.17	$128,102.00	3.1
CT 524.18	$103,893.00	7.3
CT 524.21	$135,929.00	4.3
CT 524.26	$141,021.00	3.2
CT 525.05	$76,836.00	4.9
CT 525.15	$107,014.00	6.1
CT 525.21	$72,672.00	7
CT 525.25	$111,682.00	4.2
CT 525.26	$115,481.00	4.6
CT 525.27	$123,929.00	3.7
CT 525.28	$102,981.00	2.2
CT 755.15	$95,294.00	7.9

NOTES:

CT = census tract

[a] Numbers in bold and italics denote disadvantaged communities and low-income populations.

SOURCE: U.S. Census Bureau 2010.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 4-1
Census Tracts

ESA

Minority Populations

According to the federal Council on Environmental Quality (CEQ) guidelines for environmental justice analyses (CEQ 1997), minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is "meaningfully greater" than the majority population percentage in the general population or other appropriate unit of geographic analysis. CEQ guidance does not define the term "meaningfully greater;" however, the Federal Interagency Working Group on Environmental Justice NEPA Committee's *Promising Practices for EJ Methodologies* (FIWGEJ 2016) suggests that the 50 percent approach and the "meaningfully greater" approach should be used together, and that "[t]he Meaningfully Greater analysis requires use of a reasonable, subjective threshold (e.g., ten or twenty percent greater than the reference community)." This analysis embraces the NEPA Committee's advice on this approach.

Information regarding racial and ethnic diversity in the study area was derived from the 2010 census by the U.S. Census Bureau. The City of Irvine and City of Tustin both have a total minority population greater than 50 percent, and thus, as a reference population, represent a minority population. The City of Irvine has a minority population of 59.3%, and the City of Tustin has a minority population of 69.4% (US Census Bureau 2019a). However, the minority population percentages of individual census tracts within both cities differ widely reflecting local patterns of diversity, separation, and integration. While the entire population of both cities represents a greater than 50 percent minority population, the "total minority" population, which for this analysis is considered to include all residents who reported their race and ethnicity as anything other than non-Hispanic white to the U.S. Census Bureau, above 50 percent within individual census tracts comprises about 35 percent of the census tracts in the City of Irvine, and 23 percent of the census tracts in the City of Tustin.

Selected racial and ethnic characteristics of census tracts potentially affected by the proposed project are summarized in Table 4-1. The final column in Table 4-1 presents the "total minority" population percentage.

Because the City of Irvine and City of Tustin both have a minority population over 50 percent, the "meaningfully greater" approach also is used here to identify minority populations that exceed the percentage of the two cities. As explained above, no official threshold defines this term, and a lead agency must select a threshold that provides a reasonable and meaningful basis of comparison. Given the range of minority population concentrations within the two cities, an inclusive threshold is used to acknowledge areas of particularly high minority populations: any census tracts within the potential area of environmental impact that have concentrated minority populations greater than the two cities (59.3% for Irvine and 69.4% for Tustin) are considered to be "meaningfully" greater.

Low-Income Populations

The CEQ environmental justice guidance states that "…low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty" (CEQ 1997, page 25).

USEPA guidance (1998) recommends the use of Census data on poverty income as one indicator, as well as other available data. Unlike the CEQ guidance on minority populations, none of the environmental justice guidance documents contains a quantitative definition of what proportion of low-income individuals defines a low-income population. The annual statistical poverty thresholds are based on family income. A threshold of 50 percent of individuals in families with incomes below the poverty threshold (similar to the 50 percent threshold used to identify a minority population) would be an overly restrictive threshold for identifying a low-income population due to the nature of the poverty thresholds, which are not adjusted for regional costs of living, and are below levels commonly considered low-income in many areas of California.

For the purposes of this environmental justice analysis, the method of identifying low-income populations within the study area must account for regional costs of living. Therefore, this analysis uses a comparative approach and identifies a low-income population if the proportion of people with family incomes below the poverty threshold is greater than that within the general population; in other words, if the percentage of such people in any of the communities considered is greater than 10.5 percent, which is the poverty rate in Orange County (US Census Bureau 2019b). Additionally, California's Integrated Regional Water Management guidelines provide criteria for identifying "disadvantaged communities" during water resources planning efforts. Under the California Water Code, a disadvantaged community is defined as one with an annual median household income that is less than 80 percent of the statewide median household income (California Water Code, Section 79505.5[a]). The statewide median household income during 2010 when the census tract data was gathered was $59,540. Therefore, the threshold of 80 percent of the statewide median is $47,632. As shown in Table 4-2, there are census tracts within the cities of Irvine and Tustin that have mean incomes below this figure, and are therefore identified as disadvantaged communities and low-income populations, as denoted with bold italics in Table 4-2.

These two approaches identify slightly different groups of census tracts as low-income. This may be related to different average household/family sizes (because poverty thresholds are based on family size, but median income is not) or other factors.

4.3.2 Significance Thresholds and Criteria

For the purposes of this EIR and consistency with NEPA and CEQA-Plus Guidelines, applicable local plans, and agency and professional standards, the proposed project would be considered to have a significant effect on environmental justice if it would:

- Affect the health or environment of minority or low-income populations disproportionately.

4.3.3 Impacts and Mitigation Measures

Construction

Construction-related environmental impacts would be experienced within portions of the City of Irvine and the City of Tustin. For the purposes of this discussion and as identified in Tables 4-1 and 4-2 above, only tracts that represent a greater than 50% minority population are considered minority communities, and tracts with a poverty rate above 10.5% are considered low income. The rest of the City of Irvine and the City of Tustin are excluded from consideration herein.

Because the proposed project is not located within either city, no construction-related project activities would occur in minority or low-income communities that could cause primary environmental impacts. However, construction-related project activities could have environmental impacts that reach beyond the geography of the immediate project site. Construction impacts of the proposed project are explained in detail in Sections 3.1 through 3.14 of this Draft EIR. Environmental topics that have the potential to exacerbate existing disproportionate impacts on minority and low-income populations during construction include Sections 3.2, *Air Quality*, and 3.12, *Transportation.* As explained within Sections 3.2 and 3.12, short-term temporary impacts related to air quality and traffic during construction of the proposed project could occur.

The primary construction related environmental impacts that could have the potential to exacerbate existing disproportionate impacts on minority and low-income populations include emissions of pollutant concentrations emitted near sensitive receptors. As explained in Section 3.2, the only sensitive receptors that would be exposed to significant increases in pollutant concentrations (NOx) are located within Census Tract 524.26 that covers the Stonegate community within the City of Irvine and areas within unincorporated Orange County surrounding the project site. As shown in Tables 4-1 and 4-2, Census Tract 524.26 is neither a minority nor low-income community, and can be dismissed from further environmental analysis. All other criteria pollutant air quality impacts are based on a regional scale within the South Coast Air Quality Management District (SCAQMD) and thus do not differentiate between census tracts in IRWD's service area, either low-income/minority or not. Even still, both regional and localized emissions for NOx would be mitigated to less than significant levels with implementation of Mitigation Measure AIR-1. As a result, while the proposed project would result in an increase in criteria pollutants for NOx that would be mitigated to less than significant levels, the sensitive receptors close enough to the project to be impacted by localized emissions are not within low-income/minority areas, and would therefore not be disproportionally impacted.

As discussed in Section 3.12, *Transportation,* truck trips during construction would not result in a significant increase in traffic and would be for the most part concentrated on Portola Parkway between Jeffrey Boulevard and Sand Canyon Avenue, Sand Canyon Avenue between Irvine Boulevard and Portola Parkway, and Irvine Boulevard between Jeffrey Road and Sand Canyon Avenue, as well as SR-261, SR-241, and SR-133. Aside from the State Routes, the entirety of this area is located within Census Tract 524.26, which covers the Stonegate community within the City of Irvine and areas within unincorporated Orange County surrounding the project site. This tract is neither a minority nor low-income community, and can be dismissed from further environmental analysis. SR-241 also only traverses Census Tract 524.26 and likewise can be dismissed from further environmental analysis.

SR-133 traverses Census Tracts 524.04, 525.18, 626.04, and 626.21. SR-261 traverses Census Tracts 524.20, 252.25, 525.27, and 755.15. None of the Census Tracts that are traversed by SR-133 and SR-261 are considered low income per the discussion above. Additionally, the Census

Tracts that are traversed by SR-133 are not considered minority populations. All the census tracts that SR-261 traverses are considered minority populations. As discussed in Section 3.12 Transportation¸ to ensure the project does not cause significant impact a Traffic Control Plan would be required (see Mitigation Measure TRA-1). As such, the proposed project would not create impacts to traffic and transportation that would disproportionately affect low income or minority populations with implementation of Mitigation Measure TRA-1.

Operation

Operation of the proposed project would not create local impacts to air quality or traffic that could disproportionately affect public health within minority or low-income communities. The potential impact of inundation due to emergency releases from the proposed enlarged Syphon Dam is discussed in Section 3.9, *Hydrology and Water Quality,* and shown in Figures 3.9-3 and 3.9-4. While dam failure is not anticipated, the downstream hazard for the existing Syphon Reservoir is classified as extremely high. As a result, and as required by DSOD, an inundation map was prepared for the reservoir that shows areas downstream that could be subject to flooding in the event of dam failure. As shown in Figure 3.9-4, a hypothetical breach of the expanded Syphon Reservoir would flow overland; split at the I-5 Culver Drive Bridge and continue through the defined channels of Trabuco Road Drainage and Peters Canyon Channel before reaching Upper Newport Bay and, ultimately, the Pacific Ocean (GEI 2012; Stetson 2020).

Table 4-3 shows the census tracts within the City of Irvine and City of Tustin that would be inundated if the dam were to fail. Table 4-3 also shows which tracts represent low-income and minority populations that would be affected by inundation. While none of the tracts that would be inundated were identified in the 2010 Census as low-income, there are several minority communities that would be affected should the proposed dam fail.

TABLE 4-3
CENSUS TRACTS AFFECTED BY PROJECT INUNDATION (2010)

Geography	Minority Community	Low-Income Community
CT 524.17	N	N
CT 524.18	***Y***	N
CT 524.21	N	N
CT 524.26	N	N
CT 525.05	N	N
CT 525.15	***Y***	N
CT 525.21	***Y***	N
CT 525.25	***Y***	N
CT 525.26	N	N
CT 525.27	***Y***	N
CT 525.28	N	N
CT 755.15	N	N

Of the 12 census tracts that would be affected by the inundation area of the proposed enlarged Syphon Dam, five are characterized by predominantly minority populations (Census Tracts 524.18, 525.15, 525.21, 525.25, and 525.27) as indicated in Table 4-3. Three of these census tracts (524.18, 525.25, 525.27) are included in the current inundation area of the existing Syphon Dam. As such, the proposed project would affect two additional census tracts (525.15, 525.21) that are characterized by predominantly minority populations. The proposed project would affect seven census tracts that are not predominantly minority populations, of which six are already included in the current inundation of the existing Syphon Dam and one would be added to the inundation area due the proposed project (Census Tract 524.21). As a result, the census tracts that would be affected by inundation as a result of the proposed project would not be predominantly characterized by minority populations.

As seen in Figure 3.9-3 and 3.9-4 different cross sections were analyzed to determine impact of inundation to different areas within Irvine and Tustin as the water flowed toward the Portola Parkway storm drain. While all Census Tracts discussed above would be affected by inundation, based on location certain tracts would be inundated disproportionately more than others. The closest tract immediately southwest of the dam is Census Tract 525.26, which is neither a low income or minority community. This Census Tract is located between Cross Sections 1 and 2 and would experience the largest depths of inundation from 9 to 25 feet. As a basis of comparison the impact of dam failure on the minority and low income tracts in the project area are discussed below.

Census Tract 524.18 lies between Cross Section 1 and 3 and would, similar to Census Tract 525.26 discussed above, experience the greatest inundation with an inundation depth range of 4 to 25 feet. However, only the northern most portion of Census Tract 524.18 would be affected with potential depths of 25 feet, while the majority of the tract lies further west where levels of inundation would be lower. A larger portion of Census Tract 525.26 would be inundated and the entirety of that Census Tract would experience the highest maximum depths of inundation.

Further west, Census Tracts 525.25 and 525.27 are located between Cross Sections 3 and 4 and would experience inundation depths of 4 to 5 feet. Census Tract 525.15 is located between Cross Sections 4 and 5 and would experience inundation depths of 5 to 11 feet. Lastly, Census Tract 525.27 is located between Cross Sections 5 and 7 and would experience inundation depths of 6 to 11 feet. Generally speaking, as the flood water would move toward the Peters Canyon Channel the overall depth of inundation decreases. However, due to changing topography between the Syphon Reservoir and the Portola Parkway channel depths would vary.

As such, low income and minority communities would not receive a disproportionate impact as a result of the potential inundation and flooding due to dam failure. Additionally, dam failure is not anticipated, and this inundation represents a conservative worst case scenario.

As mentioned previously in Chapter 2, *Project Description*, during precipitation events, IRWD would maintain reservoir levels well below the spillway crest to create space for stormwater runoff to enter the reservoir and avoid use of the spillway. The annual operating plan would identify a maximum water surface elevation that would ensure overtopping of reservoir and spillway would not occur due to stormwater inflow, wave action, or overfilling of the reservoir from IRWD's recycled water system. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands, and other factors as needed. Under normal operating conditions, all flow in or out of the reservoir would be conveyed through the existing 36-inch inlet/outlet pipeline. In the event of an emergency, IRWD can also draw down the reservoir through the existing 48-inch pipeline that discharges to the existing storm drain in Portola Parkway.

As designed, a baffled concrete dissipation structure and short rip-rap channel would be installed to reduce velocities to safe levels to control the release of water through the discharge pipeline and into the storm drain. Settlement and groundwater pressure monitoring, utilization of dissipation controls, and other site monitoring would maintain the expanded reservoir in sound order. As required under DSOD regulations, regular monitoring and reporting would occur. As such, impacts regarding dam inundation are not expected to impact low-income or minority communities disproportionately.

4.4 References

Council on Environmental Quality (CEQ). 1997. Environmental Justice Guidance Under the National Environmental Policy Act, https://www.epa.gov/sites/production/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf. Accessed June 12, 2020.

FEMA. 2020a. Executive Order 11988: Floodplain Management, Available online at: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/laws/descriptions#11988, Accessed on June 5 2020.

Federal Emergency Management Agency (FEMA). 2020b. Executive Order 12898: Environmental Justice, Available online at: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/laws/descriptions#12898. Accessed on June 5, 2020.

Federal Interagency Working Group on Environmental Justice NEPA Committee (FIWGEJ). 2016. Promising Practices for EJ Methodologies in NEPA Reviews, https://www.epa.gov/sites/production/files/2016-05/documents/iwg_promising_practices_final_5-16-2016.pdf, Accessed June 12, 2020.

NOAA Fisheries. 2020. Consultations for Essential Fish Habitat. Available online at: https://www.fisheries.noaa.gov/national/habitat-conservation/consultations-essential-fish-habitat#more-information. Accessed on June 5, 2020.

National Park Service (NPS). 2020. Archaeological and Historic Preservation Program. Available online at: https://www.nps.gov/archeology/tools/laws/AHPA.htm. Accessed on June 5, 2020.

NRCS. 2020. Farmland Protection Policy Act, Available online at: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/. Accessed on June 5, 2020.

National Wild and Scenic River System. 2020. List of Wild and Scenic Rivers in California, Available online at: https://www.rivers.gov/california.php, Accessed on June 5, 2020.

United States Census Bureau. 2010. Census Data for Irvine and Tustin. Accessed June 15, 2020.

United States Census Bureau. 2019a. Quick Facts: Tustin City, California; Irvine City, California. Available online at: https://www.census.gov/quickfacts/fact/table/tustincitycalifornia,irvinecitycalifornia/PST045219. Accessed June 12, 2020.

United States Census Bureau. 2019b. Quick Facts: Orange County, California. Available online at: https://www.census.gov/quickfacts/orangecountycalifornia. Accessed on June 17, 2020.

U.S. Department of Housing and Urban Development (HUD). 2020. Wetlands Protection – Executive Order 11990, Available online at: https://www.hud.gov/sites/documents/WETLANDSNARR.PDF, Accessed on June 5, 2020.

USFWS. 2019. Coastal Barrier Resources System Overview, Available online at: https://www.fws.gov/CBRA/, Updated on November 14, 2019.

USFWS. 2020 CBRA Legislation and Testimony, Available online at: https://www.fws.gov/CBRA/Legislation.html, Updated April 3, 2020.

CHAPTER 5
Growth Inducement

5.1 Overview

The California Environmental Quality Act (CEQA) Guidelines (Section 15126.2(e)) require that an EIR discuss the potential growth-inducing impacts of a proposed project. The CEQA Guidelines provide the following guidance for such discussion:

> *Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.*

A project can have direct and/or indirect growth-inducement potential. Direct growth inducement would result if a project involves construction of new housing. A project can have indirect growth-inducement potential if it establishes substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises) or if it involves a construction effort with substantial short-term employment opportunities that indirectly stimulates the need for additional housing and services to support the new employment demand. Similarly, under CEQA, a project would indirectly induce growth if it removes an obstacle to additional growth and development, such as removing a constraint on a required public service.

Water storage and supply is one of the primary public services needed to support growth and community development. While water supply plays a role in supporting growth, it is not the single determinant of such growth. Other factors, including general plan policies, land use plans, and zoning, the availability of wastewater treatment and solid waste disposal capacity, public schools, transportation services, and other essential public infrastructure, also influence business and residential population growth. Economic factors, in particular, greatly affect development rates and locations.

Growth inducement itself is not necessarily an adverse environmental impact. It is the potential consequences of growth, the secondary effects of growth, which may result in environmental impacts. Potential secondary effects of growth include increased demand on other public services; increased traffic and noise; degradation of air quality; loss of plant and animal habitats; and the conversion of agriculture and open space to developed uses. Growth inducement may result in adverse impacts if the growth is not consistent with the land use plans and growth management plans and policies for the area, as "disorderly" growth could indirectly result in additional adverse environmental impacts. Thus, it is important to assess the degree to which the growth accommodated by a project would or would not be consistent with applicable land use plans.

As stated in Chapter 2, Project Description, the proposed project would replace the existing engineered dam with a new and larger engineered dam. The proposed project would expand the reservoir's recycled water storage capacity from the current 500 AF to approximately 5,000 AF and would help IRWD become more self-sufficient by reducing its dependence on costly and less-reliable imported water from both the California State Water Project and the Colorado River. The proposed project would help IRWD to store more drought-proof recycled water during summer months, and support the increased use of recycled water for public landscaping, agricultural, business and industrial uses. By reducing IRWD's dependence on costly imported water, the proposed project would allow IRWD to replace an expensive source of water for one that is less expensive and a drought-resilient supply, which increases IRWD's water supply reliability. The project is expected to begin construction in the fall of 2022 and would be operational by early 2026.

This chapter evaluates the potential for the proposed project to induce growth in IRWD's service area. This chapter reviews the population growth projections for the IRWD service area and describes the existing and projected water demand and water supply conditions. It provides a description of IRWD's role in providing water and recycled water to customers within their service area and evaluates the potential for the proposed project to induce growth, both directly and indirectly.

5.2 Project Area Population and Water Demand Projections

5.2.1 Population Projections

Southern California Association of Governments Population Projections

The proposed project site is located entirely within IRWD's service area within unincorporated Orange County bordering the City of Irvine. Both Orange County and the City of Irvine's adopted General Plans guide the type and location of land uses and the intensity of development in response to projected population growth and associated housing needs. Each jurisdiction has assessed the growth-related impacts associated with planned land use and build-out scenarios allowed under their General Plans.

The proposed project and the IRWD service area are located within the jurisdiction of the Southern California Association of Governments (SCAG). SCAG consists of local governments from Orange, Ventura, San Bernardino, Los Angeles, Riverside, and Imperial Counties. One of SCAG's primary functions is to forecast population, housing, and employment growth for each region, subregion, and city within its jurisdiction. SCAG recently adopted the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) which acts as a long-term planning and management tool for the regional transportation system, providing mitigation measures to off-set the impacts of projected growth. SCAG population estimates are included in **Table 5-1** for the City of Irvine and Unincorporated Orange County in the years 2020, 2035, and 2040. As shown in Table 5-1, the populations of the City of Irvine and Unincorporated Orange County are anticipated to increase through 2040. The population in Unincorporated Orange County is expected to increase by approximately 30 percent while the population of the City of Irvine is anticipated to increase by approximately 10 percent.

TABLE 5-1
POPULATION PROJECTIONS

	2020	2025	2030	2035	2040	% Change
City of Irvine	296,300	—	—	326,700	327,300	10.5%
Unincorporated Orange County	137,700	—	—	177,900	180,100	30.1%
IRWD Service Area	440,981	467,483	475,346	479,783	N/A	8.8%[1]

NOTE:
[a] The percent change is based on 2035 population data provided in IRWD's UWMP.

SOURCE: SCAG 2016a, IRWD 2016

Irvine Ranch Water District's 2015 Urban Management Plan Projections

IRWD is a multi-service agency responsible for providing domestic water service, sewage collection and treatment, water recycling, and urban runoff natural treatment in Central Orange County, California. IRWD provides water service to approximately 422,000 residents as of 2019 (IRWD 2019). IRWD encompasses approximately 181 square miles extending from the Pacific Coast to the foothills of the Santa Ana Mountains, covering elevations ranging from sea level to 1,700 feet. IRWD services the City of Irvine and portions of Costa Mesa, Lake Forest, Newport Beach, Orange, Tustin, Santa Ana and unincorporated areas of Orange County.

Population projections for the IRWD service area were obtained from the IRWD's 2015 Urban Water Management Plan (UWMP). UWMPs are prepared by California's urban water suppliers to support long-term resource planning and ensure adequate water supplies are available to meet existing and future water demands. Every urban water supplier that either provides over 3,000 AF of water annually or serves more than 3,000 connections is required to assess the reliability of its water sources over a 20-year planning horizon considering normal, dry, and multiple dry years. This reliability assessment is required to be included in its UWMP, which are to be prepared every five years and submitted to the California Department of Water Resources (DWR) for consistency review under the Urban Water Management Planning Act. The latest IRWD UWMP is the 2015 plan published in 2016; the 2020 plan will be published in 2021 after the release of this Draft EIR. As a result, IRWD's 2015 UWMP is relied on herein. The UWMP takes into account the projected population growth for the water supplier's service area when determining future available water supply and future anticipated water demand.

The northern portion of Orange County was extensively developed in the 1970s and 1980s. In the period from 2000 to 2018, Orange County population density grew at a 13.2 percent, which was lower than the SCAG regional average during that time (SCAG 2019). IRWD's 2015 UWMP demonstrates that IRWD's service area is anticipated to experience minimal growth from 2020 through 2035 relative to recent conditions. As shown in Table 5-1, IRWD's service area has an anticipated growth rate of approximately 8.8 percent through 2035 (IRWD 2016).

5.2.2 Water Supply and Demand

IRWD is a member agency of the Municipal Water District of Orange County (MWDOC), which is a wholesale importer of water from the Metropolitan Water District of Southern California (MWD). MWD manages and coordinates the delivery of imported surface water supplies from the Colorado River and from Northern California through the State Water Project with six southern California counties including Orange County. MWDOC, as a water wholesale agency, does not provide water directly to customers but rather purchases it from MWD and sells it to its approximately 30 member agencies, comprising cities and water districts throughout the county. These member agencies, including IRWD, are the local water retailers, selling water directly to their local customers. IRWD is the largest retail member agency of MWDOC in terms of service area and overall water use.

IRWD's water supplies include imported potable and non-potable water, groundwater, surface water, recycled water, and water exchanges. Approximately 50 percent of IRWD's overall supply comes from local groundwater wells in the Orange County Groundwater Basin, and the Irvine and Lake Forest sub-basins. IRWD also receives surface water from other local sources including the Santiago Creek watershed. Water recycling is an essential component of IRWD's water supply portfolio, as any demand met with recycled water reduces the demand for high-quality drinking water. Today, recycled water meets approximately 26 percent of IRWD's service area water demands, and is applied towards uses including landscape irrigation, agricultural irrigation, toilet flushing, cooling towers, industrial processes, composting, grading and compaction. Water demand projections for the service area are provided in **Table 5-2**.

As shown in Table 5-2, recycled water demand is projected to steadily increase from 2020 to 2035 by about 16 percent. Recycled water demand is expected to experience the greatest increase between the years 2020 and 2025 (11 percent) when the Syphon Reservoir would be constructed and become operable. Recycled water supply is expected to increase by about 8 percent from 2020 to 2025 and then remain constant through the year 2035.

TABLE 5-2
IRWD CURRENT AND PROJECTED WATER SUPPLY AND DEMAND (AFY)

Source	2020	2025	2030	2035
Water Demand				
Potable and Raw Water Demand	71,086	77,700	80,645	81,966
Recycled Water Demand	25,359	28,261	28,786	29,311
Water Supply				
Imported Water (Potable)	41,929	41,929	41,929	41,929
Imported Water (Non-Potable)	17,826	17,826	17,826	17,826
Surface Water	N/A	N/A	N/A	N/A
Groundwater	53,171	65,523	65,523	65,523
Groundwater (Non-Potable)	3,514	3,514	3,514	3,514
Recycled Water	28,757	28,757	28,757	28,757
Total Demand	**96,445**	**105,961**	**109,431**	**111,277**
Total Supply	**145,197**	**157,549**	**157,549**	**157,549**

SOURCE: IRWD 2016

5.3 Growth Inducement Potential

Implementation of the proposed project would not have a direct growth inducement effect, as it does not propose development of new housing that would attract additional population to the area. Further, implementation of the proposed project would not result in substantial permanent employment that could indirectly induce population growth. Although construction activities would create some short-term construction employment opportunities over the approximately 36-month duration of construction, the amount of opportunities created would not require persons outside of the Orange County work force. Further, no new permanent employees would be required to operate the proposed dam and reservoir.

The objectives of the proposed project are to maximize the use of recycled water produced by IRWD for the benefit of IRWD customers, reduce diversions of sewage to OCSD and recycled water to the ocean, improve local water supply reliability by reducing the need to purchase imported water from MWD by storing and using additional recycled water when needed during high demand periods, all while ensuring the new Syphon Reservoir would continue to meet or exceed the current safety and design requirements established by DSOD. Currently, excess recycled water that otherwise could be stored and used within IRWD's service area is diverted to the ocean or diverted to the Green Acres Project of OCWD. IRWD can also divert sewage to OCSD during periods of low recycled water demand and low storage levels for recycled water. During the dry summer season, service area demand for recycled water depletes existing reservoir storage and exceeds the rate at which new recycled water is produced by the Michelson Water Recycling Plant (WRP) and the Los Alisos WRP, so IRWD must then purchase costly, supplemental imported water from MWD to meet the seasonal demands of IRWD's recycled water customers. The proposed project would not increase IRWD's production of its recycled water supply, but instead would create additional storage in order to use the majority of the recycled water supply already being produced. As a result, implementation of the proposed project would not create a new or expanded recycled water supply that could create an indirect growth inducement potential. Although the proposed project includes implementation of expanded recycled water storage, the recycled water to be stored is the existing recycled water being produced at the Michelson WRP, and therefore does not represent a new supply. Rather, the proposed project would allow IRWD to maximize the use of its recycled water and improve the efficiency of its recycled water system, making it consistent with California's Water Code Section 13512. The proposed project would eliminate the need for IRWD to purchase costly, supplemental imported water to meet the demands of IRWD's recycled water customers. The proposed project would not affect IRWD's potable water supply sources, and as such would not provide potable water supplies to support growth, either directly or indirectly. As demonstrated in Table 5-2 above, IRWD has sufficient water supply sources to meet current and planned future potable demands. With implementation of the proposed project, the increased use of recycled water would allow IRWD to support the region's existing and planned demand for recycled water as well, and withstand future water shortages by relying more on locally-produced water supply and less on imported water supply.

The local jurisdictions that govern land use and development within the proposed project area include the City or Irvine and the County of Orange. These jurisdictions' adopted General Plan documents guide the type, location, and level of land use and development within each respective jurisdiction. Both of these jurisdictions have assessed the growth-related impacts associated with planned land use and growth allowed under their General Plans and the CEQA EIRs they have prepared for those plans. In addition, SCAG prepared the Regional Comprehensive Plan (RCP) (SCAG 2008), which combines regional planning efforts into a single focused document. The RCP addresses growth management as well as several core elements including housing, transportation, air quality, and water. The principal objectives of the RCP are to coordinate regional and local decisions with respect to future growth and development and to minimize future environmental impacts. SCAG has also prepared the 2016-2040 RTP/SCS as mentioned above (SCAG 2016b). The RTP/SCS acts as a long-term planning and management plan for the regional transportation system, providing mitigation measures to off-set the impacts of growth projected in the RCP. The Final RTP/SCS Program EIR identifies significant unavoidable impacts in a number of issue areas, and concludes that when population and employment growth is held constant, many adverse environmental impacts will be significant and unavoidable regardless of whether the RTP/SCS is approved (SCAG 2015).

The proposed project would expand recycled water infrastructure to store and use recycled water that is already produced by IRWD. The proposed project would support planned population growth within IRWD's service area by providing recycled water to meet the current and planned demand for irrigation of public landscaping such as street medians, parks and golf courses, agricultural irrigation, office building uses such as toilet flushing and cooling towers. The proposed project would not create a new recycled water supply that would induce future growth. Rather, the proposed project would accommodate the population growth already planned by SCAG, the City of Irvine and the County of Orange such that water infrastructure reliability would not be an impediment to already-planned growth. As a result, the proposed project neither supports nor encourages growth within the IRWD service area to a greater degree than presently estimated by the City of Irvine, County of Orange, and SCAG, as the land use agencies with jurisdiction over the proposed project area. The proposed project would not remove any obstacles to growth and would not indirectly have a significant impact on growth inducement. As a result, impacts to growth inducement would be less than significant.

5.4 References

IRWD. 2016. *2015 Urban Water Management Plan*. Approved June 27, 2016. Available at https://www.irwd.com/images/pdf/doing-business/environmental-documents/UWMP/IRWD_UWMP_2015_rev_01-03-17_FINAL.pdf. Accessed May 2020.

IRWD. 2019. Recycled Water Syphon Reservoir Project: The Right Water for the Right Use. Available at https://www.irwd.com/images/photos/construction/Syphon_reservoir/Syphon_Brochure_M%20single%20pages.pdf. Accessed May 2020.

Southern California Association of Governments (SCAG). 2008. Regional Comprehensive Plan. Available at http://www.scag.ca.gov/NewsAndMedia/Pages/RegionalComprehensivePlan.aspx. Accessed May 2020.

SCAG. 2015. Final Program Environmental Impact Report. Available at http://scagrtpscs.net/Pages/FINAL2016PEIR.aspx. Accessed May 2020.

SCAG. 2016a. 2016-2040 RTP/SCS Final Growth Forecast by Jurisdiction. Available at https://www.scag.ca.gov/Documents/2016_2040RTPSCS_FinalGrowthForecastbyJurisdiction.pdf. Accessed May 2020.

SCAG. 2016b. *2016–2040 Regional Transportation Plan/Sustainable Communities Strategy*. Available at http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx. Accessed May 2020.

SCAG. 2019. Profile of Orange County. Available at https://www.scag.ca.gov/Documents/OrangeCountyLP.pdf, accessed May 2020.

This page intentionally left blank

CHAPTER 6
Alternatives Analysis

6.1 Overview of Alternatives Analysis

According to CEQA, an EIR must describe a reasonable range of alternatives to a proposed project that would feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the proposed project's significant environmental effects. Section 15126.6(f) of the CEQA Guidelines provides direction on the required alternatives analysis:

> *The range of alternatives required in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making.*

The alternatives considered may include a different type of project, modification of the project, or suitable alternative project sites. An EIR need not consider every conceivable alternative to a project. Rather, the alternatives must be limited to ones that meet the project objectives, are feasible, and would avoid or substantially lessen at least one of the significant environmental effects of the project. "Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors (CEQA California Public Resources Code Section 21061.1). Section 15126.6(b) of the CEQA Guidelines states an EIR:

> *…must identify ways to mitigate or avoid the significant effects that a project may have on the environment, the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.*

Section 15126.6(d) of the CEQA Guidelines provides further guidance on the extent of the alternatives analysis required:

> *The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. A matrix displaying the major characteristics and significant environmental effects of each alternative may be used to summarize the comparison. If an alternative*

> *would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed.*

The EIR must briefly describe the rationale for selection and rejection of alternatives and the information the lead agency relied on when making the selection. It also should identify any alternatives considered but rejected as infeasible by the lead agency during the scoping process and briefly explain the reasons for the exclusion (CEQA Guidelines Section 15126.6(c)). Alternatives may be eliminated from detailed consideration in the EIR if they fail to meet most of the project objectives, are infeasible, or do not avoid any significant environmental effects.

Section 15126.6(e)(1) of the CEQA Guidelines also requires that the No Project Alternative must be addressed in this analysis. The purpose of evaluating the No Project Alternative is to allow decision-makers to compare the potential consequences of the proposed project with the consequences that would occur without implementation of the proposed project.

Finally, an EIR must identify the environmentally superior alternative. The No Project Alternative may be the environmentally superior alternative to the proposed project based on the minimization or avoidance of physical environmental impacts. CEQA Guidelines (Section 15126.6(e)(2)) requires that, if the environmentally superior alternative is the No Project Alternative, the EIR shall identify an environmentally superior alternative among the other alternatives.

6.1.1 Project Objectives

The primary objective of the proposed project is to allow for an increase in IRWD's seasonal recycled water storage capacity. In implementing the proposed project, IRWD would:

- Improve local water supply reliability by reducing the need to purchase costly imported water from Metropolitan Water District of Southern California (MWD) by storing additional recycled water during low demand periods for use when needed during high demand periods;
- Ensure the new engineered dam and reservoir meet or exceed the current safety and design requirements established by the California Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which is the governing state agency associated with this project;
- Reduce diversions of sewage to OCSD;
- Maximize the use of recycled water produced by IRWD for the benefit of IRWD customers; and
- Reduce recycled water discharges to the ocean.

6.1.2 Potentially Significant Impacts of the Proposed Project

Chapter 3 of this Draft EIR identifies potential impacts associated with the proposed project for each environmental issue area in Appendix G of the CEQA Guidelines, including cumulative impacts. Chapter 4 addresses CEQA-Plus requirements that are required due to a federal funding nexus. Chapter 5 addresses impacts anticipated related to growth-inducement. Mitigation measures were identified to reduce all of the potentially significant impacts to a less than significant level. No significant and unavoidable impacts were identified as a result of construction and operation of the proposed project. A summary of the significance determination for the impacts for each environmental resource analyzed in Chapter 3 is presented in **Table 6-1**. Specific impacts and all mitigation measures are provided in Table ES-1 in the Executive Summary of this Draft EIR.

TABLE 6-1
SUMMARY OF PROPOSED PROJECT IMPACT ANALYSIS

Environmental Resource	Proposed Project Significance Determination
Aesthetics	LTSM
Air Quality	LTSM
Biological Resources	LTSM
Cultural Resources	LTSM
Energy	LTS
Geology and Soils	LTSM
Greenhouse Gas Emissions	LTS
Hazards and Hazardous Materials	LTSM
Hydrology and Water Quality	LTS
Noise and Vibration	LTS
Recreation	LTSM
Transportation	LTSM
Tribal Cultural Resources	LTSM
Wildfire	LTSM

NOTES:
LTS = Less than Significant
LTSM = Less than Significant with Mitigation

6.2 Alternatives to the Proposed Project

6.2.1 Alternatives Considered but Rejected

As stated above, CEQA Guidelines Section 15126.6(c) states that an EIR should identify any alternatives considered but rejected as infeasible by the lead agency during the scoping process and briefly explain the reasons for the exclusion. Alternatives may be eliminated from detailed consideration in the EIR if they fail to meet most of the project objectives, are infeasible, or do not avoid any significant environmental effects.

IRWD has evaluated a reasonable range of alternatives to the proposed project that would feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the proposed project’s significant environmental effects. These alternatives include looking at alternative locations to the proposed project, use of aboveground storage tanks, a new ocean outfall, and expansion of the Orange County Water District Green Acres Project.

6.2.1.1 Alternative Locations

CEQA Guidelines Section 15126.6(f)(2) provides guidance regarding consideration of one or more alternative location(s) for a proposed project, stating that putting the project in another location should be considered if doing so would allow significant effects of the project to be avoided or substantially lessened. Only locations that would avoid or substantially lessen any of the significant effects of the proposed project need to be considered for inclusion in the EIR. If no feasible alternative locations exist, the EIR must disclose the reasons for this conclusion. Among the factors that may be considered when addressing the feasibility of an alternative site is suitability, economic viability, availability of infrastructure, general plan consistency, and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site.

Reservoir Expansion

IRWD currently operates four recycled water storage reservoirs within its service area, including Syphon Reservoir: Sand Canyon, Rattlesnake, and San Joaquin. Peter's Canyon Reservoir, located in North Tustin, is owned by the County of Orange and managed by OC Parks. Over the last 25 years, IRWD has conducted multiple studies to investigate the potential for expanding its recycled water reservoirs to augment recycled water storage capacity. The results of these investigations are summarized below (see also Sections 6.2.3.1 and 6.2.3.2 for discussion of Sand Canyon Reservoir and Rattlesnake Reservoir expansions).

- **Peter's Canyon Reservoir:** Peter's Canyon Reservoir, owned by the County of Orange, currently has a recycled water storage capacity of approximately 400 AF (HDR 2020). In 2008, IRWD procured the services of MWH to investigate the feasibility of storage at Peters Canyon Reservoir as part of the Peters Canyon and Syphon Reservoir Integration Study. The study concluded that the storage at Peters Canyon was limited and did not meet IRWD's recycled water storage goals established at the time. In 2020, IRWD procured the services of HDR to again evaluate the possible expansion of Peters Canyon based on current recycled water storage goals. Given the site constraints, the maximum water surface could be increased from elevation 530 to elevation 543, adding an additional 225 AF, providing a total of 625 AF at the reservoir (HDR 2020). Site constraints of expanding Peter's Canyon Reservoir include maintaining the existing flood pool footprint in the Peter's Canyon Regional Park boundaries and other environmental factors (HDR 2020). Minor modifications to the existing trail system would be required along with raising the spillway of the existing reservoir. Expansion of the water surface elevation beyond 225 AF would require new levees to avoid inundation of homes and protection of other infrastructure in the park boundaries, including the MWD Pump Station. Given the expansion of Peter's Canyon Reservoir would result in a smaller incremental increase in storage when compared to the proposed expansion at Syphon Reservoir, this site is not considered to be a feasible project alternative and is rejected from further consideration in this Draft EIR.
- **San Joaquin Reservoir:** San Joaquin Reservoir is located in Newport Beach and initially stored drinking water until its conversion by IRWD in 2004 to store recycled water (IRWD 2020a). The reservoir currently has a recycled water storage capacity of approximately 3,080 AF. In 1995, a landslide at the San Joaquin Reservoir damaged components of the reservoir such as liners, access roads, and concrete barriers, which deposited large amounts of dirt and mud into the reservoir (MetroPoint Engineers 2001). Slope stability and landslide concerns are environmental factors that limit the expansion of San Joaquin Reservoir. Additionally, the reservoir site is land-locked by development on all sides, and therefore it would not be feasible to expand the reservoir to achieve the storage goals of the proposed project. Given the site constraints that limit physical expansion of the reservoir above existing storage capacity, this site is not considered to be a feasible project alternative and is rejected from further consideration in this Draft EIR.

Round Canyon Reservoir

IRWD considered installation of a new 6,000 AF reservoir at Round Canyon as one of several options for increased storage capacity in 1996 (Woodward-Clyde 1996). The reservoir site is located just southeast of the Frank Bowerman Landfill and north of the Foothill Transportation Corridor 241. At the time a reservoir was considered by IRWD at this location, the Foothill Transportation Corridor 241 had not yet been constructed. Site constraints at Round Canyon include unfavorable bedding dips and slope instability, with landslides identified in the upper reaches of the reservoir site (Woodward-Clyde 1996). These geologic conditions are less favorable when compared to the proposed Syphon Reservoir expansion site. In terms of environmental impacts, the new dam face at Round Canyon could be as close as 1,000 feet from the Foothill Transportation Corridor 241, which, at a height of approximately 180 feet, would result in increased aesthetic impacts to a greater number of vehicles traveling on public rights-of-way than the proposed project. Additionally, initial research conducted for the Round Canyon Reservoir site yielded at least one archaeological site, Tomato Springs, located at the mouth of Round Canyon that appears to have been the center of a group of permanent and seasonal villages which were inhabited for a period of several thousand years (Woodward-Clyde 1996). This settlement site would likely have to be destroyed during construction of the dam and spillway. While cultural resources have been identified at the proposed project site, significant known archaeological sites would not be destroyed by construction or operation of the proposed reservoir expansion at Syphon Reservoir. Due to the site constraints and known greater environmental impacts due to construction and operation of a new reservoir at Round Canyon versus an expansion of the existing reservoir at Syphon Reservoir, this alternative is not considered to be a feasible project alternative and is rejected from further consideration.

6.2.1.2 Aboveground Storage Tanks

In addition to reservoir storage, aboveground storage tanks can be used to store recycled water for future use. Given the scale of the storage expansion of the proposed project (4,500 AF), approximately 1.47 billion gallons of aboveground storage would need to be secured in order to replace the increase of recycled water stored in a reservoir. An average storage tank holds 8 million-gallons and is approximately 135 feet in diameter. If the reservoir storage were to be converted to aboveground storage tanks, approximately 175 8-million-gallon storage tanks would need to be constructed within IRWD's service area. This scale of facility construction and operation would be infeasible for IRWD to implement given open space constraints in the service area and pressure zone limitations. Additionally, constructing 175 storage tanks would not be economically infeasible for IRWD. As a result, replacement of reservoir storage with aboveground storage tanks is not considered to be a feasible project alternative and is rejected from further consideration in this Draft EIR.

6.2.1.3 New Ocean Outfall

A few small areas in IRWD's service area are not served by either the Michelson WRP or the Los Alisos WRP sewage collection and treatment systems. A small percentage of sewage generated within IRWD's service area is currently collected by neighboring OCSD or Santa Margarita Water District where these agencies' facilities treat the sewage for subsequent reuse. On a volume basis, IRWD currently sends approximately 7,300 AFY out of a total of 33,900 AFY of wastewater to OCSD, which in turn provides wastewater to Orange County Water District (OCWD) where it is treated and injected into the aquifer as part of the Groundwater Replenishment System (GWRS). In order to meet the objective to reduce diversions of sewage to OCSD, IRWD could construct a new ocean outfall and pipeline. However, an ocean outfall would be prohibitively difficult to construct due to the complexity of acquiring easements and laying pipeline through developed portions of the City of Newport Beach. A new ocean outfall would also result in a suite of impacts to the terrestrial and marine environment that would exceed in magnitude those of the proposed project. In addition, an ocean outfall would not allow for any of the water storage benefits afforded by expanding and improving Syphon Reservoir. The New Ocean Outfall Alternative would not meet the project objectives and would result in more environmental impacts than the proposed project. Therefore, this alternative is rejected from further consideration in this Draft EIR.

6.2.1.4 Expansion of Green Acres Project

In response to comments received during the NOP public review period, IRWD evaluated expanding the OCWD Green Acres Project (GAP) as a means of managing IRWD's recycled water produced at the MWRP. The OCWD GAP is a non-potable water supply project that delivers recycled water to irrigation and industrial users. The GAP facilities include 37 miles of pipeline, two reservoirs with a combined storage capacity of 7.5 million gallons, and two pump stations (OCWD 2021). IRWD is connected to the GAP distribution system through a 24-inch metered interconnection pipe. The potential expansion project would include replacement and expansion of existing facilities to allow up to 28 mgd of recycled water from IRWD's non-potable system to GAP. Neither OCSD or OCWD has indicated the need for additional recycled water for GAP or GWRS purposes. Without such a need, it would not be feasible for OCSD and OCWD to accept 28 mgd from IRWD.

An evaluation of alternative project scenarios and associated life cycle costs was performed by HDR (HDR 2020). This evaluation confirmed the need to increase IRWD's seasonal storage as the primary method for managing IRWD's recycled water. The GAP expansion alternative would not feasibly attain most of the primary objectives for the proposed project. The GAP expansion alternative:

- Would not improve local water supply reliability by reducing the need to purchase costly imported water from MWD by storing and using additional recycled water;
- Would not maximize the use of recycled water produced by IRWD for the benefit of IRWD customers; and
- Would not reduce recycled water discharges to the ocean.

Therefore, this alternative is rejected from further consideration in this Draft EIR. A copy of HDR's evaluation is available from IRWD's District Secretary.

6.2.2 No Project Alternative

According to Section 15126.6(e) of the CEQA Guidelines, discussion of the No Project Alternative must include a description of existing conditions and reasonably-foreseeable-future conditions that would exist if the Project were not approved. Under the No Project Alternative, IRWD would not demolish the existing Syphon Dam and Syphon Reservoir and would not build a new dam and reservoir with a capacity of approximately 5,000 AF and associated infrastructure. The existing 500 AF reservoir would continue to be operated by IRWD, with excess sewage continuing to be sent to OCSD for disposal. The benefits of the proposed project, which include maximizing the use of recycled water produced by IRWD for the benefit of IRWD customers, would not occur.

Ability to Meet Project Objectives

The No Project Alternative would not meet most of the project objectives. Without the proposed project, local water supply reliability would not be improved, diversions of sewage to OCSD would not be reduced, water diversions to the ocean would not decrease, and recycled water produced by IRWD for the benefit of IRWD customers would not be maximized. It is important to note that even without implementation of the proposed project, DWR DSOD safety standards would still be met for the existing dam and reservoir.

By not constructing the project, IRWD does not gain the benefit of additional seasonal storage of recycled water which optimizes IRWD's recycled water use for its recycled water customers. Without additional storage capacity provided by the proposed project, as future recycled water demands increase due to planned growth, there will be an increased shortage of available recycled water during peak water demands. Under the No Project Alternative, IRWD would need to purchase additional costly, imported supplies to ensure that an amount equivalent to the yield of the proposed increase in the Syphon Reservoir's storage capacity is seasonally available to meet IRWD's projected demands during peak periods. Imported water from MWD is subject to availability and may be reduced under a MWD-implemented Water Supply Allocation Plan during water supply shortages. In addition, without sufficient storage capacity in the winter months when IRWD has excess sewage, IRWD would need to divert excess sewage each year to OCSD for discharge. Under the No Project Alternative, IRWD does not optimize the beneficial reuse of its recycled water and does not provide long term water supply benefits for IRWD.

Impact Analysis

Aesthetics

The construction and operation of a dam and reservoir capable of holding approximately 5,000 AF would not occur under the No Project Alternative. The No Project Alternative would have no potential to impact scenic vistas, scenic resources, visual character, or light and glare in the proposed project area since no new facilities would be built. The proposed project would have a less than significant impact to scenic vistas and visual character after implementation of mitigation measures due to implementation of the enlarged dam and reservoir, and supporting infrastructure. Since the No Project Alternative would not alter any above-ground facilities at the project site, it would result in fewer aesthetic impacts when compared to the proposed project.

Air Quality

The No Project Alternative would not involve any construction activities or operation of an expanded reservoir and would therefore not generate emissions above baseline conditions that could impact air quality. While the proposed project would result in potentially significant construction-related air quality impacts due to emissions of NOx and diesel particulate matter, mitigation measures would reduce the impacts to less than significant levels. As such, the No Project Alternative would result in fewer air quality impacts when compared to the proposed project.

Biological Resources

The No Project Alternative would not involve any construction activities or operation of an expanded recycled water reservoir and would therefore not alter the existing site conditions at the Syphon Reservoir. The proposed project has the potential to impact sensitive natural communities such as coastal sage scrub, wetland, and riparian habitat and associated special-status species, which would be reduced to less than significance levels with implementation of mitigation measures. However, the No Project Alternative would completely avoid potential impacts to sensitive natural communities and special-status species. Therefore, the No Project Alternative would result in fewer potential biological resource impacts than the proposed project.

Cultural Resources

The No Project Alternative would not involve any construction activities or operation of an expanded recycled water reservoir and therefore would not result in ground disturbance that would disrupt or affect archaeological resources, historic resources, or human remains. Although the proposed project would not directly impact any known cultural resources, construction activities would involve substantial grading and excavation that could significantly impact unknown discovered cultural resources. With implementation of mitigation measures, the proposed project would result in less than significant impacts to unknown resources. Nevertheless, the No Project Alternative would result in no ground disturbance and therefore no potential to uncover any cultural resources. As a result, the No Project Alternative would result in fewer impacts to cultural resources than the proposed project.

Energy

The No Project Alternative would not involve any construction activities or operation of an expanded recycled water reservoir, and would therefore not result in an increase in energy consumption relative to existing conditions. The proposed project would result in an increased usage of electricity to operate existing pumps, but not at significant levels that would result in wasteful use of energy. The proposed project would reduce the total energy consumption associated with IRWD's provision of water supply since more energy is required to import water through the SWP and the Colorado River than to provide locally-produced recycled water. Therefore, the No Project Alternative would result in no change to energy consumption when compared to the proposed project, but also would not result in the beneficial reduction in energy consumption associated with the proposed project.

Geology and Soils

The No Project Alternative would involve continued operation of the existing reservoir at the project site. The No Project Alternative would not involve any construction activities or operation of an expanded recycled water reservoir. As a result, geologic impacts related to groundshaking and soil erosion would not occur. While the geologic effects of the proposed project were determined to be potentially significant, the impacts due to ground shaking, soil erosion, unstable geologic units, and expansive soil would be reduced to a less than significant level by incorporating into the project design the geotechnical recommendations for soils remediation and/or foundation systems necessary to reduce seismic-related hazards to less than significant levels, and compliance with DSOD regulations. For paleontological resources, construction of the proposed project could encounter unknown paleontological resources; however, mitigation measures would reduce the impact to less than significant levels. As a result, since the No Project Alternative would not result in any ground disturbing activities or potential to uncover paleontological resources, the alternative would result in fewer geological, soil, and paleontological impacts when compared to the proposed project.

Greenhouse Gas Emissions

The No Project Alternative would not involve any construction activities or operation of an expanded recycled water reservoir and therefore would not result in an increase in greenhouse gas emissions relative to existing conditions because no infrastructure would be constructed. The proposed project would result in greenhouse gas emissions during construction but not at significant levels. As such, the No Project Alternative would result in fewer greenhouse gas emissions impacts when compared to the proposed project.

Hazards and Hazardous Materials

The No Project Alternative would result in the continued operation of the existing reservoir at the project site, which would involve transport and use of water treatment chemicals (sodium bisulfite and sodium hypochlorite). No new facilities would be constructed or operated under the No Project Alternative. While the proposed project would involve routine transport and use of potentially hazardous materials including increased amounts of sodium bisulfite and sodium hypochlorite, compliance with existing State regulations would reduce all impacts to less than significant levels. While the proposed project would be located within a very high fire severity zone, mitigation measures would implement fire hazard reduction measures that would reduce impacts to a less than significant level. The No Project Alternative would involve no additional transport of potentially hazardous fuels and lubricants or use of hazardous materials above what is currently used onsite for water treatment, nor create new structures at risk of wildland fire. As a result, the No Project Alternative would result in fewer impacts to hazards and hazardous materials when compared to the proposed project.

Hydrology and Water Quality

The No Project Alternative would not result in construction or operation of any new facilities at the project site, and therefore would not result in ground disturbance that could impact surface water, associated drainage patterns, or modifications to downstream inundation risk. Under the proposed project, construction of new facilities would involve ground-disturbing activities that could impact surface water quality due to polluted runoff from the soil stockpiling and construction sites. Such potential impacts would be mitigated with implementation of required regulatory requirements such as SWPPPs and BMPs. The proposed project also involves an increase in the capacity of the reservoir which increases the potential downstream inundation area in the event of a dam breach or emergency release. IRWD would be required to adhere to all DSOD requirements, which includes construction of a spillway to provide direction for emergency release flows. Additionally, the project's structure, seepage control components, and spillway would be designed and evaluated for structural integrity by geotechnical engineers to reduce likelihood of dam breach. The No Project Alternative would not involve any ground-disturbing activities and would not have the potential for impacts to water quality during construction. The No Project Alternative would also not result in any changes to the existing storage capacity of the reservoir; therefore, risk to downstream communities due to inundation would be reduced when compared to the proposed project. As a result, the No Project Alternative would result in fewer impacts to hydrology and water quality when compared to the proposed project.

Noise and Vibration

The No Project Alternative would not involve any construction activities or operation of an expanded recycled water reservoir, and therefore would not involve activities that would generate noise above baselines conditions. The proposed project would result in less than significant temporary impacts to sensitive receptors and ambient noise levels during construction; no mitigation measures would be required. Therefore, since the No Project Alternative would not alter the existing noise environment, there would be lesser impacts associated with noise when compared to the proposed project.

Recreation

The No Project Alternative would not include a new recreation trail at the project site. The proposed project would result in increased access to the project site due to a new walking trail, although IRWD would control access to the trail. The proposed project would have indirect impacts to biological and cultural resources due to the construction and public use of the proposed recreation trail; but, these potential impacts would be mitigated to less than significant levels**.** Nevertheless, the No Project Alternative would not provide onsite access to recreational facilities that could result in deterioration of nearby recreational facilities or other related environmental impacts. As a result, the No Project Alternative would result in fewer recreation-related impacts when compared to the proposed project.

Transportation

The No Project Alternative would not result in construction activities or operation of any additional facilities onsite and would not include the intersection modification at Portola Parkway and Sand Canyon Avenue. The proposed project would result in temporary impacts to traffic and the circulation system due to increased vehicle trips during construction and would result in a modified intersection at Portola Parkway and Sand Canyon Avenue that could temporarily impact emergency access during construction. The proposed project impacts would be reduced to less than significant levels with implementation of a Traffic Control Plan. Nevertheless, since the No Project Alternative would not involve any changes to the existing activities at Syphon Reservoir that could impact traffic and emergency access, the No Project Alternative would result in fewer impacts when compared to the proposed project.

Tribal Cultural Resources

Under the No Project Alternative, the existing Syphon Reservoir would continue to operate but no new ground disturbing activities would occur. Therefore, the No Project Alternative would not affect any known or unknown tribal cultural resources. According to record searches and tribal resource consultations, no tribal resources are present on the proposed project site. As such, the proposed project would not cause a substantial adverse change in the significance of a known tribal cultural resource. However, there always exists the potential that an unknown tribal cultural resource could be impacted by construction or operational activities. For the proposed project, this potential impact would be reduced to less than significant impacts with implementation of mitigation measures. Nonetheless, the No Project Alternative would result in fewer potential impacts to tribal cultural resources when compared to the proposed project.

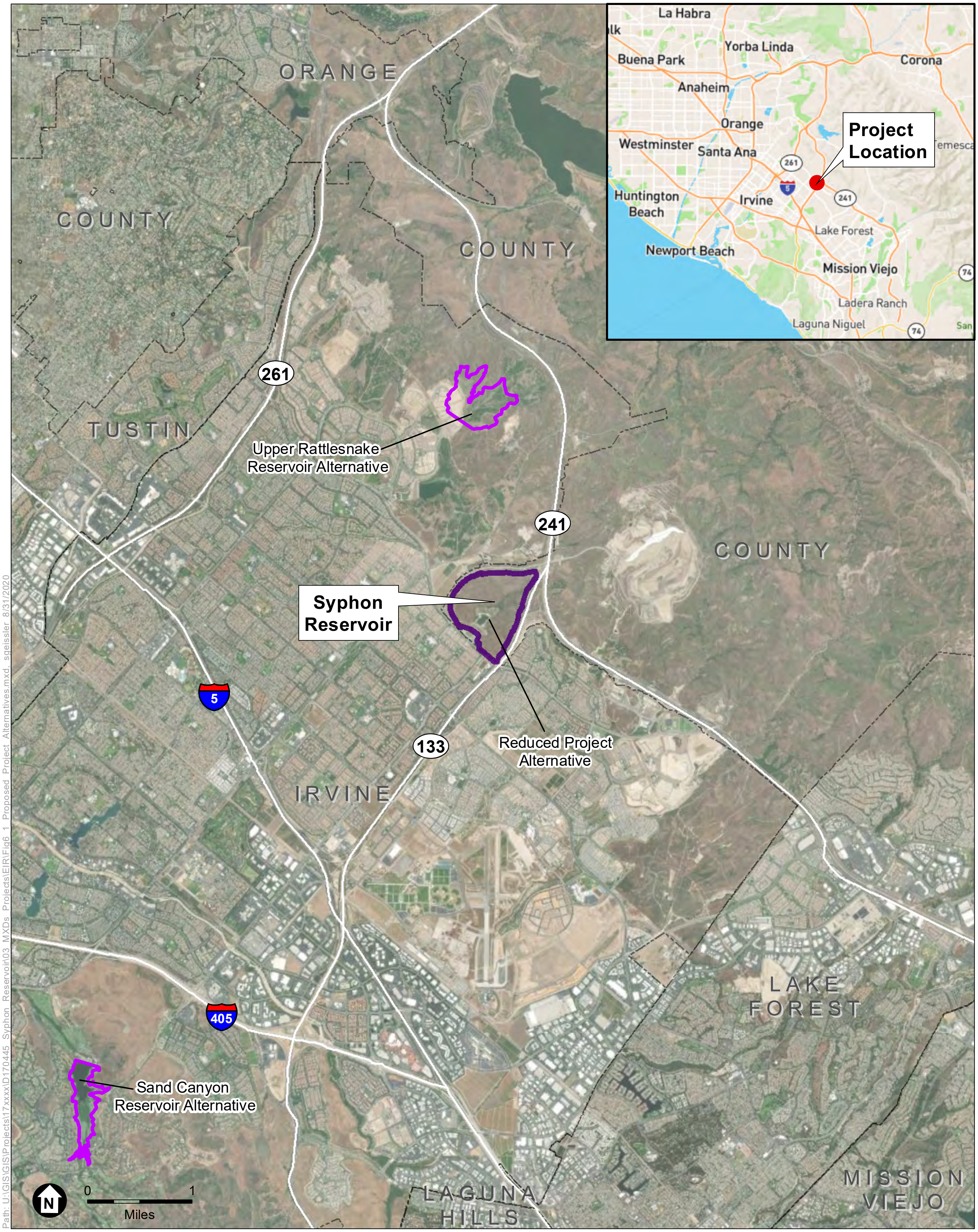
Wildfire

The project site is located within a locally-designated very high fire severity zone. The No Project Alternative would involve operation of the existing reservoir at the project site, which involves drawdown of the reservoir in summer months when fire risk is elevated. However, the No Project Alternative would not alter the existing wildlife risk at the project site. The proposed project would require operation of construction equipment that has the potential produce a spark, fire or flame in an area that includes highly flammable vegetation and prevailing winds. As a result, construction of the proposed project has potential to increase the risk of wildfire; however, implementation of mitigation measures that include fire hazard reduction measures would ensure impacts associated with wildfire risk are reduced to less than significant levels. Nonetheless, the No Project Alternative would not exacerbate the risk of wildland fire. As a result, the No Project Alternative would result in fewer impacts associated with wildfire when compared to the proposed project.

6.2.3 Alternatives to the Proposed Project

6.2.3.1 Sand Canyon Reservoir Alternative

The Sand Canyon Reservoir Alternative would involve enlarging the existing reservoir at Sand Canyon in Irvine, CA (see **Figure 6-1**). IRWD previously identified the expansion of the existing Sand Canyon Reservoir as one option for obtaining additional recycled water storage capacity. The Sand Canyon Reservoir currently has a 768 AF storage capacity (IRWD 2020a) and an early feasibility study indicated that raising the dam 28 feet above its existing elevation would increase the reservoir storage capacity to approximately 3,000 AF. Site constraints include quality and quantity of the onsite borrow and embankment materials and costs associated with property acquisitions (Woodward-Clyde 1992). Expansion of Sand Canyon Reservoir would result in approximately 2,000 AF less recycled water storage when compared to the proposed expansion at Syphon Reservoir. Existing pipelines and pump stations would be sized appropriately for the expansion, and no additional pipelines or pump stations would be required (Woodward-Clyde 1992).



SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservior Improvement Project

Figure 6-1
Proposed Project Alternatives

ESA

Ability to Meet Project Objectives

The Sand Canyon Reservoir Alternative would partially meet all of the project objectives. With the storage capacity capped at 3,000 AF, the Sand Canyon Reservoir Alternative would improve local water supply reliability, but to a lesser extent relative to the Syphon Reservoir expansion. Additionally, while diversions of sewage to OCSD and water diversions to the ocean would be reduced, the reductions would not be to the fullest extent proposed under the project at Syphon Reservoir and reduced amounts of sewage and water would continue to be diverted. Under the Sand Canyon Reservoir Alternative, IRWD would need to purchase additional costly, imported supplies to offset approximately 2,000 AF of recycled water that could not be stored when compared to the proposed project to ensure that water is seasonally available to meet demands of IRWD's recycled water customers. Recycled water produced by IRWD for the benefit of IRWD customers would not be maximized under the Sand Canyon Reservoir Alternative. However, an expansion of the reservoir under the Sand Canyon Reservoir Alternative would meet all DWR DSOD safety standards.

Aesthetics

The Sand Canyon Reservoir Alternative would result in a similar expansion of an existing reservoir as the proposed project. Expansion of the reservoir under the Sand Canyon Reservoir Alternative would involve raising the dam crest height 28 feet above its existing elevation while the proposed project at Syphon Reservoir would involve a dam raise of 77 feet above the existing condition. The Sand Canyon Reservoir Alternative site is visible from the adjacent community of Turtle Rock and William R. Mason Regional Park, and raising the crest of the dam would increase its visibility to downstream Irvine communities (Dudek 2003). Similar kinds of construction equipment would be used for both reservoir expansions. The proposed project at Syphon Reservoir would be visible to downstream Irvine communities such as Stonegate, but would have a less than significant impact with implementation of mitigation measures to aesthetics and visual resources as a result of reservoir expansion. The Sand Canyon Reservoir Alternative would similarly increase the dam's visibility to the downstream Irvine communities. As a result, the Sand Canyon Reservoir Alternative would result in a similar aesthetic impact when compared to the proposed project.

Air Quality

The Sand Canyon Reservoir Alternative would result in air quality-related construction and operation impacts that are similar in nature to the proposed project. The most likely scenario for expanding the Sand Canyon Reservoir would involve an upstream raise of the existing dam along with excavation of the reservoir bottom (Woodward-Clyde 1992). This would involve large amounts of excavation and soil movement onsite. The Sand Canyon Reservoir Alternative site is located adjacent to residential sensitive receptors (as close as 80 feet) and has a high likelihood of resulting in cancer-causing causing construction health risk impacts due to the elevated levels of diesel particular matter in close proximity to residences. The proposed project would result in potentially significant construction-related air quality impacts due to emissions of NOx, however mitigation measures would reduce the impacts to less than significant levels. Given the distance between the proposed project and nearby sensitive receptors, the cancer risk for the maximum impacted sensitive receptor near Syphon Reservoir is 8.72 per million which would not exceed the SCAQMD's threshold of 10 per million. The Sand Canyon Reservoir Alternative would result in similar potentially significant impacts due to an increase in NOx emissions from construction activities that could be mitigated, but would likely result in increased cancer-causing construction health risk impacts due to closer proximity to sensitive receptors. As such, the Sand Canyon Reservoir Alternative would result in greater air quality impacts when compared to the proposed project.

Biological Resources

The area around the existing Sand Canyon Reservoir contains riparian woodland, freshwater marsh, disturbed grassland, coastal sage scrub, and chaparral (Woodward-Clyde 1992). The Sand Canyon Reservoir Alternative would result in impacts to riparian woodland and coastal sage scrub that support a variety of special-status species including least Bell's vireo. Additionally, "landmark" sycamore trees exist around the reservoir and a rare plant habitat area for the Orange County Turkish exists along the dam face and existing reservoir rim that would be impacted by a reservoir expansion (Woodward-Clyde 1992). The proposed project would permanently impact up to 29 acres of coastal sage scrub communities and temporarily impact 0.85 acre of California sagebrush scrub. While the proposed project would permanently impact 12.28 acres of riparian communities that supports the least Bell's vireo, implementation of mitigation measures would reduce impacts to a less than significant level. Based on a preliminary study of the Sand Canyon Reservoir Alternative expansion completed in 1992, it was determined that this site contains significant biological resources that would potentially be impacted by an expansion. It is assumed similar mitigation measures to those required for the proposed project would be implemented to reduce impacts to that species and others effected to a less than significant level. As a result, the Sand Canyon Reservoir Alternative would result in similar biological resources impacts when compared to the proposed project.

Cultural Resources

Based on archaeological surveys conducted for residential developments surrounding the Sand Canyon Reservoir site, up to 10 archaeological sites may exist downstream of the dam and to the south and east of the existing reservoir (Woodward-Clyde 1992). One of these sites has been identified as a settlement. As a result, the potential for impacting cultural resources is high. The proposed project site was found to include nine historical/archaeological resources, only two of which could be impacted by proposed project activities. The presence of both historic period and prehistoric archaeological sites within the vicinity of the project area indicates that the area is sensitive for archaeological resources. Mitigation measures would require procedures to avoid the two known resources, as well as procedures to reduce impacts to any unknown resources uncovered during construction, which would reduce impacts to a less than significant level. Based on the fact that known cultural resources exist on the site of the Sand Canyon Reservoir Alternative and the archaeological sensitivity is high, similar mitigation measures as those described in Section 3.4, *Cultural Resources* for the proposed project, would be required to reduce impacts to known and unknown cultural resources. Therefore, the Sand Canyon Reservoir Alternative would result in similar impacts to cultural resources when compared to the proposed project.

Energy

The Sand Canyon Reservoir Alternative would require increased amounts of energy to pump the additional 2,200 AF water to the reservoir for storage. As described in Section 3.5, *Energy*, the proposed project would require an additional 1,082,727 kWh of electricity annually to pump an additional 4,500 AF recycled water to Syphon Reservoir. The total net new operating electricity consumption for the expanded Syphon Reservoir represents approximately 0.006 percent of the county and 0.002 percent of SCE consumption for 2018. As a result, impacts would be less than significant and no mitigation measures would be required for the proposed project. Given the smaller increase in capacity relative to the proposed project, the Sand Canyon Reservoir Alternative would be expected to result in fewer net additional kWh of electricity to operate the expanded reservoir, and would also result in less than significant impacts to the existing electrical grid. As a result, the Sand Canyon Reservoir Alternative would result in similar impacts to energy when compared to the proposed project.

Geology and Soils

The Sand Canyon Reservoir site is underlain primarily by beds of the Santiago Formation, which are constituted by silty and clayey sandstones (Woodward-Clyde 1992). These formations are considered moderately stable with low to moderate permeability (Woodward-Clyde 1992). A fault is located within the existing spillway of the Sand Canyon Reservoir, which has not been determined to be an active/inactive fault (Woodward-Clyde 1992). The Sand Canyon Reservoir site has high paleontological potential based on the identification of 17 paleontological sites east of the reservoir (Woodward-Clyde 1992). The proposed project is located in the Vaqueros and Sespe Formations, which are rated as generally having very poor slope stability characteristics and are described as landslide/erosion-prone and low permeability. As described in Section 3.6, *Geology and Soils*, an inactive fault runs through the Syphon Reservoir site. Paleontological sensitivity is moderate to high at the proposed project site. While the geologic effects of the proposed project were determined to be potentially significant, the impacts due to ground shaking, soil erosion, unstable geologic units, and expansive soil would be reduced to a less than significant level by incorporating into the project design the geotechnical recommendations for soils remediation and/or foundation systems necessary to reduce seismic-related hazards to less than significant levels, and compliance with DSOD regulations. Additionally, mitigation measures would be required to reduce impacts to any fossils that may be uncovered by construction of the project. Similarly, any expansion of Sand Canyon Reservoir would require adherence to DSOD regulatory requirements, as well as mitigation measures to reduce impacts to paleontological resources due to the high paleontological potential. As a result, the Sand Canyon Reservoir Alternative would result in similar impacts to geology and soils when compared to the proposed project.

Greenhouse Gas Emissions

The Sand Canyon Reservoir Alternative would involve an increase in greenhouse gas emissions from existing conditions to operate the pumps that would convey approximately 2,200 AF additional recycled water to the reservoir. As described in Section 3.7, *Greenhouse Gas Emissions*, construction and operation of the proposed project's increase in storage of 4,500 AF would result in emissions approximately 433 $MTCO_2e$ per year (amortized over 30 years), which would not exceed the SCAQMD 3,000 $MTCO_2e$ threshold. No mitigation measures would be required. Since the amount of water pumped to the Sand Canyon Reservoir would be less than the proposed project, it would be anticipated to similarly result in emissions less than the 3,000 $MTCO_2e$ threshold, and impacts would constitute a less than significant without the need for mitigation measures. As such, the Sand Canyon Reservoir Alternative would result in similar greenhouse gas emissions impacts when compared to the proposed project.

Hazards and Hazardous Materials

The Sand Canyon Reservoir Alternative would result in the similar routine transport of hazardous materials as the proposed project, including construction-related fuels and operational-related chemicals for recycled water treatment. Both the alternative and the proposed project would comply with existing State regulations that would reduce all impacts to a level of less than significant. Both the proposed project and the Sand Canyon Reservoir Alternative would be located within a very high fire severity zone. Mitigation measures would require implementation of fire hazard reduction measures that would reduce impacts to a less than significant level. As a result, the Sand Canyon Reservoir Alternative would result in similar impacts to hazards and hazardous materials when compared to the proposed project.

Hydrology and Water Quality

The Sand Canyon Reservoir Alternative would result in similar construction ground-disturbing activities as the proposed project that could impact surface water quality due to polluted runoff from the construction sites. Additionally, the Sand Canyon Reservoir Alternative would be similar to the proposed project in that it would result in substantial soil movement to construct the expanded reservoir, which would result in alteration of drainage patterns. The Sand Canyon Reservoir Alternative would involve an increase in the capacity of the reservoir which increases the potential downstream inundation area in the event of a dam breach or emergency release which is similar to the proposed project. For both the proposed project and the alternative, IRWD would be required to adhere to all DSOD requirements, which includes construction of a spillway to provide direction for emergency release flows. Additionally, for both the proposed project and the alternative, the dam’s structure, seepage control components, and spillway would be designed and evaluated for structural integrity by geotechnical engineers to reduce likelihood of dam breach. For the proposed project and the Sand Canyon Reservoir Alternative, surface water quality and drainage impacts would be mitigated with implementation of required regulatory requirements such as SWPPPs and BMPs. The Sand Canyon Reservoir Alternative would result in an increase in the risk to downstream communities due to inundation, which would be mitigated through project design and DSOD requirement, similar to the proposed project. As a result, the Sand Canyon Reservoir Alternative would result in similar impacts to hydrology and water quality when compared to the proposed project.

It should be noted that the Sand Canyon Reservoir Alternative site is located in a large drainage area, which, once operational, could result in large amounts of stormwater entering the expanded upper reservoir. The Sand Canyon Reservoir Alternative would require additional freeboard in the expanded reservoir to accommodate increased amounts of stormwater, which may impact operational storage capacity.

Noise and Vibration

The Sand Canyon Reservoir Alternative would result in construction-related noise levels and operation impacts that are similar in nature to the proposed project. The greatest impacts to ambient noise levels would be during construction, to sensitive receptors surrounding the Sand Canyon Reservoir. The sensitive receptors surrounding the Sand Canyon Reservoir are closer in proximity when compared to the sensitive receptors surrounding the Syphon Reservoir, especially given the position of the receptors above the reservoir at Sand Canyon Reservoir (versus below and with intervening topography at Syphon Reservoir). The proposed project would result in less than significant impacts to temporary and permanent increases in ambient noise and vibration levels, and would not require mitigation measures. Given that the Sand Canyon Reservoir Alternative would be located as close as 80 feet from adjacent sensitive receptors, it is likely that the increase in noise and vibration levels would be potentially significant and require mitigation measures. As a result, the Sand Canyon Reservoir Alternative would result in greater noise and vibration impacts when compared to the proposed project.

Recreation

The canyon bottom of the Sand Canyon Reservoir Alternative site has been designated for recreational open space and wildlife habitat by the City of Irvine, which has also established open space linear corridors to connect the flat areas of the city with the surrounding hills (Woodward-Clyde 1992). Currently, the Strawberry Farms Golf Course operates surrounding and downstream of the reservoir and could be impacted by expansion of the reservoir. The proposed project would result in increased access to the project site due to a new walking trail, although IRWD would control access to the trail. The proposed project would have indirect impacts to biological and cultural resources due to the construction and public use of the proposed recreation trail; but, these potential impacts would be mitigated to less than significant levels. An expansion of the Sand Canyon Reservoir Alternative may eliminate portions of the adjacent recreational facilities, requiring a relocation of recreational facilities which could have an adverse physical effect on the environment. Because the proposed project would not result in increased environmental effects due to expansion of recreational facilities, the Sand Canyon Reservoir Alternative would result in greater impacts to recreational facilities.

Transportation

The Sand Canyon Reservoir Alternative would result in the same kind of construction activities that could potentially result in temporary impacts to traffic and circulation patterns on local roadways when compared to the proposed project. Similar to the proposed project, impacts associated with the Sand Canyon Reservoir Alternative would be temporary and would be reduced to less than significant levels with implementation of mitigation measures such as a Traffic Control Plan. As a result, the Sand Canyon Reservoir Alternative would result in similar transportation impacts when compared to the proposed project.

Tribal Cultural Resources

Based on the archaeological sensitivity around the Sand Canyon Reservoir Alternative site and particularly the identification of an archaeological settlement, there is a potential that tribal cultural resources could be impacted by reservoir expansion. According to record searches and tribal resource consultations, no tribal resources are present on the proposed project site and expansion at Syphon Reservoir would not impact known tribal cultural resource. Although unknown tribal cultural resource could be impacted by construction or operational activities, mitigation measures would reduce the impact to less than significant levels. Based on the fact that archaeological sensitivity is high, and that similar mitigation measures would be required to reduce impacts to known and unknown tribal cultural resources, the Sand Canyon Reservoir Alternative would result in similar impacts to tribal cultural resources when compared to the proposed project.

Wildfire

Similar to the proposed project, the Sand Canyon Reservoir Alternative site would be located within a very high fire severity zone, and construction and operation of an expanded reservoir has the potential to result in uncontrolled spread of wildfire and exacerbation of fire risk. Mitigation measures would be required to ensure fire hazard reduction measures are implemented during proposed project activities to further reduce the potential for wildfire impacts on project workers. Similar mitigation measures would be required for any expansion of the Sand Canyon Reservoir Alternative within the same fire hazard zone. As a result, the Sand Canyon Reservoir Alternative would result in similar wildfire impacts when compared to the proposed project.

6.2.3.2 Upper Rattlesnake Reservoir Alternative

The Upper Rattlesnake Reservoir Alternative would involve expansion of storage capacity at the existing Rattlesnake Dam complex (see Figure 6-1). Rattlesnake Reservoir currently has a capacity of up to 1,480 AF of recycled water storage (IRWD 2020b). This alternative would involve construction of a new dam and upper reservoir that would be 3,000 feet upstream of the existing Rattlesnake Dam and would provide approximately 6,000 AF of recycled water storage. Water would flow from the new Upper Rattlesnake Reservoir downstream to the existing Rattlesnake Reservoir (Woodward-Clyde 1996). In addition, the expanded reservoir would require 5,500 linear feet of new pipeline and a new 1,200 horsepower pump station. IRWD previously identified the expansion of the existing Rattlesnake Reservoir in 1995 and considered the expansion as an alternative to the San Joaquin Reservoir Conservation Project in 2003 (Dudek 2003).

Ability to Meet Project Objectives

The Upper Rattlesnake Reservoir Alternative would meet all of the project objectives. The Upper Rattlesnake Reservoir Alternative would improve local water supply reliability by reducing the need to purchase costly, imported water from MWD and would reduce diversions of sewage to OCSD and water diversions to the ocean. Recycled water produced by IRWD for the benefit of IRWD customers would be maximized under the Upper Rattlesnake Reservoir Alternative. Additionally, an expansion of the reservoir under the Upper Rattlesnake Reservoir Alternative would meet all DWR DSOD safety standards.

Aesthetics

Expansion of the reservoir under the Upper Rattlesnake Reservoir Alternative would involve construction of a second additional dam approximately 3,000 feet upstream from the existing reservoir. The second reservoir would involve an increase in dam crest height of 115 feet above the existing condition (Woodward-Clyde 1996) while the proposed project at Syphon Reservoir would be raised 77 feet from its existing height of 59 feet to a total cam crest height of 136 feet. The Upper Rattlesnake Reservoir Alternative site would be visible from the adjacent community of Orchard Hills and likely from State Route 241 north of the site, both of which had not been constructed at the time the Woodward-Clyde 1996 was prepared. Similar kinds of construction equipment would be used for both reservoir expansions. The Draft EIR found that the proposed project at Syphon Reservoir would be visible to downstream Irvine communities such as Stonegate, but would have a less than significant impact with implementation of mitigation measures such as a landscape plan as a result of reservoir expansion. The Upper Rattlesnake Reservoir Alternative would similarly increase the dam's visibility to nearby Irvine communities and rights-of-way. Unlike the proposed project at Syphon Reservoir, which would involve expansion of an existing facility, the Rattlesnake Reservoir Alternative would result in greater aesthetic impacts since a second new dam and reservoir would be built within an undeveloped area. As a result, the Upper Rattlesnake Reservoir Alternative would result in greater aesthetic impact when compared to the proposed project.

Air Quality

The Upper Rattlesnake Reservoir Alternative would result in air quality-related construction and operation impacts that are similar in nature to the proposed project. The alternative would involve constructing the reservoir either within existing topography or reshaping existing topography by excavating large amounts of earth (Dudek 2003). Either option would involve between 1,200,000 to 1,400,000 cubic yards of embankment volume and would require extensive soil movement onsite (Woodward-Clyde 1996). The alternative would also require construction of 5,500 linear feet of new pipeline, a new 1,200 horsepower pump station, and haul routes of approximately 3,000 feet from the existing reservoir to the upper reservoir. The Upper Rattlesnake Reservoir Alternative site is located approximately 2,000 feet from the nearest existing sensitive receptor although pipelines would be installed within rights-of-way adjacent to receptors. It should be noted that the Orchard Hills community is being developed and the upper reservoir would be located adjacent to residential sensitive receptors in the future. The proposed project would result in potentially significant construction-related air quality impacts due to emissions of NOx from soil excavation and other construction activities, however mitigation measures would reduce the impacts to less than significant levels. Given the distance between the proposed project and nearby sensitive receptors, the cancer risk for the maximum impacted sensitive receptor near Syphon Reservoir is 8.72 per million which would not exceed the SCAQMD's threshold of 10 per million. The Upper Rattlesnake Reservoir Alternative would result in similar potentially significant impacts due to an increase in NOx emissions from construction of the reservoir, but would require additional activities for construction of the pump station, 5,500 linear feet of pipeline, and 3,000 linear feet of haul roads. The increase in intensity of construction activities could result in greater emissions levels and would constitute a significant impact. Additionally, construction of the pipelines would be located close to existing sensitive receptors potentially resulting in greater impacts to construction health risk than the proposed project. Even though mitigation measures would be implemented, construction of the Upper Rattlesnake Reservoir Alternative has the potential to result in greater air quality emissions than the proposed project, which may not be able to be mitigated to a less than significant level. As such, the Upper Rattlesnake Reservoir Alternative would result in greater air quality impacts when compared to the proposed project.

Biological Resources

The Upper Rattlesnake Reservoir Alternative site is within the Coastal Subregion of the Orange County NCCP/HCP Reserve (Woodward-Clyde 1996), similar to the proposed project. The area is specifically within the coastal sage scrub habitat reserve, and depending on the reservoir footprint, includes between 24.1 and 34.5 acres of coastal sage scrub (Woodward-Clyde 1996). This coastal sage scrub habitat supports a variety of special-status species. The proposed project would permanently impact up to 29 acres of coastal sage scrub communities and temporarily impact 0.85 acre of California sagebrush scrub. The proposed project would require mitigation measures that would reduce impacts to coastal sage scrub and special-status species to a less than significant level. The Upper Rattlesnake Reservoir Alternative site includes coastal sage scrub habitat within the Orange County NCCP/HCP Reserve and would require mitigation similar to that associated with the Syphon Reservoir expansion (Woodward-Clyde 1996). As a result, the Upper Rattlesnake Reservoir Alternative would result in similar biological resources impacts when compared to the proposed project.

Cultural Resources

The Upper Rattlesnake Reservoir Alternative site has moderate to high sensitivity for archaeological resources (Woodward-Clyde 1996). The proposed project site was found to include nine historical/archaeological resources, only two of which could be impacted by proposed project activities. The presence of both historic period and prehistoric archaeological sites within the vicinity of the project area indicates that the area is sensitive for archaeological resources. Mitigation measures would require procedures to avoid the two known resources, as well as procedures to reduce impacts to any unknown resources uncovered during construction, which would reduce impacts to a less than significant level. Based on the fact that archaeological resource sensitivity is presumed to be high at the Upper Rattlesnake Reservoir Alternative site, and that similar mitigation measures would be required to reduce impacts to unknown cultural resources, the Upper Rattlesnake Reservoir Alternative would result in similar impacts to cultural resources when compared to the proposed project.

Energy

The Upper Rattlesnake Reservoir Alternative would require increased amounts of energy to pump the additional 6,000 AF recycled water to the new upper reservoir for storage. The proposed project would require 1,082,727 kWh of electricity annually to pump an additional 4,500 AF recycled water to Syphon Reservoir. The total net new operating electricity consumption for the expanded Syphon Reservoir represents approximately 0.006 percent of the county and 0.002 percent of SCE consumption for 2018. As a result, impacts would be less than significant and no mitigation measures would be required. The Upper Rattlesnake Reservoir Alternative would result in increased energy consumption compared to the proposed project to pump an additional 1,500 AF water. While the Upper Rattlesnake Reservoir Alternative would result in more kWh of electricity to operate the expanded reservoir, when compared to the county and SCE regional consumptions levels, the increase would be less than significant when compared to the existing electrical grid. As a result, the Upper Rattlesnake Reservoir Alternative would result in similar impacts to energy when compared to the proposed project.

Geology and Soils

The Upper Rattlesnake Reservoir Alternative site is underlain by bedrock of the Capistrano, Vaqueros-Sespe, and Santiago Formations (Woodward-Clyde 1996). Several bedrock faults are mapped beneath the potential location for the upper reservoir dam that have not been proven to be active/inactive (Woodward-Clyde 1996). Given the geologic formations onsite, the Upper Rattlesnake Reservoir Alternative site has a high potential for scientifically significant fossil resources (Woodward-Clyde 1996) and therefore has high paleontological potential. The bedding at the site dips favorably with respect to slope stability and there have been several small landslides detected onsite (Woodward-Clyde 1996). The proposed project is located in the Vaqueros and Sespe Formations, which are rated as generally having very poor slope stability characteristics and are described as landslide/erosion-prone and low permeability. An inactive fault runs through the Syphon Reservoir site. Paleontological sensitivity is moderate to high at the proposed project site. While the geologic effects of the proposed project were determined to be potentially significant, the impacts due to ground shaking, soil erosion, unstable geologic units, and expansive soil would be reduced to a less than significant level by incorporating into the project design the geotechnical recommendations for soils remediation and/or foundation systems necessary to reduce seismic-related hazards to less than significant levels, and compliance with DSOD regulations. Additionally, mitigation measures would be required to reduce impacts to any fossils that may be uncovered by construction of the project. Similarly, any new dam constructed as part of the Upper Rattlesnake Reservoir Alternative would require adherence to DSOD regulatory requirements, as well as mitigation measures to reduce impacts to paleontological resources due to the high paleontological potential. As a result, the Upper Rattlesnake Reservoir Alternative would result in similar impacts to geology and soils when compared to the proposed project.

Greenhouse Gas Emissions

The Upper Rattlesnake Reservoir Alternative would involve an increase in greenhouse gas emissions relative to existing conditions to operate the pumps that would convey approximately 6,000 AF additional recycled water to the reservoir. Construction and operation of the proposed project's increase in storage of 4,500 AF would equal approximately 433 $MTCO_2e$ per year (amortized over 30 years), which would not exceed the SCAQMD 3,000 $MTCO_2e$ threshold. No mitigation measures would be required. While the amount of water pumped to the Upper Rattlesnake Reservoir would be more than the proposed project by approximately 1,500 AF, it would similarly result in fewer greenhouse gas emissions than the 3,000 $MTCO_2e$ threshold, and impacts would be less than significant without the need for mitigation measures. As such, the Upper Rattlesnake Reservoir Alternative would result in similar greenhouse gas emissions impacts when compared to the proposed project.

Hazards and Hazardous Materials

The Upper Rattlesnake Reservoir Alternative would result in the similar routine transport of hazardous materials as the proposed project, including construction-related fuels and operational-related chemicals for recycled water treatment. Both the alternative and the proposed project would comply with existing State regulations that would reduce all impacts to a level of less than significant. While the Upper Rattlesnake Reservoir Alternative would not be located in a very high fire severity zone, historic fires at the site suggest an increased risk of wildland fire, which would require implementation of mitigation measures similar to the proposed project. As a result, the Upper Rattlesnake Reservoir Alternative would result in similar impacts to hazards and hazardous materials when compared to the proposed project.

Hydrology and Water Quality

The Upper Rattlesnake Reservoir Alternative would result in similar construction ground-disturbing activities as the proposed project that could impact surface water quality due to polluted runoff from construction. Additionally, the Upper Rattlesnake Reservoir Alternative would be similar to the proposed project in that it would result in substantial soil movement to construct the reservoir, which would result in alteration of drainage patterns. Operation of the Upper Rattlesnake Reservoir Alternative would involve an increase in the capacity of the reservoir which increases the potential downstream inundation area in the event of a dam breach or emergency release. For both the proposed project and the alternative, IRWD would be required to adhere to all DSOD requirements, which includes construction of a spillway to provide direction for emergency release flows. Additionally, the alternative and the project's structure, seepage control components, and spillway would be designed and evaluated for structural integrity by geotechnical engineers to reduce likelihood of dam breach. For the proposed project and the Upper Rattlesnake Reservoir Alternative, surface water quality and drainage impacts would be mitigated with implementation of required regulatory requirements such as SWPPPs and BMPs. The Upper Rattlesnake Reservoir Alternative would result in an increase in the risk to downstream communities due to inundation, which would be mitigated through project design and DSOD requirement, similar to the proposed project. As a result, the Upper Rattlesnake Reservoir Alternative would result in similar impacts to hydrology and water quality when compared to the proposed project.

It should be noted that the Upper Rattlesnake Reservoir Alternative site is located in a large drainage area, which, once operational, could result in excess amounts of stormwater entering the expanded upper reservoir. The Upper Rattlesnake Reservoir Alternative would require additional freeboard in the expanded reservoir to accommodate increased amounts of stormwater, which may impact operational storage capacity.

Noise and Vibration

The Upper Rattlesnake Reservoir Alternative would result in construction-related noise levels and operation impacts that are similar in nature to the proposed project. The Upper Rattlesnake Reservoir Alternative site is located approximately 2,000 feet from the nearest existing sensitive receptor. However, the alternative would require construction of approximately 5,500 linear feet of pipeline that would be installed within rights-of-way adjacent to sensitive receptors such as schools and residences. The proposed project would result in less than significant impacts to temporary and permanent increases in ambient noise and vibration levels, and would not require mitigation measures. Given that the Upper Rattlesnake Reservoir Alternative involves construction of pipelines installed within rights-of-way adjacent to sensitive receptors, it is likely that the increase in noise and vibration levels would be potentially significant and require mitigation measures. As a result, the Upper Rattlesnake Reservoir Alternative would result in greater noise and vibration impacts when compared to the proposed project.

Recreation

The Upper Rattlesnake Reservoir Alternative is not currently operated as a recreational facility although trails in the vicinity are used for hiking purposes. The proposed project would result in increased access to the project site due to a new walking trail, although IRWD would control access to the trail. The proposed project would have indirect impacts to biological and cultural resources due to the construction and public use of the proposed recreation trail; but, these potential impacts would be mitigated to less than significant levels. An expansion of the Upper Rattlesnake Reservoir Alternative would not eliminate recreational facilities, or require relocation that could cause an adverse physical effect on the environment. As a result, the Upper Rattlesnake Reservoir Alternative would result in similar recreation impacts when compared to the proposed project.

Transportation

The Upper Rattlesnake Reservoir Alternative would result in the same kind of construction activities that could potentially result in temporary impacts to traffic and circulation patterns on local roadways as the proposed project. The Upper Rattlesnake Reservoir Alternative would involve installation of pipeline within rights-of-way and the proposed project would involve intersection improvements, both of which would result in lane closures and/or detours. Similar to the proposed project, impacts associated with the Upper Rattlesnake Reservoir Alternative would be temporary and would be reduced to less than significant levels with implementation of mitigation measures such as a Traffic Control Plan. As a result, the Upper Rattlesnake Reservoir Alternative would result in similar transportation impacts when compared to the proposed project.

Tribal Cultural Resources

The Upper Rattlesnake Reservoir Alternative site has a potential for unknown tribal cultural resources. According to record searches and tribal resource consultations, no tribal resources are present on the proposed project site and expansion at Syphon Reservoir would not impact known tribal cultural resources. Although unknown tribal cultural resource could be impacted by construction or operational activities, mitigation measures would reduce the impact to less than significant levels. Based on the potential for tribal cultural resources, and the fact that similar mitigation measures would be required to reduce impacts to known and unknown tribal cultural resources, the Sand Canyon Reservoir Alternative would result in similar impacts to tribal cultural resources when compared to the proposed project.

Wildfire

Unlike the proposed project, the Upper Rattlesnake Reservoir Alternative site would not be located within a moderate, high, or very high fire severity zone (see Figure 3.14-1). However, historic fires Such as the 2007 Santiago Fire have impacted the Upper Rattlesnake Reservoir Alternative (see Figure 3.14-2). As a result, construction and operation of a new reservoir has the potential to result in uncontrolled spread of wildfire and exacerbation of fire risk. The proposed project would be located within a very high fire severity zone; mitigation measures would be required to ensure fire hazard reduction measures are implemented during proposed project activities to further reduce the potential for wildfire impacts on project workers. Similar mitigation measures would be required for any expansion of the Upper Rattlesnake Reservoir Alternative. As a result, the Upper Rattlesnake Reservoir Alternative would result in similar wildfire impacts when compared to the proposed project.

6.2.3.3 Reduced Project Alternative

The Reduced Project Alternative would result in expansion of Syphon Reservoir but not at the capacity proposed under the project. Instead of raising the existing 59-foot dam height to 136 feet as proposed for the project, the Reduced Project Alternative would raise the existing dam to 98 feet. The Reduced Project Alternative would provide approximately 2,500 AF of recycled water storage, or about half of the proposed project’s capacity. The Reduced Project Alternative would involve similar activities as the project, such as excavation of large amounts of onsite sediment, import of dam embankment material, construction of a spillway, treatment facility, access roads, and recreation trail.

Ability to Meet Project Objectives

The Reduced Project Alternative would partially meet all of the project objectives. Because the Reduced Project Alternative would result in half of the storage proposed under the project, IRWD would still have to purchase costly, imported water from MWD to account for the lack of full storage potential. Due to the fact that the full capacity of the reservoir would not be achieved, IRWD would not be able to maximize the use of recycled water to benefit its customers within its service area. Additionally, while diversions of sewage to OCSD and recycled water to the ocean would be reduced if approximately half of the storage at Syphon Reservoir were achieved, diversions would still occur under the Reduced Project Alternative. Any new dam built by IRWD would continue to meet or exceed the current safety and design requirements established by DSOD.

Aesthetics

The Reduced Project Alternative would result in a total dam crest height of 98 feet compared to the proposed project’s height of 136 feet. Similar construction equipment would be required for construction of the Reduced Project Alternative as the proposed project. The proposed project at Syphon Reservoir would be visible to downstream Irvine communities such as Stonegate and could obstruct views of dominant ridgelines and vistas associated with the Sana Ana Mountains. However, mitigation measures such as a landscape plan would be required to mitigate impacts to local scenic views, which would reduce impacts to a less than significant level. The Reduced Project Alternative would similarly increase the dam’s visibility compared with existing conditions, although it would do so to a lesser degree than the proposed project due to the reduced dam crest height. While the lower dam crest associated with the Reduced Project Alternative would maintain views of the dominant ridgelines and vistas associated with the Sana Ana Mountains, mitigation measures would still be required to reduce impacts to a less than significant level. As a result, the Reduced Project Alternative would result in a similar aesthetic impact when compared to the proposed project.

Air Quality

The Reduced Project Alternative would result in air quality-related construction and operation impacts that are similar in nature to the proposed project. The residential sensitive receptors would be located the same distance from the Reduced Project Alternative site as the proposed project site, and therefore the likelihood of resulting in cancer-causing causing construction health risk impacts due to the elevated levels of diesel particular matter would be similar. The proposed project would result in potentially significant construction-related air quality impacts due to emissions of NOx, however mitigation measures would reduce the impacts to less than significant levels. Given the distance between the proposed project and nearby sensitive receptors, the cancer risk for the maximum impacted sensitive receptor near Syphon Reservoir is 8.72 per million which would not exceed the SCAQMD's threshold of 10 per million. These conditions are expected to be similar under the Reduced Project Alternative, and the alternative would result in similar potentially significant impacts due to an increase in NOx emissions from construction activities that could be mitigated, and similar less than significant cancer-causing construction health risk impacts. As such, the Reduced Project Alternative would result in similar air quality impacts when compared to the proposed project.

Biological Resources

The Reduced Project Alternative would be implemented in the same location as the proposed project and would therefore have the same potential to impact coastal sage scrub and riparian habitat and the special-status species supported by that habitat. The proposed project would permanently impact up to 29 acres of coastal sage scrub communities and temporarily impact 0.85 acre of California sagebrush scrub. While the proposed project would permanently impact 12.28 acres of riparian communities that supports the least Bell's vireo, implementation of mitigation measures would reduce impacts to a less than significant level. Biological resource impact acreages associated with the Reduced Project Alternative would be reduced because the area that would be inundated by the reservoir would be lessened when compared to the proposed project due to the smaller reservoir capacity. Therefore, sensitive natural communities such as coastal sage scrub, wetlands, and riparian habitats and associated special-status species would be impacted to a lesser degree. Nevertheless, mitigation measures would be required to reduce impacts to lower elevations of habitat impacted by the Reduced Project Alternative inundation levels. As a result, the Reduced Project Alternative would result in similar biological resources impacts when compared to the proposed project.

Cultural Resources

The Reduced Project Alternative would be implemented in the same location as the proposed project and would therefore have the potential to impact known and unknown cultural resources.

The proposed project site was found to include nine historical/archaeological resources, only two of which could be impacted by proposed project activities. The presence of both historic period and prehistoric archaeological sites within and within the vicinity of the project area indicates that the area is sensitive for archaeological resources. Mitigation measures would require procedures to avoid the two known resources, as well as to reduce impacts to any unknown resources uncovered during construction, which would reduce impacts to a less than significant level. Based on the fact that known cultural resources exist on the Reduced Project Alternative site and the archaeological sensitivity is high, and that similar mitigation measures would be required to reduce impacts to known and unknown cultural resources, the Reduced Project Alternative would result in similar impacts to cultural resources when compared to the proposed project.

Energy

The Reduced Project Alternative would require increased amounts of energy to pump the additional 2,500 AF water to Syphon Reservoir for storage. The proposed project would require 1,082,727 kWh of electricity annually to pump an additional 4,500 AF recycled water to Syphon Reservoir. The total net new operating electricity consumption for the expanded Syphon Reservoir represents approximately 0.006 percent of the county and 0.002 percent of SCE consumption for 2018. As a result, impacts would be less than significant and no mitigation measures would be required. Given the smaller increase in capacity, the Reduced Project Alternative would result in lesser additional kWh of electricity to operate the expanded reservoir, but would still result in less than significant impacts to the existing electrical grid. As a result, the Reduced Project Alternative would result in similar impacts to energy when compared to the proposed project.

Geology and Soils

The Reduced Project Alternative would be implemented in the same location as the proposed project. The site is located in the Vaqueros and Sespe Formations, which are rated as generally having very poor slope stability characteristics and are described as landslide/erosion-prone and low permeability. An inactive fault runs through the Syphon Reservoir site. Paleontological sensitivity is moderate to high at the proposed project site. While the geologic effects of the proposed project were determined to be potentially significant, the impacts due to ground shaking, soil erosion, unstable geologic units, and expansive soil would be reduced to a less than significant level by incorporating into the project design the geotechnical recommendations for soils remediation and/or foundation systems necessary to reduce seismic-related hazards to less than significant levels, and compliance with DSOD regulations. Additionally, mitigation measures would be required to reduce impacts to any fossils that may be uncovered by construction of the project. Similarly, the Reduced Project Alternative would require adherence to DSOD regulatory requirements, as well as mitigation measures to reduce impacts to paleontological resources due to the high paleontological potential onsite. As a result, the Reduced Project Alternative would result in similar impacts to geology and soils when compared to the proposed project.

Greenhouse Gas Emissions

The Reduced Project Alternative would involve an increase in greenhouse gas emissions from existing conditions to operate the pumps that would convey approximately 2,500 AF additional recycled water to an expanded Syphon Reservoir. Construction and operation of the proposed project's increase in storage of 4,500 AF would result in emissions approximately 433 $MTCO_2e$ per year (amortized over 30 years), which would not exceed the SCAQMD 3,000 $MTCO_2e$ threshold. No mitigation measures would be required. Since the amount of water pumped to the Reduced Project Alternative would be less than the proposed project, it would be anticipated to similarly result in less than the 3,000 $MTCO_2e$ threshold, and impacts would constitute a less than significant without the need for mitigation measures. As such, the Reduced Project Alternative would result in similar greenhouse gas emissions impacts when compared to the proposed project.

Hazards and Hazardous Materials

The Reduced Project Alternative would result in the similar routine transport of hazardous materials as the proposed project, including construction-related fuels and operational-related chemicals for recycled water treatment. Both the alternative and the proposed project would comply with existing State regulations that would reduce all impacts to a level of less than significant. Both the proposed project and the Reduced Project Alternative would be located within a very high fire severity zone. Mitigation measures would require implementation of fire hazard reduction measures that would reduce impacts to a less than significant level. As a result, the Reduced Project Alternative would result in similar impacts to hazards and hazardous materials when compared to the proposed project.

Hydrology and Water Quality

The Reduced Project Alternative would result in similar construction ground-disturbing activities as the proposed project that could impact surface water quality due to polluted runoff from the construction. Even though the Reduced Project Alternative would result in a smaller storage capacity, substantial soil movement would be required to construct the expanded reservoir, which would result in similar alteration of drainage patterns when compared to the proposed project. While operation of the Reduced Project Alternative would involve a smaller increase in capacity of the reservoir when compared to the proposed project, the alternative would increase the potential downstream inundation area in the event of a dam breach or emergency release above the existing condition. For both the project and the alternative, IRWD would be required to adhere to all DSOD requirements, which includes construction of a spillway to provide direction for emergency release flows. Additionally, the alternative and the project's structure, seepage control components, and spillway would be designed and evaluated for structural integrity by geotechnical engineers to reduce likelihood of dam breach. For the proposed project and the Reduced Project Alternative, surface water quality and drainage impacts would be mitigated with implementation of required regulatory requirements such as SWPPPs and BMPs. The Reduced Project Alternative would result in an increase in the risk to downstream communities due to inundation, which would be mitigated through project design and DSOD requirement, similar to the proposed project. As a result, the Reduced Project Alternative would result in similar impacts to hydrology and water quality when compared to the proposed project.

Noise and Vibration

The Reduced Project Alternative would result in construction-related noise levels and operation impacts that are similar in nature to the proposed project. The greatest impacts to ambient noise levels would be during construction to sensitive receptors in the vicinity of the Syphon Reservoir site. The proposed project would result in less than significant impacts to temporary and permanent increases in ambient noise and vibration levels, and would not require mitigation measures. Given that the Reduced Project Alternative would be located the same distance from sensitive receptors as the proposed project, the increase in noise and vibration levels would be similar. As a result, the Reduced Project Alternative would result in similar noise and vibration impacts when compared to the proposed project.

Recreation

The Reduced Project Alternative would be implemented in the same location as the proposed project and would therefore have the same potential to impact recreation. The Reduced Project Alternative and the proposed project would involve recreation opportunities at Syphon Reservoir in the form of a walking trail, which would be moderated by IRWD and therefore would not increase the use of nearby recreation facilities. Because neither the Reduced Project Alternative nor the proposed project would not result in increased environmental effects due to expansion of recreational facilities, the alternative would result in similar impacts to recreational facilities.

Transportation

The Reduced Project Alternative would result in the same kind of construction activities that could potentially result in temporary impacts to traffic and circulation patterns on local roadways as the proposed project. Similar to the proposed project, impacts associated with the Reduced Project Alternative would be temporary and would be reduced to less than significant levels with implementation of mitigation measures such as a Traffic Control Plan. As a result, the Reduced Project Alternative would result in similar transportation impacts when compared to the proposed project.

Tribal Cultural Resources

The Reduced Project Alternative would be implemented in the same location as the proposed project and would therefore have the potential to impact known and unknown tribal cultural resources. According to record searches and tribal resource consultations, no tribal resources are present on the proposed project site and expansion at Syphon Reservoir would not impact known tribal cultural resources. Although unknown tribal cultural resource could be impacted by construction or operational activities, mitigation measures would reduce the impact to less than significant levels. Based on the potential to unearth unknown tribal cultural resources, and that similar mitigation measures would be required to reduce impacts to known and unknown tribal cultural resources, the Reduced Project Alternative would result in similar impacts to tribal cultural resources when compared to the proposed project.

Wildfire

Similar to the proposed project, the Reduced Project Alternative would be located within a very high fire severity zone, and construction and operation of an expanded reservoir has the potential to result in uncontrolled spread of wildfire and exacerbation of fire risk. Mitigation measures would be required to ensure fire hazard reduction measures are implemented during proposed project activities to further reduce the potential for wildfire impacts on project workers. Similar mitigation measures would be required for any expansion of the Reduced Project Alternative within the same fire hazard zone. As a result, the Reduced Project Alternative would result in similar wildfire impacts when compared to the proposed project.

6.3 Environmentally Superior Alternative

CEQA requires that an EIR identify the environmentally superior alternative of a project other than the No Project Alternative (CEQA Guidelines Section 15126.6(e)(2)). One of the primary purposes of the alternatives analysis is to identify project alternatives that may avoid or substantially lessen significant project impacts (CEQA Guidelines Section 15126.6). With incorporation of mitigation measures, the proposed project would result in no significant and unavoidable impacts.

As stated above and summarized in **Table 6-2**, the No Project Alternative would avoid all of the mitigated environmental impacts associated with the proposed project, but would not meet all of the project objectives. Because the proposed project does not result in any significant and unavoidable impacts, the No Project Alternative does not avoid or substantially lessen significant environmental effects.

TABLE 6-2
SUMMARY OF ALTERNATIVES ANALYSIS
IMPACTS AS COMPARED TO THE PROPOSED PROJECT

Environmental Resource	Proposed Project	No Project Alt.	Sand Canyon Reservoir Alt.	Upper Rattlesnake Reservoir Alt.	Reduced Project Alt.
Meets All Project Objectives?	Yes	No	No	Yes	No
Environmental Impacts					
Aesthetics	LTSM	-	-	+	0
Air Quality	LTSM	-	+	+	0
Biological Resources	LTSM	-	0	0	0
Cultural Resources	LTSM	-	0	0	0
Energy	LTS	-	0	0	0
Geology and Soils	LTSM	-	0	0	0
Greenhouse Gas Emissions	LTS	-	0	0	0
Hazards and Hazardous Materials	LTSM	-	0	0	0
Hydrology and Water Quality	LTS	-	0	0	0
Noise and Vibration	LTS	-	+	+	0
Recreation	LTSM	-	+	0	0
Transportation	LTSM	-	0	0	0
Tribal Cultural Resources	LTSM	-	0	0	0
Wildfire	LTSM	-	0	0	0

SOURCE: ESA 2020; (+) Greater Impacts; (-) Lesser Impacts; (0) Similar Impacts

The Sand Canyon Reservoir Alternative would result in greater impacts when compared to the proposed project to air quality and noise during construction due to sensitive receptors located approximately 80 feet from construction activities. Temporary increases in noise levels and construction health risk impacts would be greater than the proposed project, resulting in potentially significant impacts. Additionally, the Sand Canyon Reservoir Alternative may eliminate portions of adjacent recreational facilities, requiring the relocation of recreational facilities which could have an adverse physical effect on the environment. As a result, the Sand Canyon Reservoir Alternative would result in greater environmental impacts when compared to the proposed project. The Sand Canyon Reservoir Alternative would not fully achieve all of the project objectives.

The Upper Rattlesnake Reservoir Alternative would result in greater impacts when compared to the proposed project to air quality and noise during construction due to proximity of pipelines to adjacent sensitive receptors. Temporary increases in noise levels and construction health risk impacts would be greater than the proposed project, resulting in potentially significant impacts. Additionally, the Upper Rattlesnake Reservoir Alternative would involve installation of a new separate reservoir, not an expansion of an existing reservoir, which would result in greater impacts to aesthetic resources from surrounding Irvine communities. As a result, the Upper Rattlesnake Reservoir Alternative would result in greater environmental impacts when compared to the proposed project. The Upper Rattlesnake Reservoir Alternative would fully achieve all of the project objectives due to reservoir capacity, resulting in maximization of recycled water produced by IRWD and elimination of the need to purchase expensive imported water, among other objectives.

The Reduced Project Alternative would generally result in similar environmental impacts to the proposed project. The extent of earth moving activities would be the same for the project and the Reduced Project Alternative, with the main difference being the height of the dam. Because the proposed project does not result in any significant and unavoidable impacts, the Reduced Project Alternative does not avoid or substantially lessen significant environmental effects. The Reduced Project Alternative would not fully achieve all of the project objectives.

CEQA requires that an EIR identify the environmentally superior alternative of a project other than the No Project Alternative (CEQA Guidelines Section 15126.6(e)(2)). While the proposed project would result in potentially significant impacts, with the incorporation of mitigation measures, no significant and unavoidable impacts would occur. The Sand Canyon Reservoir Alternative and the Upper Rattlesnake Reservoir Alternative would result in greater environmental impacts due to proximity to sensitive receptors, when compared to the proposed project. The Reduced Project Alternative would generally result in similar environmental impacts to the proposed project without fully achieving its objectives. Overall, none of the alternatives would avoid any impacts or mitigation measures associated with the proposed project. Only the Upper Rattlesnake Reservoir Alternative would fully achieve all of the project objectives, but with greater environmental impacts than the proposed project.

6.4 References

Dudek. 2003. San Joaquin Reservoir Conservation Project EIR, Section 8.0 Alternatives to the Proposed Project. Prepared for Irvine Ranch Water District, February 2003.

HDR. 2020. Technical Memorandum: Evaluation of Syphon Reservoir Expansion in Response to EIR Notice of Preparation Comments. December, 2020.

IRWD. 2020a. Recycled Water Reservoirs. Accessed: https://www.irwd.com/construction/recycled-water-reservoirs, on August 13, 2020.

IRWD. 2020b. 50 Years of Recycled Water. Accessed: https://www.irwd.com/about-us/50-years-recycled-water, on August 13, 2020.

MetroPoint Engineers. 2001. San Joaquin Reservoir Conversion to Non-Potable Seasonal Storage, Preliminary Planning Study. Prepared by MetroPoint Engineers. September 2001.

Orange County Water District (OCWD). Green Acres Project. Accessed: https://www.ocwd.com/what-we-do/water-reuse/green-acres-project/, on February 26, 2021.

Woodward-Clyde. 1992. Feasibility Study for Sand Canyon Reservoir Expansion – Phase I. Prepared for Irvine Ranch Water District, September 1992, 924E168A.

Woodward Clyde. 1996. Alternative Reservoir Development Concepts. Prepared for Irvine Ranch Water District, May 1996, 924E384A.

This page intentionally left blank

CHAPTER 7
Report Preparers

7.1 Lead Agency

Irvine Ranch Water District

15600 Sand Canyon Ave
Irvine, CA 92618

- Paul Weghorst, Executive Director, Water Policy
- Fiona Sanchez, Director of Water Resources
- Kellie Welch, Water Resources Manager
- Jo Ann Corey, Environmental Compliance Analyst
- Richard Mori, Engineering Manager
- Eric Akiyoshi, Engineering Manager
- Scott Toland, Senior Engineer
- Ray Bennett, Engineer

7.2 EIR Authors

Environmental Science Associates (ESA)

626 Wilshire Boulevard, Suite 1100
Los Angeles, California 90017

- Tom Barnes, Project Director
- Jennifer Jacobus, Project Manager
- Sarah Spano, Deputy Project Manager

ESA Technical Staff

- Candace Ehringer
- Michael Burns
- Andray Cardoza
- Brandon Carroll
- Heather Dubois
- Stephan Geissler
- Maria Hensel
- Scott Holbrook
- Alan Sako
- Maile Tanaka

7.3 Organizations and Persons Consulted

Fehr & Peers – Traffic

101 Pacifica, Suite 300
Irvine, CA 92618

- Spencer Reed, PE

HDR – Engineering Support

3230 El Camino Real, Suite 200
Irvine, CA 92602-1377

- Christopher Krivanec PE, GE

Fiona Hutton & Associates – Public Outreach

12711 Ventura Blvd., Suite 170
Los Angeles, CA 91604

- Fiona Hutton
- Brenda Deeley

Appendix A
Scoping Summary

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax
www.esassoc.com

Scoping Summary

date October 10, 2019

to Fiona Sanchez, Director of Water Resources, Irvine Ranch Water District
Kellie Welch, Water Resources Manager, Irvine Ranch Water District
Jo Ann Corey, Environmental Compliance Specialist, Irvine Ranch Water District

from Jennifer Jacobus, CEQA Project Manager, ESA

subject Syphon Reservoir Improvement Project California Environmental Quality Act Public Scoping Summary

Introduction

Irvine Ranch Water District (IRWD), as the Lead Agency, is proposing the Syphon Reservoir Improvement Project (proposed project). The proposed project would involve increasing the capacity of Syphon Reservoir, which is an existing recycled water storage reservoir in unincorporated County of Orange, California. As part of the reservoir expansion, the existing engineered dam would be replaced with a new engineered dam that would meet and exceed the latest safety standards. The new dam would increase the recycled water reservoir capacity from approximately 500 acre-feet (AF) to 5,000 AF, and would allow IRWD to serve the seasonal and future water needs within its service area. The proposed project is located on the northeast side of Portola Parkway between Bee Canyon Access Road and State Route 133 (SR-133), where the majority of the property bounded by these thoroughfares is owned by IRWD.

Recycled water is vital to the community, serving as a reliable, affordable and drought-proof source in IRWD's water supply portfolio. Recycled water is used for irrigation, cooling office buildings, flushing toilets, mixing concrete, fighting regional wildfires, and other industrial uses. By making more recycled water available to the community, the proposed project would reduce IRWD's dependence on costly imported water and make the community more self-sufficient.

Notice of Preparation

The Notice of Preparation (NOP) was prepared pursuant to Section 15082 of the California Environmental Quality Act (CEQA) Guidelines, to notify interested parties that IRWD will be preparing an Environmental Impact Report (EIR) to evaluate potential environmental impacts of the proposed project (see Attachment 1). The NOP was mailed on August 2, 2019 to interested parties, including local, state, and federal agencies; local tribes; and other groups or individuals who had previously expressed interest in the project. The NOP also was posted by the County Clerk in Orange County (see Attachment 1). A Notice of Completion (NOC) was also prepared by IRWD and sent to the State Clearinghouse (see Attachment 2). The proposed project was given a State Clearinghouse number of SCH# 2019080009, and the project information was posted in the CEQAnet Database (see Attachment 2). Copies of the NOP were made available for public review at Irvine/Heritage Park Library (14361 Yale Ave, Irvine CA 92604) and online at the IRWD website (https://www.irwd.com/construction/syphon-reservoir-improvement-project).

Scoping Period

The 45-day project scoping period began with the distribution of the NOP on August 2, 2019 and remained open through September 16, 2019 at 4:00 p.m. During the scoping period, one scoping meeting was held on August 21, 2019 at IRWD headquarters (15600 Sand Canyon Avenue, Irvine CA 92618). Public notices of the scoping meeting were placed in the Orange County Register newspaper (see Attachment 3). Public notices of the scoping meeting were also mailed directly to interested homeowners' associations (HOAs), and to residents within the Stonegate Village, Stonegate East, Woodbury Community, and Woodbury East communities (see Attachment 4).

At the scoping meetings, ESA gave a presentation on the proposed project and the CEQA process (see Attachment 5). Aside from ESA and IRWD staff, approximately twenty-two (22) meeting participants attended the August 21, 2019 scoping meeting at the IRWD headquarters. Participant questions and comments were recorded and comment cards were also available for participants to fill out at the meeting or to send in at a later date. The sign-in sheet from the August 21, 2019 public scoping meeting is included as Attachment 6.

Comments

During the scoping period, IRWD received a total of thirty-five (35) comment letters on the proposed project via mail and e-mail (see Attachment 7). Table 1 below includes a list of the agencies and individuals that submitted comments during the 30-day project scoping period. IRWD also received verbal comments during the scoping meeting, which have been recorded as Attachment 8. CEQA does not require IRWD to formally respond to these comments, but rather to consider these comments during preparation of the EIR.

TABLE 1:
LIST OF COMMENTERS

Comment Number	Commenter	Date Received (2019)
Agencies		
1	Orange County Fire Authority	August 8
2	Native American Heritage Commission	August 15
3	California Department of Water Resources	August 15
4	Crean Lutheran High School	August 29
5	California Department of Fish and Wildlife	August 30
6	South Coast Air Quality Management District	September 10
7	City of Irvine Community Development	September 12
8	Transportation Corridor Agencies	September 13
9	California Department of Transportation	September 13
10	Orange County Public Works	September 17

Comment Number	Commenter	Date Received (2019)
11	Peer A. Swan, Board Member, IRWD Board of Directors	September 16, 18
Local Residents		
12	Alice Lin	August 21
13	Adrienne Escoe	September 4
14	Valerie Gebhardt	September 5
15	Lawrence Gebhardt	September 10
16	Michele Jacknik	September 10
17	Mark O'Brien	September 11
18	Jie Gao	September 13
19	Zhong Xiong	September 13
20	Richard Zeng	September 13
21	Yongfeng Wang	September 13
22	Jessie Tsai	September 16
23	Vivian Qian	September 16
24	Noura Abdelmaaboud	September 16
25	Mike Qiao	September 16
26	Ahmed Sidky	September 16
27	Yun Yun Kang	September 16
28	Guoshan Lai, Yanna Lai	September 16
29	Joe Yan	September 16
30	Amy Pham	September 16
31	Justin Choi	September 16
32	Yun Pan	September 16
33	Lina Guo	September 16
34	Pei Yang	September 16
35	Amanda Scott-Yu	September 16

The next formal opportunity for public comments will be associated with the release of the Draft Environmental Impact Report.

List of Attachments

This Scoping Summary contains documents pertinent to the scoping process. The following items are included:

Attachment 1: Notice of Preparation
Attachment 2: Notice of Completion
Attachment 3: Public Notice of Scoping Meeting
Attachment 4: Letters to Local Community
Attachment 5: Scoping Meeting Presentation
Attachment 6: Scoping Meeting Sign-in Sheets
Attachment 7: Comment Letters Received by IRWD
Attachment 8: Scoping Meeting Verbal Comments

Attachment 1: Notice of Preparation

Irvine Ranch
WATER DISTRICT

POSTED

AUG 02 2019

ORANGE COUNTY CLERK-RECORDER DEPARTMENT

BY: ____ DEPUTY

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

DATE: August 2, 2019

TO: Responsible Agencies, Trustee Agencies, Interested Parties

LEAD AGENCY: Irvine Ranch Water District

PROJECT TITLE: Syphon Reservoir Improvement Project

PUBLIC REVIEW PERIOD: August 2, 2019 through September 16, 2019

This Notice of Preparation (NOP) has been prepared to notify agencies and interested parties that Irvine Ranch Water District (IRWD), as the lead agency, will prepare an Environmental Impact Report (EIR) pursuant to the California Environmental Quality Act (CEQA) for the Syphon Reservoir Improvement Project (proposed project). The proposed project would increase the capacity of the existing recycled water reservoir to serve the community's seasonal and future water needs. As a part of the reservoir expansion, the existing engineered dam would be replaced with a new engineered dam that would meet and exceed the latest safety standards. The new engineered dam would increase the reservoir capacity from approximately 500 acre-feet (AF) to 5,000 AF.

Recycled water is vital to the community, serving as a reliable, affordable and drought-proof source in IRWD's water supply portfolio. Recycled water is used for irrigation, cooling office buildings, flushing toilets, mixing concrete, fighting regional wildfires and other industrial uses. By making more recycled water available to the community, the proposed project would reduce IRWD's dependence on costly imported water and make the community more self-sufficient. Additional information about the proposed project and a discussion of potential environmental impacts are included in **Attachment A** to this NOP.

PROJECT LOCATION: The proposed project would be built within the IRWD service area at the site of the existing Syphon Reservoir, which is currently a recycled water storage reservoir. Syphon Reservoir is located in unincorporated County of Orange, California, on the northeast side of Portola Parkway between Bee Canyon Access Road and State Route 133 (SR-133), where the majority of the property bounded by these thoroughfares is owned by IRWD (see **Figure 1**).

PUBLIC REVIEW AND COMMENTS: IRWD is soliciting comments from responsible and trustee agencies as well as interested parties as to the scope and content of the environmental information to be included in the EIR. In accordance with CEQA, agencies are requested to review the project description provided in this NOP and provide comments on environmental issues related to the statutory responsibilities of the agency. The EIR will be used by IRWD when considering approval of the proposed project as well as any related discretionary approvals. All comments to the NOP are due no later than

4:00 p.m. on **September 16, 2019**. Please send your comments to the mailing address or email address shown below. Include a return address or email address and a contact name for your agency or party with your comments.

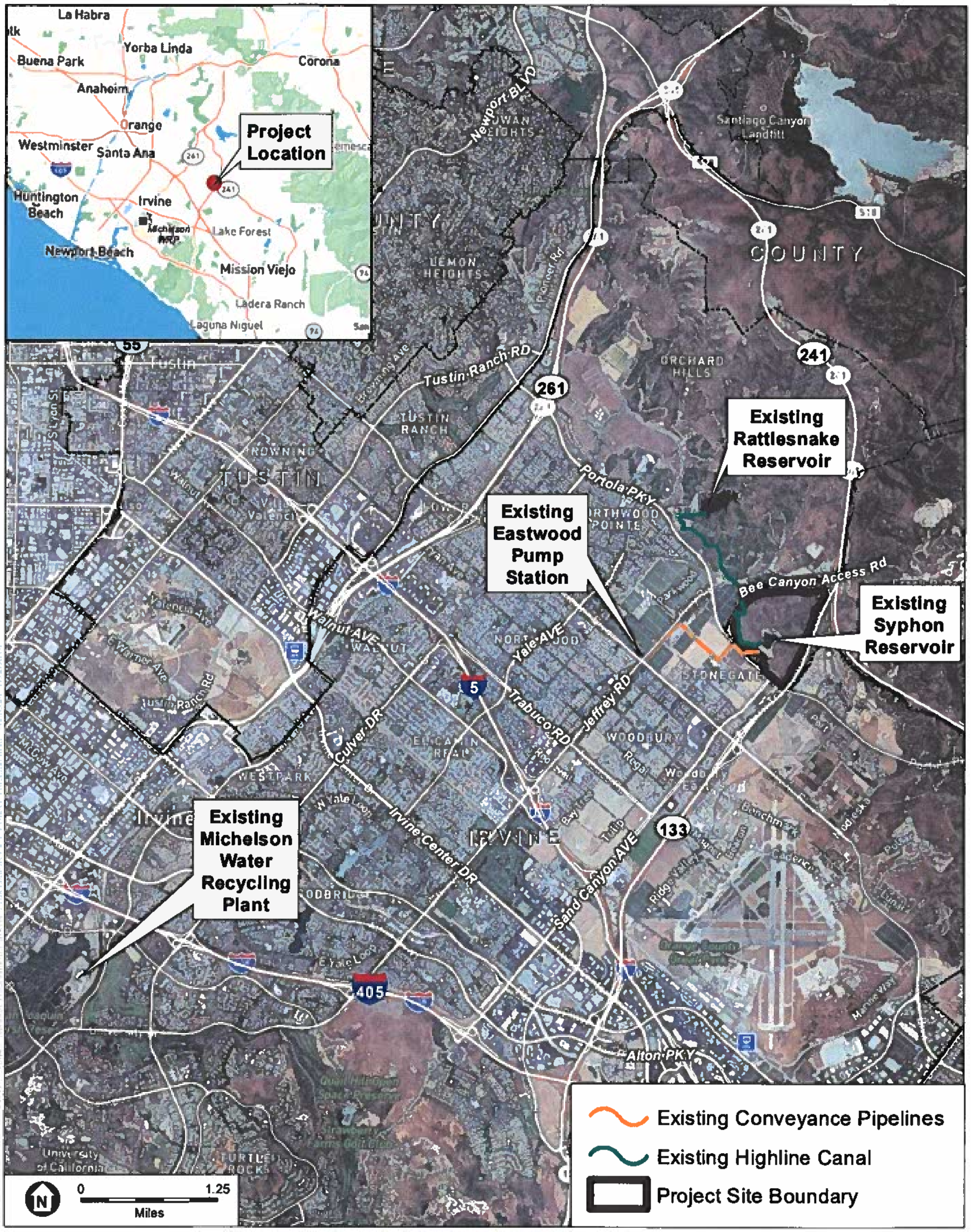
CONTACT PERSON:

Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, California 92619-7000
Attn: Jo Ann Corey, Environmental Compliance Specialist
SyphonEIR@irwd.com
Phone: 949-453-5300

DOCUMENT AVAILABILITY: Copies of the NOP are available at the Heritage Park Library, 14361 Yale Ave, Irvine CA 92604; and online at the IRWD Web Site (http://www.irwd.com/doing-business/environmental-documents).

SCOPING MEETING: IRWD will hold a public meeting to receive comments and suggestions about the issues to be included in the EIR. The scoping meeting will include a brief presentation, providing an overview of the proposed project. After the presentation, public comments will be accepted either orally or in writing at the scoping meeting. Comment forms will be supplied for those who wish to submit comments in writing at the scoping meeting; written comments may also be submitted anytime during the 45-day NOP review period. The scoping meeting will be held as follows:

Wednesday, August 21, 2019, 6:00 p.m.
Irvine Ranch Water District
Multi-Purpose Conference Room
15600 Sand Canyon Avenue
Irvine, California 92618



SOURCE: ESRI, 2016; OC LAFCO, 2018

IRWD Syphon Reservoir Improvement Project

Figure 1
Project Location

ESA

ATTACHMENT A

Introduction

Irvine Ranch Water District (IRWD), as the lead agency pursuant to CEQA, is proposing to implement the Syphon Reservoir Improvement Project (proposed project). The proposed project would increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam that would meet and exceed the latest safety standards. The proposed project would be able to store additional recycled water to meet the seasonal demand of customers and will enhance IRWD's water supply reliability.

Project Background

District Overview

Established in 1961 as a California Water District under the provisions of the State of California Water Code, IRWD is a non-profit, independent special district serving central Orange County, California. IRWD provides drinking water, reliable sewage collection and treatment, recycled water and urban runoff treatment to approximately 422,000 residents. As an independent public agency, IRWD is governed by a five-member publicly-elected Board of Directors that are responsible for the District's policies and decision-making. Day-to-day operations are supervised by the General Manager and District staff.

IRWD has a diverse water supply that includes local groundwater, recycled water, imported water, and local surface water. Approximately 54 percent of the IRWD water supply comes from 26 local groundwater wells in the Orange County Groundwater Basin; approximately 18 percent of the District's water supply is imported from the Metropolitan Water District of Southern California (MWD); and roughly 26 percent of the District's water demands are met with recycled water. IRWD produces recycled water at its Michelson Water Recycling Plant (WRP) located in Irvine, CA and at its Los Alisos WRP located in Lake Forest, CA. Recycled water is provided to customers primarily for irrigation of public landscaping such as street medians, parks and golf courses as well as agricultural irrigation. It is also used in industrial processes such as mixing concrete, office building uses such as toilet flushing and cooling towers, as well as for firefighting. When recycled water production exceeds seasonal demands, recycled water is stored at Syphon Reservoir, as well as other recycled water storage reservoirs operated by IRWD, including San Joaquin, Rattlesnake, and Sand Canyon Reservoirs.

Existing Syphon Reservoir

The existing Syphon Reservoir is formed by a 59-foot high, engineered dam with a crest width of approximately 12-feet. An engineered dam is built by compacting successive layers of earth, using the most impervious materials. Syphon Reservoir was constructed in 1949 and was acquired by IRWD in 2010 from the Irvine Company, which previously used the reservoir to store water for agricultural irrigation. In 2012, IRWD converted the facilities at Syphon Reservoir for storage of recycled water, by adding strainer and disinfection facilities, as well as constructing a pipeline and pump station to connect the reservoir to IRWD's existing recycled water distribution system.

The tertiary-treated recycled water stored in the Syphon Reservoir originates from IRWD's Michelson WRP. Recycled water is currently conveyed to the Syphon Reservoir via a portion of the Highline Canal from IRWD's Rattlesnake Reservoir into Syphon Reservoir. Syphon Reservoir's existing outlet facilities include a series of underground pipes that convey flows through the strainer and disinfection facilities and then to IRWD's recycled water system for distribution to customers. Alternatively, the existing reservoir can be drawn down through an existing 48-inch pipeline that discharges to the storm drain at Portola Parkway (see **Figure 1** and **Figure 2**).

IRWD directly controls the water into and out of Syphon Reservoir and can lower the water surface to allow for storage of minor amounts of runoff during storm events. The reservoir does not receive water from rivers or streams. The existing reservoir also includes a spillway structure that protects the dam from overtopping by conveying recycled water to the existing storm drain in Portola Parkway. The reservoir includes a small watershed that is not capable of generating significant amounts of runoff that need to be managed through the use of the spillway.

Project Location

The proposed project would be constructed within the IRWD service area at the site of the existing Syphon Reservoir, which is located on the northeast side of Portola Parkway between Bee Canyon Access Road and State Route 133 (SR-133) in the County of Orange (see **Figure 1** and **Figure 2**). IRWD owns the majority of the property bounded by these thoroughfares. Crean Lutheran High School's Athletic Complex is located between Portola Parkway and the toe of the existing dam. Residential neighborhoods are located on the southwest side of Portola Parkway. The ground surrounding the reservoir, which dominates the Syphon site, is hilly with ridgelines and terraced slopes. Ground surface elevations at the site range from about 675 feet above mean sea level (amsl) in the northeast corner to about 319 feet amsl at Portola Parkway immediately downstream of the existing reservoir. Syphon Reservoir is surrounded by sensitive upland and wetland vegetation communities that are protected under local, state and federal environmental regulatory requirements, as well as school recreation facilities and residential neighborhoods.

The Syphon Reservoir is located within the Central and Coastal Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and is included as an operating reservoir allowed within the NCCP/HCP Reserve. Implementation of expanded seasonal storage for recycled water purposes was anticipated and identified as a permitted use in the NCCP/HCP.

Project Purpose and Objectives

The purpose of the proposed project is to increase the recycled water storage capacity of Syphon Reservoir by replacing and enlarging the existing reservoir facilities to meet the seasonal demands of recycled water customers and to enhance IRWD's water supply reliability. Currently, once IRWD's existing recycled water storage reservoirs are filled to capacity in winter months, IRWD sewage is either diverted around the Michelson WRP to the Orange County Sanitation District (OCSD) or recycled water produced at the Michelson WRP is discharged to the ocean. During peak summer months, IRWD is left short of recycled water to meet the demands of IRWD's recycled water customers and IRWD must then purchase costly supplemental imported water from MWD.

POSTED

AUG 0 2 2019

ORANGE COUNTY CLERK-RECORDER DEPARTMENT

BY: RM DEPUTY

SOURCE: ESRI, 2016

IRWD Syphon Reservoir Improvement Project

Figure 2
Project Site and Proposed Project

ESA

Based on projected demands and supplies, IRWD estimates that it will need an additional 4,500 AF of recycled water seasonal storage capacity by the year 2030. The expansion of Syphon Reservoir would allow the storage of recycled water that is currently lost to the ocean or that could have been produced at Michelson WRP absent any diversion of sewage to OCSD. The additional stored recycled water could then be used to meet the projected seasonal recycled water demands within IRWD's service area.

The proposed project would allow the storage of additional recycled water produced at the Michelson WRP during periods of low demand (winter months) for use during periods of high demand (summer months). The expansion of the reservoir's storage capacity from the current 500 AF to approximately 5,000 AF would help IRWD become more self-sufficient by reducing its dependence on costly and less reliable imported water during summer months, and support the increased use of recycled water for public landscaping, agricultural, business and industrial uses. Increased use of recycled water for these non-drinking water purposes would make more drinking water available to the region to better withstand future water shortages. The recycled water available for use by IRWD's customers as a result of the proposed project would not be subject to water shortages and would therefore increase IRWD's water supply reliability.

The objectives of the proposed project are as follows:

- Improve local water supply reliability by reducing the need to purchase less reliable imported water from MWD by storing and using additional recycled water;
- Reduce diversions of sewage to OCSD;
- Promote additional recycling of water while reducing effluent discharges to the ocean; and
- Ensure the new dam and reservoir continue to meet or exceed the latest safety standards, including the standards of the California Department of Water Resources (DWR), Division of Safety of Dams requirements (DSOD).

Project Components

Dam Replacement

The proposed project would involve replacement of the existing 59-foot high engineered dam with a new 136-foot high engineered dam with a 20-foot wide crest. The new dam would be constructed primarily from on-site impermeable materials, although the importation of some specialty materials is anticipated. During removal of the existing dam, materials would be stockpiled for reuse to the extent feasible. In addition, new borrow areas would be identified onsite, where material would be excavated for use as fill for the new dam. IRWD recently approved the Syphon Reservoir Geotechnical Investigations Project, which will be completed prior to designing the proposed new dam. The Geotechnical Investigations Project will help to determine the amount and type of specialty materials that would need to be imported to the site, as well as help to define the limits of disturbance to minimize impacts. The total volume of all materials comprising the dam would be approximately 2.3 million cubic yards.

The new reservoir would include the same small watershed as the existing reservoir and would not be capable of generating significant amounts of runoff that would need to be managed through the use of the spillway. Similar to the existing dam, it is a requirement of DSOD that a spillway be included with the new dam to protect the dam from overtopping. The new spillway would be constructed and lined with reinforced concrete to prevent erosion of the abutment and embankment materials. The spillway would be designed to meet and exceed the latest safety standards. Flows through the spillway would discharge into a channel lined with grouted rip-rap (concrete grout placed in void spaces between rip-rap pieces), and then into a partially below-grade retention basin designed to dissipate the energy of the flow. Water would exit the retention basin into the existing 48-inch pipeline to the storm drain at Portola Parkway.

Slope protection for the new dam would consist of rip-rap on the upstream slope and vegetation on the downstream slope. The rip-rap on the upstream slope would provide erosion protection from small wave action resulting from water in the reservoir. The vegetation on the downstream slope would provide erosion protection from rainfall runoff.

Reservoir Enlargement

The replacement dam would result in an increase in the reservoir's maximum water surface elevation from 376 feet amsl to 456 feet amsl and increase the reservoir's capacity from approximately 500 AF to 5,000 AF. The proposed project would expand the reservoir's shoreline and inundate up to approximately 82 acres upstream of the dam that currently support upland and wetland vegetation communities, some of which are within the NCCP/HCP Reserve area and deed restricted lands. **Figure 2** shows the preliminary footprint of the proposed dam and reservoir inundation area.

Similar to existing operations, with implementation of the proposed project, water levels at Syphon Reservoir would fluctuate seasonally. Water would be stored in winter when recycled water supplies exceed demands, and the reservoir would be drawn down in summer when demands exceeds supply. The estimated minimum operating capacity of the reservoir would be about 180 AF to maintain water quality.

IRWD would develop an annual operating plan for the enlarged Syphon Reservoir to set targets for the volume of water to be contained in the reservoir on a daily, monthly, annual, or seasonal basis. Reservoir operations would vary with time and would need to consider a wide variety of factors, such as: seasonal storage needs, water quality considerations, rainfall projections, and operational compatibility with the IRWD recycled water system. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands and other factors.

Conveyance Facilities and Other Project Components

The conveyance and inlet facilities that would deliver recycled water from the Michelson WRP to Syphon Reservoir are sufficiently sized to accommodate the proposed project and would not require modification. Under the proposed project, water would be delivered to Syphon Reservoir via an existing 36-inch recycled water pipeline and the Eastwood Recycled Water Pump Station, which is located off-site and currently under construction. The Highline Canal would be abandoned in place and no longer used to deliver water to Syphon Reservoir from Rattlesnake Reservoir.

As stated previously, Syphon Reservoir's existing outlet facilities include a series of underground pipes that convey flow through the strainer and disinfection facilities and then into IRWD's recycled water system for distribution to customers. In the event of an emergency, the existing reservoir can also be drawn down through an existing 48-inch pipeline that discharges to the existing storm drain in Portola Parkway (see **Figures 1 and 2**). Under normal operating conditions, all flow in or out of the reservoir would be conveyed through the existing 36-inch inlet/outlet pipeline. With the exception of the strainer and disinfection facilities, these existing outlet conveyance facilities are sufficiently sized to accommodate the proposed project and would not require modification (see **Figure 2**).

The expanded strainer and disinfection facilities would be relocated at the toe of future dam in the same general vicinity of the existing facility (see **Figure 2**) and would continue to use sodium hypochlorite to disinfect water stored in the reservoir. The new facility would also include sodium bisulfite storage and associated metering pumps to de-chlorinate the future inlet flow to Syphon Reservoir.

Other operational systems that would likely be part of the proposed project include (1) an internal seepage control system within the new dam; and (2) a circulation/aeration system for the enlarged reservoir. In addition, during project design, IRWD will consider recreational opportunities that may be compatible with the project site. Recreational opportunities that will be reviewed include public walking trails, potential restrooms, shade structure, benches, and interpretive signs.

Project Construction Schedule

Construction of the proposed project is estimated to require approximately 36 months, depending on weather conditions and other variables. Construction is currently anticipated to begin in the fall of 2022.

Potential Environmental Impacts

The EIR will assess and disclose the reasonably foreseeable direct, indirect, and cumulative impacts that would likely result from the construction and operation of the proposed project. Potential impacts to resources listed in Appendix G of the CEQA Guidelines, as amended on December 28, 2018, are summarized below. The EIR will identify mitigation measures if necessary to avoid, minimize, and offset potentially significant impacts of the project. The EIR also will describe the alternatives screening analysis conducted for the proposed project, and evaluate alternatives to the proposed project that would avoid, minimize, and offset potentially significant impacts of the project while attempting to meet the objectives of the proposed project.

Aesthetics

The project area is not officially designated as a scenic vista; however, open space and conservation areas are considered important scenic resources within the County of Orange and the adjacent City of Irvine. Replacing the dam and enlarging the reservoir would alter the views of the project site from surrounding public vantage points, including the Crean Lutheran High School Athletic Complex immediately below the reservoir and the adjacent residential areas, parks, and roadways. Potential direct and indirect visual impacts could occur both during construction and after the reservoir is enlarged and infrastructure is built and operational. The EIR will identify the visible changes to scenic resources, scenic vistas, and visual character of the project area due to the reservoir enhancement and development of ancillary facilities associated with the proposed project within the viewshed. Further, the EIR will evaluate the potential increase in light and glare from the proposed project on motorists traveling along Portola Parkway, SR-133 and neighboring sensitive receptors.

Agriculture and Forestry Resources

The project site includes the existing Syphon Reservoir and surrounding open space area. While the project site is zoned as General Agriculture by the County of Orange, the General Agricultural District allows for low-intensity uses that have predominantly open space character, such as Syphon Reservoir. The EIR will analyze the potential impacts of project implementation on farmland or forestry resources, as well as conflicts with zoning designations for such land uses.

Air Quality

The project site is located within the South Coast Air Basin, which is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). Deconstruction of the existing reservoir and construction of a new reservoir and ancillary facilities would generate temporary emissions from construction equipment exhaust, earth movement, construction workers' commute, and material hauling. Operational activities associated with the proposed project could generate air pollutants from employee commuting, truck deliveries and operation of stationary equipment. The EIR will evaluate the generation of air pollutants during construction and operational activities associated within the proposed project. Conflicts or obstructions with the implementation of the SCAQMD Air Quality Plan will also be discussed in the EIR. Furthermore, the exposure of sensitive receptors to pollutant concentrations or other emissions such as odors will be analyzed.

Biological Resources

Sensitive biological resources at the project site could be significantly affected by construction of the proposed project and the long-term seasonal water elevation changes that would result during operation of an enlarged reservoir. The EIR will evaluate the potential for construction and operation of the proposed project to affect biological resources and will discuss local ordinances, as well as state and federal regulations governing biological resources. In particular, consistency with the NCCP/HCP will be discussed in the EIR. Such analysis will incorporate updated spatial data from the California Natural Diversity Database, the proposed project's Biological Resources Technical Report, various surveys conducted at the project site for rare plants, natural communities, and special-status species, and will address recent changes to the status of federal and State listed species.

A large portion of the project site was previously used by the Transportation Corridor Agencies (TCA) for mitigation lands for impacts associated with the Eastern Transportation Corridor Project. When IRWD acquired Syphon Reservoir from the Irvine Company, the Conveyance Agreement included a Grant Deed with use restrictions that provide for the conservation of biological resources associated with that mitigation. The EIR will evaluate the impacts associated with biological resources within areas included in the Grant Deed. IRWD will continue ongoing consultation with both U.S. Fish and Wildlife Service and California Department of Fish and Wildlife regarding consistency with both the NCCP/HCP and the Grant Deed and appropriate mitigation. A modification to the Grant Deed could be pursued consistent with these consultations.

Cultural Resources

The analysis included in the EIR will document and evaluate the existing dam and associated facilities, which would be deconstructed as part of the project. Constructed in 1949, the existing facilities are over 45 years of age and therefore meet the California Office of Historic Preservation's threshold for consideration as a historical resource. The proposed project also would include excavation activities that could uncover previously known or unknown historical or archaeological resources, or unknown human burial resources. The EIR will assess the potential effects on cultural resources in the project area as a result of the proposed dam replacement, reservoir enlargement and construction of ancillary facilities.

Energy

The proposed project could require significant amounts of energy during construction and operation of the proposed facilities. The EIR will quantitatively evaluate energy demand from construction equipment, haul trucks, vendor trucks, and construction workers. The EIR will also quantify the Project's anticipated operational energy needs, including direct consumption of electricity to pump recycled water and fuel needed for maintenance operations. Any construction of new or expanded energy related facilities could result in environmental effects. The EIR will assess the potential impacts of the proposed project on energy use.

Geology and Soils

The project site is located in a seismically active region. Active or potentially active faults that could potentially affect Syphon Reservoir include the San Joaquin Hills, Chino, Elsinore, Newport-Inglewood, Puente Hills, San Jacinto, and San Andreas faults; the closest is Puente Hills, which is located 4.3 miles away from the project site. Previous studies indicate that two faults are located within the project site, one of which runs directly beneath the existing reservoir and dam.[1] Neither fault is considered active or potentially active. The proximity of these faults places the project area at potential risk for geological hazards. IRWD recently approved the Syphon Reservoir Geotechnical Investigations Project, which will be completed prior to designing the proposed project. The Geotechnical Investigations Project will characterize the geologic and geotechnical conditions of the Syphon Reservoir site and verify the location and historic activity of the onsite faults. The Geotechnical Investigations Project will also help develop criteria for the proposed project that will be used to design for potential geologic hazards.

Construction and operation of the proposed project could be subject to potential seismic hazards including surface fault rupture, strong seismic shaking, soil liquefaction, and geologic hazards such as subsidence, soil erosion, ground collapse, and expansive soil. The EIR will evaluate the potential seismic and geologic hazards that could affect the proposed facilities. The proposed project and its appurtenant facilities would be designed to safely accommodate these potential hazards and the structures would meet and exceed the latest state and federal safety standards.

Greenhouse Gas Emissions

In addition to air emissions, the proposed project would result in the emission of greenhouse gases from construction and operational activities. Construction activities could generate greenhouse gas emissions from equipment exhaust, construction workers' commutes, and material hauling. Operational activities could generate emissions from employee commuting, truck deliveries, and stationary equipment. The EIR will evaluate the contribution of construction and operational greenhouse gas emissions to global climate change. The EIR will evaluate the proposed project's consistency with state and local regulatory requirements and regulations.

Hazards and Hazardous Materials

A database search of hazardous materials sites using the online Department of Toxic Substances Control's EnviroStor and State Water Resources Control Board (SWRCB) GeoTracker databases showed that Syphon Reservoir is not located on a hazardous materials site. However, construction activities associated with the proposed project could result in the release of hazardous materials. Additionally, the proposed disinfection facilities could result in use, storage and/or transport of potentially hazardous materials to and

[1] GEI Consultants, Inc. 2012. Syphon Reservoir Expansion Engineering Feasibility Study, Constructability Analysis.

from the project site. The proposed project would be designed to safely store any potentially hazardous materials. The EIR will assess the potential for storing and transporting hazardous materials associated with the operation of proposed facilities, and the upset/accident condition involving the release of hazardous materials into the environment, including the emission of hazards within 0.25 mile of a school. Further, the proposed project may result in increased truck load intensities that could increase traffic and physically interfere with an adopted emergency response plan. The EIR will also evaluate the potential for interference with an adopted emergency response plan to occur and wildland fire threats due to project implementation.

Hydrology and Water Quality

The proposed project may change local drainage patterns at the project site, which could impact water quality, volume, and surface runoff, as well as groundwater resources. The EIR will describe relevant federal, state, and local regulations and agencies, including provisions of the federal Clean Water Act and the permitting and regulatory authority of the Regional Water Quality Control Board and the SWRCB. The EIR will identify potential seiche and dam inundation hazard zones in the project area, as well as stormwater quality protection measures required during construction and operation of proposed project.

Land Use and Planning

The project site is designated as Open Space Reserve and is zoned as General Agriculture by the County of Orange. The project area contains specialized development requirements as required by various regulatory agencies and the City of Irvine. The EIR will evaluate the proposed project's potential to conflict with all applicable plan, policies, and regulations as well as any deed restrictions imposed on surrounding mitigation lands as described above under Biological Resources.

Mineral Resources

While the project site is not identified as a known mineral resource area and does not have a history of mineral extraction uses, the EIR will include an evaluation of the project's potential to result in the loss of availability of a known mineral resource.

Noise

Implementation of the proposed project would require construction and operation of project components that would generate noise and vibration. Construction activities could be a significant source of temporary noise and vibration from trucking operations and the use of heavy construction equipment (e.g., drill rigs, graders, cranes, and frontend loaders). During project operation, fixed sources of noise could be established. The EIR will describe the local noise policies and ordinances. The EIR will quantify potential noise and vibration levels associated with construction and operation of the proposed project for comparison to standards and thresholds established in local noise policies and ordinances.

Population and Housing/Growth Inducement

The proposed project does not include the construction of new housing. As such, the proposed project would not directly induce population growth. The proposed project will be built to enable IRWD to meet the community's needs for recycled water. The proposed project is not expected to indirectly result in construction of new housing or increase the local population; the workforce for construction of the proposed project is anticipated to derive form the existing labor pool in Orange County, and operation of the proposed project is not expected to create new long-term employment opportunities. However, the

EIR will address the proposed project's potential to induce indirect population growth due to expansion of water storage capacity and the corresponding ability to store recycled water at Syphon Reservoir. The EIR will evaluate the proposed project's potential to indirectly induce growth in the region.

Public Services

The proposed project would construct a new recycled water storage facility but is unlikely to affect demand for other public services or to require other new or expanded public facilities. The EIR will assess the potential for the proposed project to affect police and fire protection services, schools, and parks.

Recreation

In the project vicinity, the City of Irvine and Orange County Parks (OC Parks) maintain parks and provide recreational services. The nearest recreational facility is the Crean Lutheran High School Athletic Complex and Mockingbird Park located adjacent and approximately 0.25-mile south of the project site, respectively. The EIR will analyze potential impacts to existing local recreational resources. The EIR also will evaluate any potential recreational opportunities that may be compatible with the project site and implemented as a component of the proposed project.

Traffic and Transportation

Construction of the proposed project could affect traffic on local roadways as a result of vehicle trips associated with hauling of material and equipment, increased demand for parking to serve construction workers, and increase in traffic hazards caused by construction activities. In addition, operation of the proposed project could introduce vehicle trips to the project area for delivery of disinfection materials and operation and maintenance vehicles. The EIR will evaluate the potential impact to traffic and circulation due to construction-related vehicle trips and operational vehicle trips on local and regional roadways.

Tribal Cultural Resources

IRWD is conducting AB 52 tribal consultation with the following three Native American Tribes who have requested to be informed of activities initiated by IRWD: San Gabriel Band of Mission Indians, Gabrieleño Band of Mission Indians – Kizh Nation, and Juaneño Band of Mission Indians/Acjachemen Nation. There is a potential for the proposed project to affect tribal cultural resources during ground-disturbing activities associated with construction of the proposed project. The EIR will evaluate potential impacts to tribal cultural resources and incorporate the results of AB 52 consultations into the analysis.

Utilities and Service Systems

The EIR will evaluate whether construction and operation of the proposed project could result in impacts to existing public utilities, such as water or sewage treatment, storm water drainage, and solid waste disposal. The proposed project would not require additional water facilities beyond those identified in the project description; however, development of the proposed project may modify the mix of water supplies used within the IRWD service area. The proposed project is not anticipated to increase impervious surfaces that can result in increases in storm water runoff, and the existing storm drain in Portola Parkway has sufficient capacity for discharges from the proposed enlarged reservoir as described previously. As such, additional storm water drainage facilities would not be required. Construction activities associated with the proposed project could increase construction waste that could be required to be placed in a landfill, subject to solid waste regulations.

Wildfire

The project site is located within an undeveloped and vegetated open space area. The project site area is located within a State/Federal Responsibility Area, Very High Fire Hazard Severity Zone. The project site includes slopes that surround the existing reservoir and are susceptible to prevailing winds. During construction, equipment and on-site diesel fuel could pose a risk to wildfire with possible ignition sources such as internal combustion engines, gasoline-powered tools, and equipment that could produce a spark, fire, or flame. The use of spark-producing construction machinery within fire risk areas such as the project area could expose temporary project workers and contractors to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire. Additional water available for firefighting would be available as a result of the additional recycled water stored in the proposed enlarged reservoir. The EIR will evaluate potential impacts of wildfires due to implementation of the proposed project.

Attachment 2: Notice of Completion

2019080009

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P. O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH # ____________

Project Title: Syphon Reservoir Improvement Project

Lead Agency: Irvine Ranch Water District — Contact Person: Jo Ann Corey
Mailing Address: 15600 Sand Canyon Avenue — Phone: 949-453-5300
City: Irvine — Zip: 92618 — County: Orange

Project Location: County: Orange — City/Nearest Community: Irvine
Cross Streets: Portola Parkway and Bee Canyon Access Road — Zip Code: 92620
Lat. / Long.: 33 ° 42 ′ 38 ″ N/ -117 ° 43 ′ 52 ″ W — Total Acres: 266
Assessor's Parcel No.: 104-118-34 — Section: ____ Twp.: ____ Range: ____ Base: ____
Within 2 Miles: State Hwy #: 133 — Waterways: Syphon Reservoir, Bee Canyon Wash
Airports: N/A — Railways: N/A — Schools: Stonegate Elementary, Crean Lutheran High School, Eastwood Elementary

Governor's Office of Planning & Research

AUG 01 2019

STATE CLEARINGHOUSE

Document Type:

CEQA: ☒ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ____ Other ____
NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI
Other: ☐ Joint Document ☐ Final Document ☐ Other ____

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☐ Other ____

Development Type:

☐ Residential: Units ____ Acres ____
☐ Office: Sq.ft. ____ Acres ____ Employees ____
☐ Commercial: Sq.ft. ____ Acres ____ Employees ____
☐ Industrial: Sq.ft. ____ Acres ____ Employees ____
☐ Educational ____
☐ Recreational ____
☒ Water Facilities: Type Reservoir Expansion AF 5,000
☐ Transportation: Type ____
☐ Mining: Mineral ____
☐ Power: Type ____ MW ____
☐ Waste Treatment: Type ____ MGD ____
☐ Hazardous Waste: Type ____
☐ Other: ____

Project Issues Discussed in Document:

☒ Aesthetic/Visual
☒ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☐ Coastal Zone
☒ Drainage/Absorption
☐ Economic/Jobs
☐ Fiscal
☒ Flood Plain/Flooding
☒ Forest Land/Fire Hazard
☒ Geologic/Seismic
☒ Minerals
☒ Noise
☒ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☒ Schools/Universities
☒ Septic Systems
☒ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☒ Solid Waste
☒ Toxic/Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☒ Water Supply/Groundwater
☒ Wetland/Riparian
☒ Wildlife
☒ Growth Inducing
☒ Land Use
☒ Cumulative Effects
☐ Other ____

Present Land Use/Zoning/General Plan Designation:

Orange County GP: Open Space Reserve; Unincorporated Orange County Zoning: A1 (General Agriculture); Orange County NCCP Reserve

Project Description: *(please use a separate page if necessary)*

The proposed Syphon Reservoir Improvement Project (proposed project) would increase the capacity of the existing recycled water reservoir to serve the community's seasonal and future recycled water needs. The reservoir capacity would increase from approximately 500 acre-feet (AF) to 5,000 AF. As a part of the reservoir expansion, the existing engineered dam would be replaced with a new engineered dam that would meet and exceed the latest safety standards.

Note: The state Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

Syphon Reservoir Improvement Project

Summary

SCH Number	2019080009
Lead Agency	Irvine Ranch Water District
Document Title	Syphon Reservoir Improvement Project
Document Type	NOP - Notice of Preperation
Received	8/1/2019
Present Land Use	Orange County GP: Open Space Reserve; Unincorporated Orange County Zoning: A1 (General Agriculture); Orange County NCCP Reserve

Document Description The proposed Syphon Reservoir Improvement Project (proposed project) would increase the capacity of the existing recycled water reservoir to serve the community's seasonal and future recycled water needs. The reservoir capacity would increase from approximately 500 acre-feet (AF) to 5,000 AF. As a part of the reservoir expansion, the existing engineered dam would be replaced with a new engineered dam that would meet and exceed the latest safety standards.

Contact Information
Jo Ann Corey
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618
Phone : (949) 453-5300

Location

Coordinates	33°42'38"N 117°43'52"W
Cities	Irvine
Counties	Orange
Cross Streets	Portola Parkway and Bee Canyon Access Road
Zip	92620
Total Acres	266
Parcel #	104-118-34
State Highways	133
Schools	Stonegate Elementary, Crean Lutheran Highschool,
Waterways	Syphon Reservoir, Bee Canyon Washcess Road
Other Location Info	Schools: Eastwood Elementary

Notice of Completion

Review Period Start	8/1/2019
Review Period End	9/16/2019
Development Type	Water Facilities (Reservoir Expansion)(5,000 MGD)
Project Issues	

Aesthetic/Visual | Agricultural Land | Air Quality | Archaeologic-Historic | Biological Resources | Drainage/Absorption | Flood Plain/Flooding | Forest Land/Fire Hazard | Geologic/Seismic | Minerals | Noise | Population/Housing Balance | Public Services | Recreation/Parks | Schools/Universities | Septic System | Sewer Capacity | Soil Erosion/Compaction/Grading | Solid Waste | Toxic/Hazardous | Traffic/Circulation | Vegetation | Water Quality | Water Supply | Wetland/Riparian | Wildlife | Growth Inducing | Land Use | Cumulative Effects

Reviewing Agencies

Air Resources Board, Major Industrial Projects | Cal Fire | California Department of Parks and Recreation | California Highway Patrol | Caltrans, Division of Transportation Planning | Department of Conservation | Department of Toxic Substances Control | Office of Emergency Services, California | Office of Historic Preservation | Resources Agency | Resources, Recycling and Recovery | State Water Resources Control Board, Division of Water Quality | Native American Heritage Commission | Department of Water Resources | Department of Fish and Wildlife, Region 5 | Caltrans, District 12

Attachments

Environmental Document

NOP PDF 3537 K

NOC

Letter PDF 169 K

NOC PDF 1733 K

State Comments

2019080009_CDFW_Syphon Reservoir NOP comments PDF 2064 K

2019080009_DOT_2019-01193 Syphon Reservoir Improvment Cmnt PDF 98 K

2019080009_DWR_DSOD Comment_Syphon Reservoir Improvement Project PDF 87 K

2019080009_NAHC_NOP Syphon Reservoir Improvement Project 8 PDF 167 K

Disclaimer: The Governor's Office of Planning and Research (OPR) accepts no responsibility for the content or accessibility of these documents. To obtain an attachment in a different format, please contact the lead agency at the contact information listed above. You may also contact the OPR via email at state.clearinghouse@opr.ca.gov or via phone at (916) 445-0613. For more information, please visit OPR's Accessibility Site.

Attachment 3: Public Notice of Scoping Meeting

Notice of Preparation of an Environmental Impact Report
for the Syphon Reservoir Improvement Project

This Notice of Preparation (NOP) has been prepared to notify agencies and interested parties that Irvine Ranch Water District (IRWD), as the lead agency, will prepare an Environmental Impact Report (EIR) pursuant to the California Environmental Quality Act (CEQA) for the Syphon Reservoir Improvement Project (proposed project). The proposed project would be built within the IRWD service area at the site of the existing Syphon Reservoir, which is currently a recycled water storage reservoir. Syphon Reservoir is located in unincorporated County of Orange, California, on the northeast side of Portola Parkway between Bee Canyon Access Road and State Route 133, where the majority of the property bounded by these thoroughfares is owned by IRWD. The proposed project would increase the capacity of the existing recycled water reservoir to serve the community's seasonal and future water needs. As a part of the reservoir expansion, the existing engineered dam would be replaced with a new engineered dam that would meet and exceed the latest safety standards. The new engineered dam would increase the reservoir capacity from approximately 500 acre-feet (AF) to 5,000 AF.

IRWD is soliciting comments from responsible and trustee agencies as well as interested parties as to the scope and content of the environmental information to be included in the EIR. In accordance with CEQA, agencies are requested to review the project description provided in the NOP and provide comments on environmental issues related to the statutory responsibilities of the agency. The EIR will be used by IRWD when considering approval of the proposed project as well as any related discretionary approvals.

A 45-day public review period for the NOP begins on **August 2, 2019** and ends **September 16, 2019**. Copies of the NOP are available at Heritage Park Library located at 14361 Yale Ave, Irvine CA 92604; and online at the IRWD Web Site (http://www.irwd.com/doing-business/environmental-documents).

IRWD will hold a public scoping meeting on **August 21, 2019, 6:00 p.m.** at IRWD's Main Office (15600 Sand Canyon Avenue Irvine, CA 92618, Multi-Purpose Room) to receive comments and suggestions about the issues to be included in the EIR. The scoping meeting will include a brief presentation, providing an overview of the proposed project. After the presentation, public comments will be accepted either orally or in writing at the scoping meeting. Comment forms will be supplied for those who wish to submit written comments at the meeting; written comments will also be accepted by IRWD anytime during the 45-day review period until the **4:00 p.m. deadline on September 16, 2019.** Please send your comments to the mailing address or email address shown below. Include a return address or email address and a contact name for your agency or party with your comments.

Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, California 92619-7000
Attn: Jo Ann Corey, Environmental Compliance Specialist
SyphonEIR@irwd.com
Phone: 949-453-5300

Aviso de Preparación de un Reporte de Impacto Ambiental para el Proyecto de Mejora de la Reserva Syphon

Este Aviso de Preparación (NOP, por sus siglas en inglés) ha sido preparado para notificar a las agencias y partes interesadas acerca de que el Irvine Ranch Water District (IRWD) (Distrito de Agua Irvine Ranch), como agencia líder, preparará un Reporte de Impacto Ambiental (EIR, por sus siglas en inglés) de acuerdo con la Ley de Calidad Ambiental de California (CEQA, por sus siglas en inglés) para el Proyecto de Mejora de la Reserva Syphon (proyecto propuesto). El proyecto propuesto se construiría dentro del área de servicio del IRWD en el sitio donde se encuentra la Reserva Syphon, que actualmente es una reserva de almacenamiento de agua reciclada. La Reserva Syphon se encuentra en el Condado no incorporado de Orange, California, en el lado Noreste de Portola Parkway entre Bee Canyon Access Road y State Route 133, donde la mayor parte de la propiedad delimitada por estas carreteras es propiedad del IRWD. El proyecto propuesto aumentaría la capacidad de la reserva de agua reciclada existente para atender las necesidades de agua futuras y estacionales de la comunidad. Como parte de la expansión de la reserva, la represa existente sería reemplazada por una represa nuevamente diseñada que cubriría y excedería las últimas normas de seguridad. La nueva represa aumentaría la capacidad de la reserva de unos 500 acres-pies (AF, por sus siglas en inglés) a 5.000 AF.

El IRWD solicita comentarios de agencias responsables y administradoras así como de partes interesadas respecto del alcance y contenido de la información ambiental para incluir en el EIR. De acuerdo con la CEQA, las agencias deben revisar la descripción del proyecto provista en el NOP y ofrecer comentarios sobre asuntos ambientales relacionados con las responsabilidades legales de la agencia. El EIR será utilizado por el IRWD al considerar la aprobación del proyecto propuesto así como aprobaciones discrecionales relacionadas.

El período de revisión pública de 45 días para el NOP comienza el **2 de agosto de 2019** y termina el **16 de septiembre de 2019.** Hay disponibles copias del NOP en la Biblioteca Heritage Park ubicada en 14361 Yale Ave, Irvine CA 92604; y en línea en el sitio web del IRWD (http://www.irwd.com/doing-business/environmental-documents).

El IRWD realizará una reunión pública el **21 de agosto de 2019 a las 6:00 p.m.** en la Oficina Central del IRWD (15600 Sand Canyon Avenue Irvine, CA 92618, Salón de Usos Múltiples) para recibir comentarios y sugerencias acerca de los asuntos para incluir en el EIR. La reunión incluirá una breve presentación, que brindará una descripción general del proyecto propuesto. Tras la presentación, se aceptarán comentarios públicos en forma oral o escrita. A quienes deseen brindar comentarios escritos en la reunión se les proporcionarán formularios para comentarios; también el IRWD aceptará comentarios escritos en cualquier momento durante el período de revisión de 45 días, hasta las **4:00 p.m. del 16 de septiembre de 2019.** Envíe sus comentarios a la dirección postal o por correo electrónico a la dirección que se indica a continuación. Incluya una dirección de retorno o dirección de correo electrónico y nombre de contacto de su agencia o grupo con sus comentarios.

Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue

P.O. Box 57000
Irvine, California 92619-7000
Attn: Jo Ann Corey, Environmental Compliance Specialist
SyphonEIR@irwd.com
Teléfono: 949-453-5300

사이펀 저수지 개선 프로젝트에 대한
환경영향보고서 준비 통지서

본 준비 통지서(NOP)는 주도 기관인 어바인 랜치 수도국에서 캘리포니아 환경보존법(CEQA)에 따라 사이펀 저수지 개선 프로젝트(개발 프로젝트)에 대한 환경영향보고서(EIR)를 작성하는 데 대하여 기관들과 이해 관계자들에게 통지하기 위하여 작성되었습니다. 개발 프로젝트는 현재 재활용 상수 저수지로 사용되고 있는 기존의 사이펀 저수지 부지에 위치한 IRWD 서비스 지역 이내에 건설될 것입니다. 사이펀 저수지는 캘리포니아 주 자치체로서 인가되지 않은 오렌지 카운티의 Bee Canyon Access Road와 State Route 133 사이에 있는 Portola Parkway 의 북동쪽에 위치하여 있고 이처럼 주요 도로로 가로막힌 대부분의 부지는 IRWD 의 소유입니다. 지역 사회의 계절 수요와 향후 상수 수요를 공급하기 위해 개발 프로젝트의 기존 재활용 저수지 용량을 늘일 것입니다. 저수지 확장의 일환으로 최근 안전 기준을 맞추거나 능가하는 새로운 공학적 댐으로 기존의 공학적 댐을 교체할 것입니다. 새로운 공학적 댐은 저수지의 용량을 약 500 에이커 피트(AF)로부터 5,000 에이커 피트(AF)까지 늘이게 됩니다.

IRWD 는 EIR 에 포함시킬 환경 정보의 범위와 내용에 대하여 이해 관계자들과 책임지는 기관과 신탁 기관들로부터 의견을 요청하고 있습니다. 기관들은 CEQA 에 근거하여 NOP 에 제공된 프로젝트 설명을 검토해 보고 해당 기관들의 법적 책임에 관련된 환경 문제에 대하여 의견을 제출해야 합니다. IRWD 는 개발 프로젝트의 승인과 관련 재량 승인을 고려하는 측면에서 EIR 을 이용합니다.

NOP 공공 검토는 45 일 동안 진행되며 **2019 년 8 월 2** 일에 시작하여 **2019 년 9 월 16** 일에 마무리 됩니다. 14361 Yale Ave, Irvine CA 92604 에 위치한 역사공원도서관(Heritage Park Library)에서 NOP 사본을 얻으실 수 있으며 온라인에서 IRWD 웹사이트 (http://www.irwd.com/doing-business/environmental-documents)에서도 NOP 사본을 구하실 수 있습니다.

EIR 에 포함시킬 문제에 대한 의견과 제안을 받게 위해,IRWD 는 **2019 년 8 월 21 일 오후 6 시**에 IRWD 의 본사(15600 Sand Canyon Avenue Irvine, CA 92618, 다용도실/ Multi-Purpose Room)에서 공공 검사 회의를 열 것입니다. 검사 회의는 간단한 프레젠테이션을 포함하여 개발 프로젝트의 개요를 제공합니다. 프레젠테이션을 마친 후 검사 회의에서 구두 또는 서면 형식으로 공공 의견을 받게 됩니다. 회의에서 서면 의견을 제출하려는 분들을 위하여 의견 양식을 제공해 드립니다. 또한, 서면 의견은 마감일인 **2019 년 9 월 16 일 오후 4 시**까지 45 일 동안의 검토 기간 중 언제든지 접수가 가능합니다. 우편 주소 또는 아래의 이메일 주소로 소중한 의견을 보내주시기 바랍니다. 회신 주소 또는 이메일 주소와 기관 또는 관계자 연락처 이름도 의견과 함께 보내주세요.

Irvine Ranch Water District (어바인 랜치 수도)
Water Resources & Policy Department (수자원 및 정책본부)
15600 Sand Canyon Avenue
P. O. Box 57000
Irvine, California 92619-7000
Attn: Jo Ann Corey, Environmental Compliance Specialist (환경 준수 전문가 귀하)
이메일: SyphonEIR@irwd.com
전화번호: 949-453-5300

虹吸水庫(Syphon Reservoir)改善**項目**
環境影響報告**內容界定通知**

此**項目準備通知** (NOP) 旨在通知各個機構及相關單位，爾灣農場水務局(IRWD) 作為領導機構，即將遵照《加州環境品質法》(CEQA) 的要求，針對**虹吸水庫**(Syphon Reservoir)改善**項目**（擬議**計劃**）**製作**一份環境影響報告 (EIR)。擬議**計劃**將在 IRWD 服務區範圍內的**虹吸水庫**現址**建造**。**虹吸水庫**目前是**回收**水的儲水庫，位於加州橙縣的非建制地區，地處 Bee Canyon 聯絡道和 133 號州道之間的 Portola 公路東北面，在這裡，由主要幹線圍起的地產大部分屬於 IRWD 所有。擬議**計劃**將擴大現有的循環水水庫的容量，以便滿足社區季節性的用水需求以及未來的用水需求。作為水庫擴建的一部分，現有的工程水壩將由符合並超越最新安全標準的全新工程水壩取代。新建的工程水壩將把水庫容量從大約 500 英畝呎 (AF) 提升到 5,000 英畝呎(AF)。

IRWD 當前正在召集負責機構、委託機構和相關各方的意見，以便確定 EIR 的涵蓋範圍以及將納入在 EIR 中的環境資訊內容。根據 CEQA 的規定，機構需要審查 NOP 中提供的專案說明，並針對與本機構相關環境問題的法定職責提供意見。IRWD 將在考慮是否批准擬議專案以及相關授權時用到 EIR。

NOP 將有 45 天的公審期，於 **2019 年 8 月 2 日**開始，並在 **2019 年 9 月 16 日**結束。您可前往 14361 Yale Ave, Irvine CA 92604 的 Heritage Park 圖書館領取 NOP 副本，或造訪 IRWD 網站，在 IRWD 網站上在線收取文檔 (http://www.irwd.com/doing-business/environmental-documents)。

IRWD 將在 **2019 年 8 月 21 日下午 6 點,** 在 IRWD 的辦公室（15600 Sand Canyon Avenue Irvine, CA 92618，多功能室）舉行**內容**界定公聽會，聽取各方就 EIR 應該涵蓋那些問題提出的意見和建議。範圍界定會議將提供簡短的展示，並對擬議專案作出概述。在展示過後，範圍界定會議將收取公眾提出的口頭或書面意見。IRWD 將提供公眾提供意見表格給在會議上有意提交書面意見的參與者；IRWD 也將在 **2019 年 9 月 16 日下午 4 點**截止的 45 天公眾評審期內的期間收取書面意見。請將您的意見寄送至以下通信地址或發送至以下電子郵箱。並請在提交意見時隨附您所屬的機構、各方的回郵地址或電郵地址以及聯絡人資訊。

爾灣農場水務局
水資源及政策部門
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, California 92619-7000
Attn: Jo Ann Corey, Environmental Compliance Specialist
SyphonEIR@irwd.com
電話：949-453-5300

اعلان آمادەسازی یک گزارش تأثیر زیست‌محیطی
برای پروژه بهبود مخزن سیفون

این اعلان آمادەسازی (NOP) تهیه شده است تا به آژانس‌ها و شرکای ذی‌نفع اطلاع داده شود منطقه آب مزرعه ارواین (IRWD)، به عنوان آژانس اصلی، یک گزارش تأثیر زیست‌محیطی (EIR) پیرو قانون کیفیت زیست‌محیطی کالیفرنیا (CEQA) برای پروژه بهبود مخزن سیفون (پروژه پیشنهادی) آماده خواهد کرد. پروژه پیشنهادی در ناحیه خدمات‌رسانی IRWD در محل فعلی مخزن سیفون، که در حال حاضر یک مخزن نگهداری آب بازیافتی است، ساخته خواهد شد. مخزن سیفون در استان ثبت نشده آرنج در کالیفرنیا در سمت شمال شرقی پورتولا پارک‌وی بین جاده بی کانیون اکسس و جاده ایالتی 133 واقع شده است. بیشتر املاک احاطه شده توسط این شاهراه‌ها در تملک IRWD است. پروژه پیشنهادی، ظرفیت مخزن آب بازیافتی فعلی را افزایش خواهد داد تا پاسخگوی نیازهای آبی فصلی و آتی جامعه باشد. سد مهندسی‌شده فعلی، به عنوان بخشی از گسترش مخزن، با یک سد مهندسی‌شده جدید که از آخرین استانداردهای ایمنی برخوردار بوده و بالاتر از آن‌ها باشد، جایگزین خواهد شد. سد مهندسی‌شده جدید ظرفیت مخزن را از حدود 500 آکر بر فوت (AF) به 5000 آکر بر فوت افزایش خواهد داد.

IRWD از آژانس‌های مسئول و مورد اعتماد و همچنین شرکای ذی‌نفع درخواست کرده است که نظرات خود را درباره حدود و محتوای اطلاعات زیست‌محیطی که لازم است در EIR گنجانده شود اعلام کنند. در رابطه با CEQA، از آژانس‌ها درخواست شده است که شرح پروژه مندرج در NOP را بررسی کرده و نظرات خود را درباره مسائل مرتبط با مسئولیت‌های قانونی آن آژانس اعلام کنند. EIR هنگام بررسی موافقت با پروژه پیشنهادی و همچنین هرگونه موافقت مرتبط در صورت صلاحدید، توسط IRWD استفاده خواهد شد.

دوره بررسی عمومی 45 روزه برای NOP از **2 آگوست 2019** آغاز شده و در **16 سپتامبر 2019** پایان می‌پذیرد. رونوشت‌هایی از NOP در کتابخانه هریتج پارک واقع در 14361 Yale Ave, Irvine CA 92604 و همچنین به صورت آنلاین در وب‌سایت IRWD در دسترس هستند (http://www.irwd.com/doing-business/environmental-documents).

IRWD جهت دریافت نظرات و پیشنهادات درباره مسائلی که لازم است در EIR گنجانده شوند، در روز **21 آگوست 2019 ساعت 6:00 ب.ظ.** یک جلسه عمومی تعیین حدود در دفتر اصلی IRWD (15600 خیابان سند کانیون ارواین، کالیفرنیا 92618، اتاق چندمنظوره) برگزار می‌کند. جلسه تعیین حدود شامل یک ارائه کوتاه می‌شود که مروری کلی بر پروژه پیشنهادی خواهد داشت. پس از ارائه، نظرات عموم مردم به صورت شفاهی یا کتبی در جلسه تعیین حدود دریافت خواهد شد. فرم‌های نظرخواهی به کسانی که تمایل دارند نظرات خود را به صورت کتبی در جلسه اعلام کنند ارائه خواهد شد. به علاوه، IRWD همواره نظرات کتبی را در طول دوره بررسی 45 روزه تا پایان **آخرین مهلت، یعنی 4:00 ب.ظ. 16 سپتامبر 2019**، دریافت خواهد کرد. لطفاً نظرات خود را به نشانی پستی یا نشانی ایمیل درج شده در پایین ارسال کنید. به همراه نظرات خود، یک نشانی بازگشت یا نشانی ایمیل و یک نام مخاطب برای آژانس یا طرف دریافت‌کننده نظرات قید کنید.

منطقه آب مزرعه ارواین
دپارتمان منابع و سیاست‌گذاری آب
15600 خیابان سند کانیون
صندوق پستی 57000
اروان، کالیفرنیا 92619-7000
برسد به دست:جو آن کورنی، متخصص تطابق با قوانین زیست‌محیطی
SyphonEIR@irwd.com
تلفن: 949-453-5300

Thông Báo Về Việc Lập Báo Cáo Đánh Giá Tác Động Môi Trường
cho Dự Án Cải Thiện Hồ Chứa Nước Syphon

Thông Báo Về Việc Chuẩn Bị (NOP) này nhằm thông báo cho các cơ quan và các bên liên quan rằng Thủy Cục Irvine Ranch (IRWD), với vai trò là cơ quan đứng đầu, sẽ chuẩn bị một Báo Cáo Đánh Giá Tác Động Môi Trường (EIR) theo Đạo Luật về Chất Lượng Môi Trường California (CEQA) cho Dự Án Cải Thiện Hồ Chứa **Nước** Syphon (sau đây được gọi tắt là dự án đề xuất). Dự án đề xuất sẽ được xây dựng trong khu vực phục vụ của IRWD tại vị trí hiện tại của Hồ Chứa **Nước** Syphon, một hồ chứa nước tái chế. Hồ Chứa **Nước** Syphon nằm tại phần chưa thành lập chính thức của Quận Orange, California , ở phía đông bắc của Portola Parkway giữa Đường Bee Canyon và Xa lộ Tiểu bang 133, nơi phần lớn tài sản trong phạm vi các đường phố này thuộc sở hữu của IRWD. Dự án đề xuất sẽ giúp tăng công suất của hồ chứa nước tái chế hiện tại để phục vụ các nhu cầu nước theo mùa và trong tương lai của cộng đồng. Trong công việc mở rộng hồ chứa, đập nước hiện tại sẽ được thay thế bằng một đập nước mới đáp ứng và vượt các tiêu chuẩn an toàn mới nhất. Đập nước mới sẽ làm tăng công suất của hồ chứa từ 500 mẫu-feet (AF) lên 5.000 AF.

IRWD đang lấy ý kiến từ các cơ quan có trách nhiệm và ủy thác cũng như các bên liên quan về phạm vi và nội dung của các thông tin môi trường được đưa vào EIR. Theo CEQA, các cơ quan được yêu cầu xem xét mô tả dự án được nêu trong NOP và đưa ra ý kiến về các vấn đề môi trường liên quan đến trách nhiệm theo luật định của cơ quan. EIR sẽ được IRWD sử dụng khi xem xét phê duyệt dự án đề xuất cũng như mọi phê duyệt liên quan theo nhiệm ý của IRWD.

Thời hạn xem xét NOP công khai trong 45 ngày được bắt đầu từ ngày **02 tháng 8 năm 2019** và kết thúc vào ngày **16 tháng 9 năm 2019**. Các bản sao NOP hiện có sẵn tại Thư viện Heritage Park ở địa chỉ 14361 Yale Ave, Irvine CA 92604; và được đăng trực tuyến trên trang web của IRWD (http://www.irwd.com/doing-business/environmental-documents).

IRWD sẽ tổ chức một cuộc họp đánh giá công khai vào lúc **6 giờ chiều ngày 21 tháng 8 năm 2019** tạiTrụ sở Văn phòng IRWD (Phòng Đa năng, 15600 Sand Canyon Avenue Irvine, CA 92618) để tiếp nhận các ý kiến và gợi ý về các vấn đề được nêu trong EIR. Cuộc họp đánh giá sẽ có một bản trình bày ngắn với các thông tin tổng quan về dự án đề xuất. Sau khi trình bày, chúng tôi sẽ tiếp nhận các ý kiến của người dân trực tiếp hoặc bằng văn bản tại cuộc họp đánh giá. Những người muốn gửi ý kiến bằng văn bản tại cuộc họp sẽ được cung cấp các mẫu văn bản trình bày ý kiến. Các ý kiến bằng văn bản cũng sẽ được IRWD chấp nhận vào bất kỳ lúc nào trong thời hạn xem xét 45 ngày cho tới **4:00 chiều ngày 16 tháng 9 năm 2019.** Quý vị hãy gửi ý kiến của mình cho chúng tôi theo địa chỉ bưu tín hoặc email dưới đây. Hãy ghi địa chỉ nhận thư trả lời hoặc địa chỉ email và tên người liên lạc của cơ quan hoặc nhóm của quý vị hoặc cùng với ý kiến của mình.

Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, California 92619-7000
Attn: Jo Ann Corey, Environmental Compliance Specialist
SyphonEIR@irwd.com
Phone: 949-453-5300

Attachment 4: Letters to Local Community

Irvine Ranch
WATER DISTRICT

August 8, 2019

Mr. Rick Zarski
General Manager
Associa
27051 Towne Centre Drive, Suite 200
Foothill Ranch, CA 92610
via email rick.zarski@associa.us

Re: Stonegate Village Community Association

Dear Mr. Zarski,

We wanted the Stonegate Village Community Association Board of Directors to be among the first to know about our plans to increase the recycled water supply for the Irvine Ranch Water District service area. Recycled water is an important part of IRWD's water portfolio as it benefits all IRWD customers. In fact, we have successfully recycled water in this community for more than 50 years. It's a reliable, drought-proof source of non-drinking water that makes up about one-fourth of our water supply.

Recycled water is used to:

- Keep parks, medians, school athletic fields, public landscaping, and other open space areas green and beautiful;
- Provide additional water to fight wildfires throughout the region; and
- Supply commercial and industrial needs such as mixing concrete and cooling office buildings.

And because recycled water can be used for these purposes, more drinking water is available for all IRWD customers.

We are just now beginning the environmental review process for the long-planned Syphon Reservoir Improvement Project. This project will increase the recycled water storage capacity in the reservoir from 535 acre-feet to a proposed 5,000 acre-feet (1.6 billion gallons), allowing IRWD to use nearly 100% of the recycled water that we produce. You can follow our progress at syphonreservoirproject.com.

The first opportunity for the community to learn about the project and provide feedback is at an upcoming open house for what is known as the Notice of Preparation Scoping Meeting for the Environmental Impact Report (EIR). This is where you can let us know what you would like to be included in our analysis for the EIR.

Syphon Reservoir Improvement Project: Public Scoping Meeting Open House
Wednesday, August 21, 2019 at 6 p.m.
Irvine Ranch Water District in the Multi-Purpose Room
15600 Sand Canyon Avenue, Irvine, CA 92618

There will be additional opportunities to provide input on the project as well – when the draft EIR and final EIR are circulated for public comment and when the EIR is submitted to the IRWD Board for consideration of acceptance.

We would welcome the opportunity to make a presentation to the Stonegate Village Community Association Board, before the August 21 Public Scoping Meeting, so we can inform your directors about the project and answer any questions they may have.

To schedule a presentation for the Stonegate Village Community Association Board of Directors, please contact Beth Beeman, Public Affairs Director, at 949-453-5300 or info@irwd.com. We hope to hear from you.

Sincerely,

Paul Cook, P.E.
General Manager

Irvine Ranch
WATER DISTRICT

August 8, 2019

Ms. Jessica Roberson
Crummack Huseby Property Management
25531 Commercentre Drive, Suite 100
Lake Forest, CA 92630
via email jessica@ch-pm.com

Re: Stonegate East Community Association

Dear Ms. Roberson,

We wanted the Stonegate East Community Association Board of Directors to be among the first to know about our plans to increase the recycled water supply for the Irvine Ranch Water District service area. Recycled water is an important part of IRWD's water portfolio as it benefits all IRWD customers. In fact, we have successfully recycled water in this community for more than 50 years. It's a reliable, drought-proof source of non-drinking water that makes up about one-fourth of our water supply.

Recycled water is used to:

- Keep parks, medians, school athletic fields, public landscaping, and other open space areas green and beautiful;
- Provide additional water to fight wildfires throughout the region; and
- Supply commercial and industrial needs such as mixing concrete and cooling office buildings.

And because recycled water can be used for these purposes, more drinking water is available for all IRWD customers.

We are just now beginning the environmental review process for the long-planned Syphon Reservoir Improvement Project. This project will increase the recycled water storage capacity in the reservoir from 535 acre-feet to a proposed 5,000 acre-feet (1.6 billion gallons), allowing IRWD to use nearly 100% of the recycled water that we produce. You can follow our progress at syphonreservoirproject.com.

The first opportunity for the community to learn about the project and provide feedback is at an upcoming open house for what is known as the Notice of Preparation Scoping Meeting for the Environmental Impact Report (EIR). This is where you can let us know what you would like to be included in our analysis for the EIR.

Syphon Reservoir Improvement Project: Public Scoping Meeting Open House
Wednesday, August 21, 2019 at 6 p.m.
Irvine Ranch Water District in the Multi-Purpose Room
15600 Sand Canyon Avenue, Irvine, CA 92618

There will be additional opportunities to provide input on the project as well – when the draft EIR and final EIR are circulated for public comment and when the EIR is submitted to the IRWD Board for consideration of acceptance.

We would welcome the opportunity to make a presentation to the Stonegate East Community Association Board, before the August 21 Public Scoping Meeting, so we can inform your directors about the project and answer any questions they may have.

To schedule a presentation for the Stonegate East Community Association Board of Directors, please contact Beth Beeman, Public Affairs Director, at 949-453-5300 or info@irwd.com. We hope to hear from you.

Sincerely,

Paul Cook, P.E.
General Manager

Irvine Ranch
WATER DISTRICT

August 8, 2019

Ms. Susan Seifen
Property Manager
Keystone Pacific Property Management
108 Lamplighter
Irvine, CA 92620
via email sseifen@keystonepacific.com

Re: Woodbury Community Association

Dear Ms. Susan Seifen,

We wanted the Woodbury Community Association Community Association Board of Directors to be among the first to know about our plans to increase the recycled water supply for the Irvine Ranch Water District service area. Recycled water is an important part of IRWD's water portfolio as it benefits all IRWD customers. In fact, we have successfully recycled water in this community for more than 50 years. It's a reliable, drought-proof source of non-drinking water that makes up about one-fourth of our water supply.

Recycled water is used to:

- Keep parks, medians, school athletic fields, public landscaping, and other open space areas green and beautiful;
- Provide additional water to fight wildfires throughout the region; and
- Supply commercial and industrial needs such as mixing concrete and cooling office buildings.

And because recycled water can be used for these purposes, more drinking water is available for all IRWD customers.

We are just now beginning the environmental review process for the long-planned Syphon Reservoir Improvement Project. This project will increase the recycled water storage capacity in the reservoir from 535 acre-feet to a proposed 5,000 acre-feet (1.6 billion gallons), allowing IRWD to use nearly 100% of the recycled water that we produce. You can follow our progress at syphonreservoirproject.com.

The first opportunity for the community to learn about the project and provide feedback is at an upcoming open house for what is known as the Notice of Preparation Scoping Meeting for the Environmental Impact Report (EIR). This is where you can let us know what you would like to be included in our analysis for the EIR.

Syphon Reservoir Improvement Project: Public Scoping Meeting Open House
Wednesday, August 21, 2019 at 6 p.m.
Irvine Ranch Water District in the Multi-Purpose Room
15600 Sand Canyon Avenue, Irvine, CA 92618

There will be additional opportunities to provide input on the project as well – when the draft EIR and final EIR are circulated for public comment and when the EIR is submitted to the IRWD Board for consideration of acceptance.

We would welcome the opportunity to make a presentation to the Woodbury Community Association Board, before the August 21 Public Scoping Meeting, so we can inform your directors about the project and answer any questions they may have.

To schedule a presentation for the Woodbury Community Association Board of Directors, please contact Beth Beeman, Public Affairs Director, at 949-453-5300 or info@irwd.com. We hope to hear from you.

Sincerely,

Paul Cook, P.E.
General Manager

Irvine Ranch
WATER DISTRICT

August 8, 2019

Ms. Danielle Salinas
Property Manager
Keystone Pacific Property Management
16775 Von Karman Avenue, Suite #100
Irvine, CA 92606
via email dsalinas@keystonepacific.com

Re: Woodbury East Master Association

Dear Ms. Salinas,

We wanted the Woodbury East Master Association Board of Directors to be among the first to know about our plans to increase the recycled water supply for the Irvine Ranch Water District service area. Recycled water is an important part of IRWD's water portfolio as it benefits all IRWD customers. In fact, we have successfully recycled water in this community for more than 50 years. It's a reliable, drought-proof source of non-drinking water that makes up about one-fourth of our water supply.

Recycled water is used to:

- Keep parks, medians, school athletic fields, public landscaping, and other open space areas green and beautiful;
- Provide additional water to fight wildfires throughout the region; and
- Supply commercial and industrial needs such as mixing concrete and cooling office buildings.

And because recycled water can be used for these purposes, more drinking water is available for all IRWD customers.

We are just now beginning the environmental review process for the long-planned Syphon Reservoir Improvement Project. This project will increase the recycled water storage capacity in the reservoir from 535 acre-feet to a proposed 5,000 acre-feet (1.6 billion gallons), allowing IRWD to use nearly 100% of the recycled water that we produce. You can follow our progress at syphonreservoirproject.com.

The first opportunity for the community to learn about the project and provide feedback is at an upcoming open house for what is known as the Notice of Preparation Scoping Meeting for the Environmental Impact Report (EIR). This is where you can let us know what you would like to be included in our analysis for the EIR.

Syphon Reservoir Improvement Project: Public Scoping Meeting Open House
Wednesday, August 21, 2019 at 6 p.m.
Irvine Ranch Water District in the Multi-Purpose Room
15600 Sand Canyon Avenue, Irvine, CA 92618

There will be additional opportunities to provide input on the project as well – when the draft EIR and final EIR are circulated for public comment and when the EIR is submitted to the IRWD Board for consideration of acceptance.

We would welcome the opportunity to make a presentation to the Woodbury East Master Association Board, before the August 21 Public Scoping Meeting, so we can inform your directors about the project and answer any questions they may have.

To schedule a presentation for the Woodbury East Master Association Board of Directors, please contact Beth Beeman, Public Affairs Director, at 949-453-5300 or info@irwd.com. We hope to hear from you.

Sincerely,

Paul Cook, P.E.
General Manager

Irvine Ranch
WATER DISTRICT

August 8, 2019

Dear Neighbor,

We wanted you to be among the first to know about our plans to increase the recycled water supply for the Irvine Ranch Water District service area. Recycled water is an important part of IRWD's water portfolio as it benefits all IRWD customers. In fact, we have successfully recycled water in this community for more than 50 years. It's a reliable, drought-proof source of non-drinking water that makes up about one-fourth of our water supply.

Recycled water is used to:

- Keep parks, medians, school athletic fields, public landscaping, and other open space areas green and beautiful;
- Provide additional water to fight wildfires throughout the region; and
- Supply commercial and industrial needs such as mixing concrete and cooling office buildings.

And because recycled water can be used for these purposes, more drinking water is available for all IRWD customers.

We are just now beginning the environmental review process for the long-planned Syphon Reservoir Improvement Project. This project will increase the recycled water storage capacity in the reservoir from 535 acre-feet to a proposed 5,000 acre-feet (1.6 billion gallons), allowing IRWD to use nearly 100% of the recycled water that we produce.

The first opportunity for you to learn about the project and provide feedback is at an upcoming open house for what is known as the Notice of Preparation Scoping Meeting for the Environmental Impact Report (EIR). This is where you can let us know what you would like to be included in our analysis for the EIR.

Syphon Reservoir Improvement Project: Public Scoping Meeting Open House
Wednesday, August 21, 2019 at 6 p.m.
Irvine Ranch Water District in the Multi-Purpose Room
15600 Sand Canyon Avenue, Irvine, CA 92618

There will be additional opportunities to provide input on the project as well – when the draft EIR and final EIR are circulated for public comment and when the EIR is submitted to the IRWD Board for consideration of acceptance.

Irvine Ranch Water District has one of the most technologically advanced and safe recycled water systems in the nation. If you would like to learn more or to view a video about our recycled water system, visit **www.irwd.com/services/recycled-water**.

We are committed to a safe, high-quality project that ensures enough recycled water to meet the needs of our customers. You can also follow our progress at **www.syphonreservoirproject.com** and sign up for notifications. If you have any questions, please email us at info@irwd.com or call us at 949-453-5500.

Sincerely,

Paul Cook, P.E.
General Manager

瞭解更多資訊 | 자세한 정보를 | Para obtener más información | Để biết thêm thông tin | جهت کسب اطلاعات بیشتر به زبان فارسی
www.syphonreservoirproject.com

Attachment 5: Scoping Meeting Presentation

SYPHON RESERVOIR IMPROVEMENT PROJECT

CEQA PUBLIC SCOPING MEETING

August 21, 2019

PRESENTATION OVERVIEW

- Purpose of Meeting
- California Environmental Quality Act (CEQA) Overview
- Irvine Ranch Water District (IRWD) Overview
- Project Description
- CEQA Process and Schedule
- Public Comments

PURPOSE OF MEETING

- Initiate the CEQA Process
  - The Notice of Preparation published on August 2, 2019, initiated the environmental review process for the environmental impact report (EIR).
  - 45-day public review and comment period.
- Public Scoping
  - Scoping is early public consultation.
  - Scoping is used to identify potential issues to address in the EIR.
- Describe the Project
  - Increase the capacity of the existing Syphon Reservoir.
  - Increase recycled water storage from approximately 500 to 5,000 acre-feet, to serve the community's seasonal and future water needs.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

ESA

Irvine Ranch
WATER DISTRICT

Disclosure

Identifies potentially significant impacts to the environment

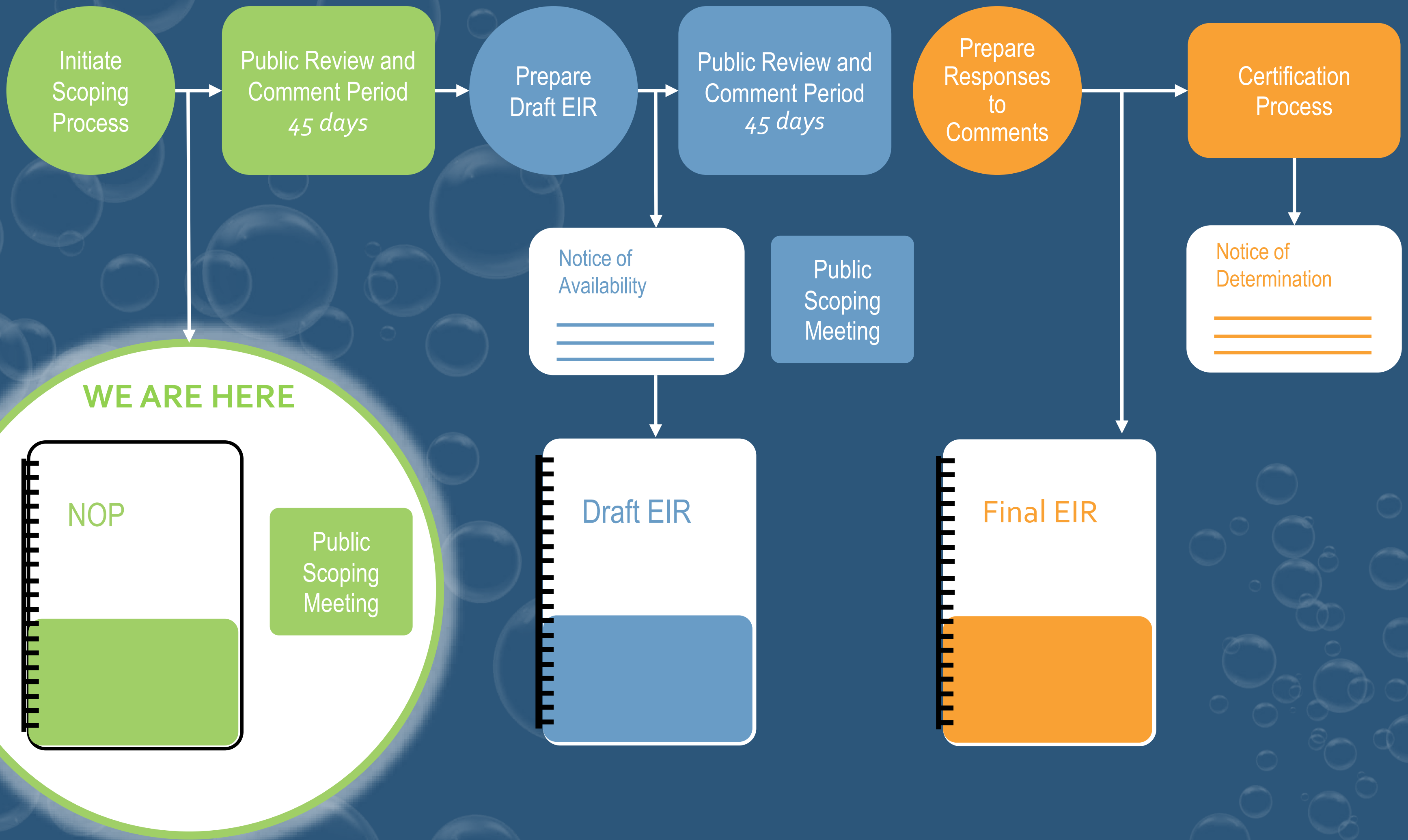
Decision-Making Tool

Requires public agencies to consider impacts prior to project approval

Reduce Impacts

Identifies feasible mitigation measures and alternatives

CEQA PROCESS FOR THE SYPHON RESERVOIR EIR



IRVINE RANCH WATER DISTRICT OVERVIEW

- Current Water Supply Sources
- 21% = treated groundwater
- 29% = clear groundwater
- 6% = local surface water
- 18% = imported surface water
- 26% = recycled water

- Recycled Water Production
- Michelson Water Recycling Plant
- Los Alisos Water Recycling Plant

- Recycled Water Storage
    - Storage is used when supply exceeds demand in winter months.
    - When storage is full, recycled water is discharged to the ocean.

IRWD RECYCLED WATER RESERVOIRS IN THE COMMUNITY

RATTLESNAKE RESERVOIR

Built 1959

1,480 AF capacity

SAN JOAQUIN RESERVOIR

Built 1966

3,036 AF capacity

SAND CANYON RESERVOIR

Built 1912

960 AF capacity

SYPHON RESERVOIR

Built 1949

578 AF capacity

5,000 AF (proposed)

ESA

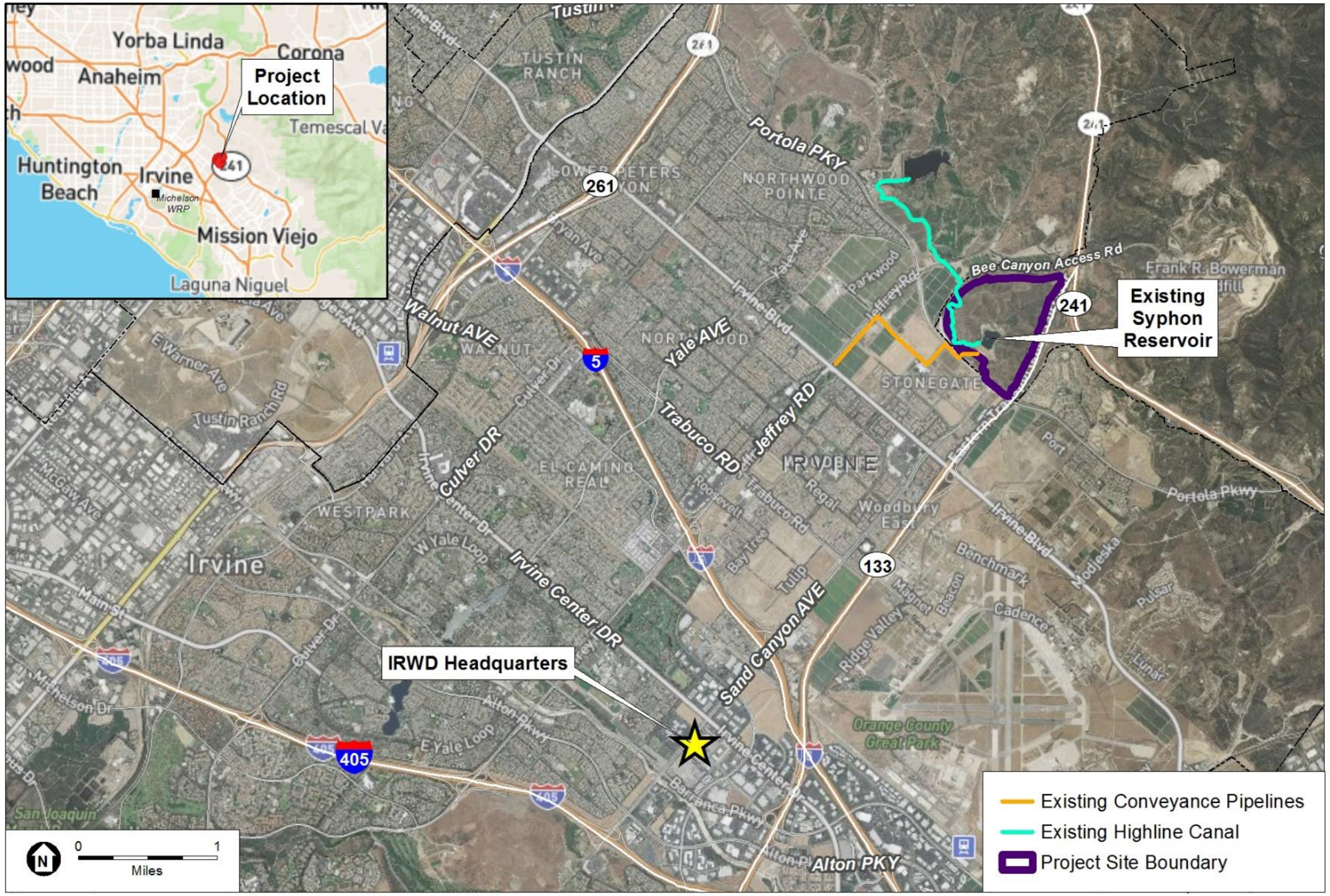
Irvine Ranch WATER DISTRICT

EXISTING SYPHON RESERVOIR

Existing capacity = approx. 500 acre-feet.

Water levels fluctuate seasonally to balance recycled water supply and demand.

PROJECT LOCATION MAP



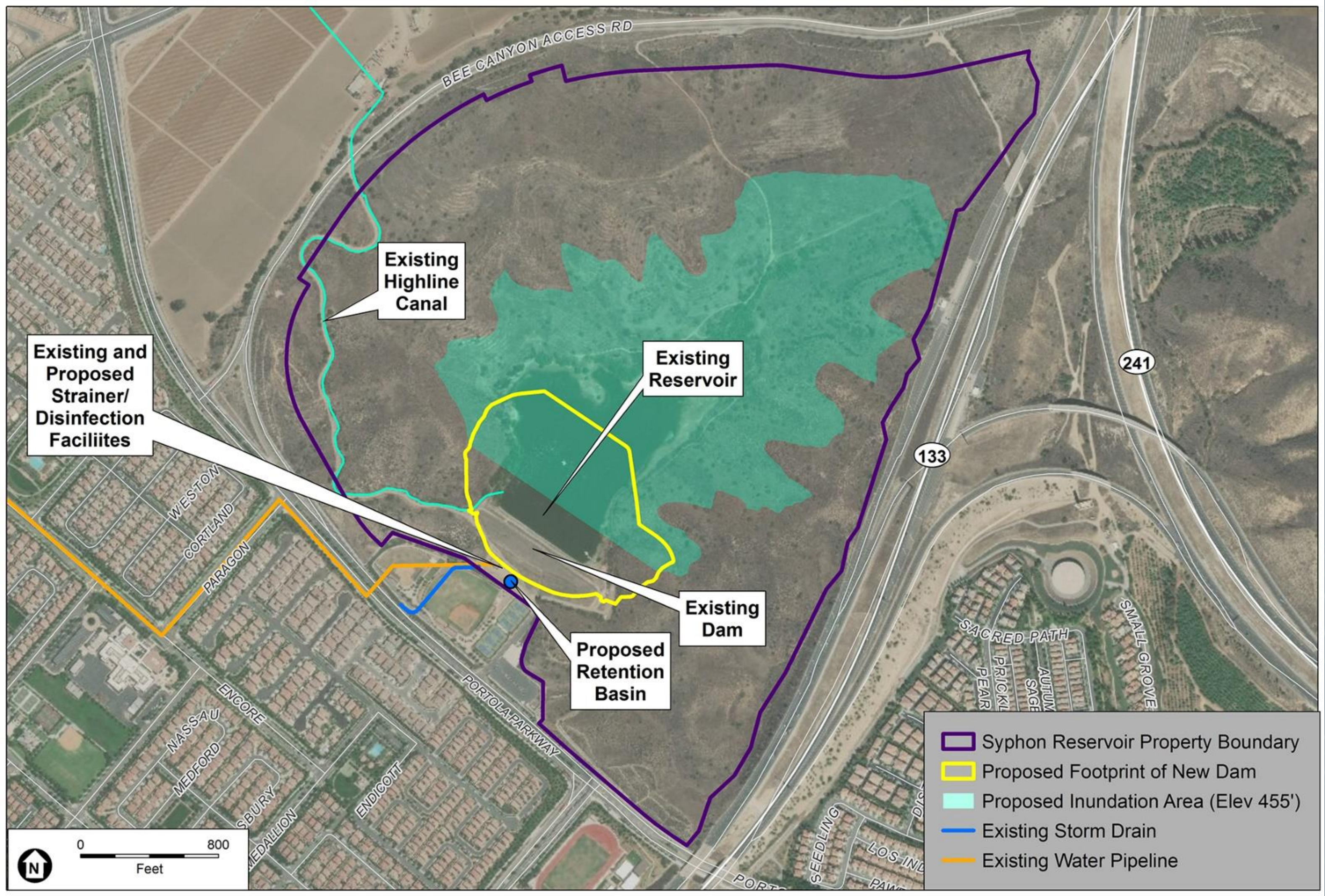
PROJECT OBJECTIVES

- **Improve local water supply reliability**
  - Store and use additional recycled water
  - Reduce purchases of more expensive, less-reliable imported water and make the community more self-sufficient.
- **Use 100% of recycled water produced by IRWD**
  - Reduce discharges of recycled water to the ocean.
  - Prepare for the future by storing more drought-proof water.
  - Keep parks, medians, athletic fields, public landscaping and golf courses green and beautiful.
- **Meet or exceed the latest safety standards**
  - Facilities are regulated by California Department of Water Resources, Division of Safety of Dams.

ESA

Irvine Ranch WATER DISTRICT

PROJECT SITE & PROPOSED PROJECT



DAM REPLACEMENT

- Replacement of the existing 59-foot-high engineered dam with a new 136-foot-high engineered dam with a 20-foot-wide crest.
- The new dam would be constructed primarily from on-site impermeable materials, although the importation of some specialty materials is anticipated.
- New dam would meet or exceed the latest safety standards.
- Project design will be peer reviewed through a rigorous process overseen by a technical advisory panel of respected reservoir experts.

ESA
Irvine Ranch WATER DISTRICT

RESERVOIR ENLARGEMENT

- The replacement dam would result in an increase in the reservoir's maximum water surface elevation from 376 feet to 456 feet above mean sea level and increase the reservoir's capacity from approximately 500 acre-feet (AF) to 5,000 AF.
- Expand the reservoir's shoreline and water surface area up to approximately 82 acres upstream of the dam.

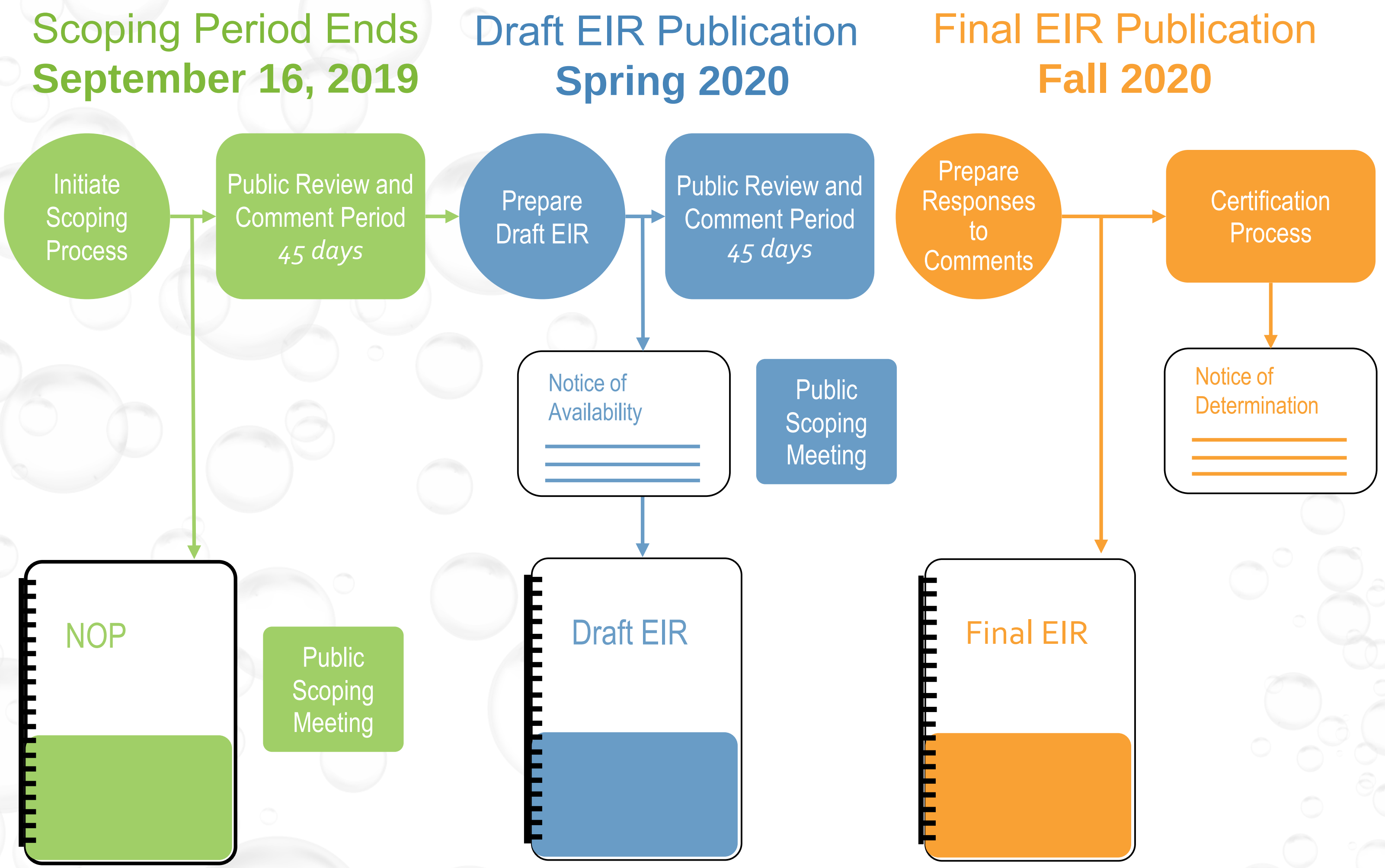
ESA

Irvine Ranch
WATER DISTRICT

TOPICS TO BE ANALYZED IN THE EIR

- Environmental resources required by CEQA
  - Aesthetics
  - Agriculture & Forestry Resources
  - Air Quality
  - Biological Resources
  - Cultural Resources
  - Energy
  - Geology & Soils
  - Greenhouse Gas Emissions
  - Hazards & Hazardous Materials
  - Hydrology & Water Quality
  - Land Use & Planning
  - Mineral Resources
  - Noise
  - Population & Housing
  - Public Services
  - Recreation
  - Traffic & Transportation
  - Tribal Cultural Resources
  - Utilities & Service Systems
  - Wildfire
- Growth Inducement
- Alternatives

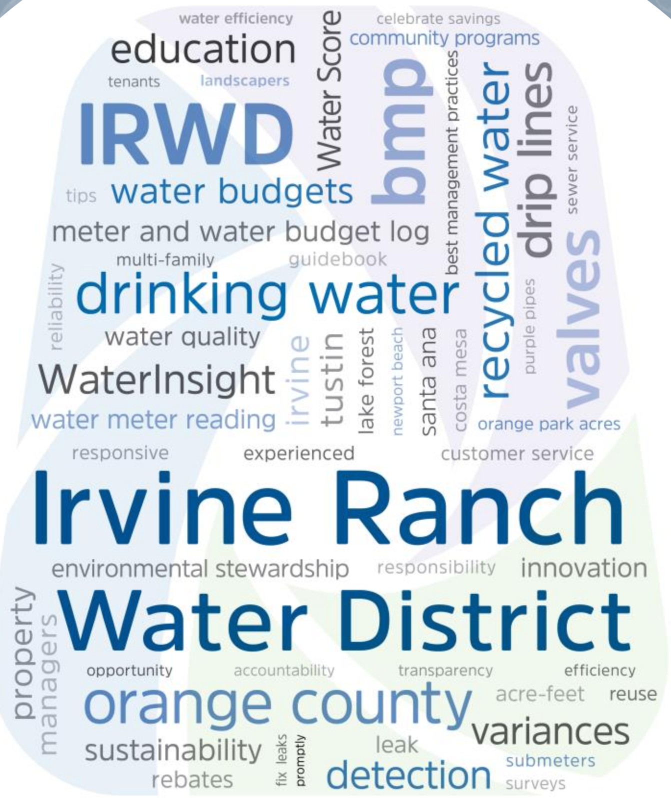
CEQA SCHEDULE – NEXT STEPS



PUBLIC SCOPING COMMENTS

- NOP Availability
  - Heritage Park Library, 14361 Yale Ave, Irvine CA 92604
  - Online at the IRWD Web Site
    - **www.irwd.com/doing-business/environmental-documents**
- Comment period ends **September 16, 2019**
- Submit comments tonight or e-mail/mail comments to:

  Irvine Ranch Water District
  Attn: Jo Ann Corey, Environmental Compliance Specialist
  P.O. Box 57000
  Irvine, California 92619-7000
  SyphonEIR@irwd.com
- Project information & updates:
  www.syphonreservoirproject.com



PUBLIC COMMENTS

Attachment 6: Scoping Meeting Sign-in Sheets

Sign-in Sheet

Irvine Ranch Water District Office
15600 Sand Canyon Avenue
Irvine, CA 92618
Wednesday, August 21, 2019 | 6:00pm

Irvine Ranch Water District
Syphon Reservoir Improvement Project

The signing, registering, or completion of this document is voluntary. All persons may attend this meeting regardless of whether they sign, register, or complete this document.

Name: Jeffrey Beavers, CEO
Affiliation/Organization: Crean Lutheran High School
Address: 12500 Sand Canyon
Email: beavers@creanlutheran.org
Do you want future notices regarding this project? ☒ yes ☐ no

Name: Robin Leftwich
Affiliation/Organization:
Address: 12441 Eveningside Dr. Tustin CA
Email: rleftwich1@mac.com
Do you want future notices regarding this project? ☐ yes ☐ no

Name: JOSEPH L JOSEPH
Affiliation/Organization: HEARTLAND
Address: 1291 E. DYER RD S.A
JOSEPH.JOSEPH@HEARTLAND.COM.
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Name: Michele Jacknik
Affiliation/Organization:
Address: 46 Diamond Irvine CA 92620
Email:
Do you want future notices regarding this project? ☒ yes ☐ no

Name: Cindy Zhu
Affiliation/Organization: Realtor
Address: 115 Yellow Pine, Irvine
Email: jianhzhu@gmail.com
Do you want future notices regarding this project? ☐ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

1

Sign-in Sheet

Irvine Ranch Water District Office
15600 Sand Canyon Avenue
Irvine, CA 92618
Wednesday, August 21, 2019 | 6:00pm

Irvine Ranch Water District

Syphon Reservoir Improvement Project

The signing, registering, or completion of this document is voluntary. All persons may attend this meeting regardless of whether they sign, register, or complete this document.

Name: Tim Cheng
Affiliation/Organization: AASCSC
Address:
Email: Tim.Cheng@aascsc.org
Do you want future notices regarding this project? ☐ yes ☐ no

Name: Vivian Qian
Affiliation/Organization:
Address:
Email: xy.qian@gmail.com
Do you want future notices regarding this project? ☑ yes ☐ no

Name: Bruce Aird
Affiliation/Organization: Sea and Sage Audubon
Address:
Email: bruceaird@gmail.com
Do you want future notices regarding this project? ☒ yes ☐ no

Name: Christine Tischer
Affiliation/Organization:
Address:
Email: clmukai13@gmail.com
Do you want future notices regarding this project? ☐ yes ☐ no

Name: MOHAMMED ISLAM
Affiliation/Organization:
Address:
Email: MISLAM100@Hotmail.com
Do you want future notices regarding this project? ☐ yes ☐ no

Name: Stephanie Tsung
Affiliation/Organization:
Address:
Email: ikshan@gmail.com
Do you want future notices regarding this project? ☑ yes ☐ no

Name: Alice Liu
Affiliation/Organization:
Address:
Email: liuyansh99@gmail.com
Do you want future notices regarding this project? ☑ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Sign-in Sheet

Irvine Ranch Water District Office
15600 Sand Canyon Avenue
Irvine, CA 92618
Wednesday, August 21, 2019 | 6:00pm

Irvine Ranch Water District
Syphon Reservoir Improvement Project

The signing, registering, or completion of this document is voluntary. All persons may attend this meeting regardless of whether they sign, register, or complete this document.

Name: Darrell Wilson
Affiliation/Organization:
Address: 48 Foxhill
714-401-7852
Email: darrellwilson@cox.net
Do you want future notices regarding this project? ☐ yes ☐ no

Name: ALICE LEI
Affiliation/Organization: AWE
Address: 9070 Irvine Center Dr
Irvine
Email: nctech@verizon.net
Do you want future notices regarding this project? ☐ yes ☐ no

Name: IRIS McCAMMON
Affiliation/Organization:
Address: 106 Ridge Valley
Email: imccammon@yahoo.com
Do you want future notices regarding this project? ☑ yes ☐ no

Name: NATE KRETZMANN
Affiliation/Organization: CREAN LUTHERAN HS
Address: 12500 SAND CANYON
IRVINE
Email: kretzmann@creanlutheran.org
Do you want future notices regarding this project? ☒ yes ☐ no

Name: GREGG LaGIVINNA
Affiliation/Organization: Home owner
Address: 79 ~~@~~ woodhill
IRVINE CA 92620
Email: GreggL@me.com
Do you want future notices regarding this project? ☑ yes ☐ no

Name: Richard Zeng
Affiliation/Organization: Home Owner
Address: 66 Dublin
Irvine, CA 92620
Email:
Do you want future notices regarding this project? ☑ yes ☐ no

Name: JERRY CHANG
Affiliation/Organization: IZCSA
Address: ~~29 CHANDLER PL~~ 567 SAN LEON
~~RANCHO SANTA MAR~~ IRVINE CA 92606
Email: Jerrychang2@cox.NET
Do you want future notices regarding this project? ☐ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Sign-in Sheet

Irvine Ranch Water District Office
15600 Sand Canyon Avenue
Irvine, CA 92618
Wednesday, August 21, 2019 | 6:00pm

Irvine Ranch Water District
Syphon Reservoir Improvement Project

The signing, registering, or completion of this document is voluntary. All persons may attend this meeting regardless of whether they sign, register, or complete this document.

Name: Mary Anne Foo
Affiliation/Organization: OCAPICA
Address: ~~37~~ 12912 Brookhurst St Ste 410
Garden Grove CA 92840
Email: Mafoo@ocapica.org
Do you want future notices regarding this project? ☒ yes ☐ no

Name: Jennifer S Wang
Affiliation/Organization: AASCSC
Address:
Email: Jennifer.s.wang@aascsc.org
Do you want future notices regarding this project? ☐ yes ☐ no

Name: VALARIE MCFALL
Affiliation/Organization: TCA
Address: 125 Pacifica
Irvine 92618
Email: VMCFALL@thetollroads.com
Do you want future notices regarding this project? ☑ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Name:
Affiliation/Organization:
Address:
Email:
Do you want future notices regarding this project? ☐ yes ☐ no

Attachment 7: Comment Letters Received by IRWD

Jo Ann Corey - Notice of Preparation of an Environmental Impact Report Project Syphon Reservoir Improvement Project

From: "Rivers, Tamy" <TamyRivers@ocfa.org>
To: "SyphonEIR@irwd.com" <SyphonEIR@irwd.com>
Date: 8/8/2019 3:14 PM
Subject: Notice of Preparation of an Environmental Impact Report Project Syphon Reservoir Improvement Project

Thank you for the opportunity to review the subject document. OCFA has no comments.

Have a great day!

Tamera Rivers
Management Analyst
Orange County Fire Authority
Office: 714-573-6199
tamyrivers@ocfa.org

We visualize problems and solutions through the eyes of those we serve.

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691 Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

WATER RESOURCES

AUG 15 2019

IRVINE RANCH
WATER DISTRICT

August 9, 2019

Jo Ann Corey
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

RE: SCH# 2019080009, Syphon Reservoir Improvement Project, Orange County

Dear Ms. Corey:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP) for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
    a. A brief description of the project.
    b. The lead agency contact information.
    c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
    d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).
    a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
    a. Alternatives to the project.
    b. Recommended mitigation measures.
    c. Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
    a. Type of environmental review necessary.
    b. Significance of the tribal cultural resources.
    c. Significance of the project's impacts on tribal cultural resources.
    d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
    a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
    b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
   a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
   b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
       i. Planning and construction to avoid the resources and protect the cultural and natural context.
       ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
       i. Protecting the cultural character and integrity of the resource.
       ii. Protecting the traditional use of the resource.
       iii. Protecting the confidentiality of the resource.
    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Staff Service Analyst

cc: State Clearinghouse

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

WATER RESOURCES

AUG 15 2019

IRVINE RANCH
WATER DISTRICT

AUG 12 2019

Ms. Jo Ann Corey, Environmental Compliance
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

Environmental Document Transmittal for the Syphon Reservoir Improvement Project
SCH2019080009
Orange County

Dear Ms. Corey:

The Division of Safety of Dams (DSOD) has reviewed the Notice of Preparation for the Syphon Reservoir Improvement Project Environmental Impact Report which describes a proposed enlargement of the existing reservoir by replacing the existing dam with a new approximately 150-foot tall dam. The project will increase the recycled water storage capacity from 500 acre-feet to 5,000 acre-feet on the subject parcels.

As defined in Sections 6002 and 6003, Division 3, of the California Water Code, dams 25 feet or higher with a storage capacity of more than 15 acre-feet, and dams higher than 6 feet with a storage capacity of 50 acre-feet or more are subject to State jurisdiction. The dam height is the vertical distance measured from the maximum possible water storage level to the downstream toe of the barrier.

The proposed construction of the new dam is subject to State jurisdiction, and a construction application, together with plans, specifications, and the appropriate filing fee must be filed with DSOD for this project. All dam safety related issues must be resolved prior to approval of the application, and the work must be performed under the direction of a Civil Engineer registered in California. Erik Malvick, our Design Engineering Branch Chief, is responsible for the application process and can be reached at (916) 565-7840.

If you have any questions or need additional information, you may contact Field Engineer Ashley Moran at (909) 214-1503, or me at (916) 565-7827.

Sincerely,

Rick G. Draeger, Regional Engineer
Southern Region
Field Engineering Branch
Division of Safety of Dams

cc: Governor's Office of Planning and Research
State Clearinghouse
state.clearinghouse@water.ca.gov

From: Jo Ann Corey
Sent: Thursday, August 29, 2019 9:46 AM
To: Jeffrey Beavers
Subject: Re: Public Scoping Comments

Jeff...

Thank you for submitting these comments. I will share these with both the IRWD team as well as IRWD's environmental consultant, ESA who is preparing the project's environmental impact report.

Regards,

Irvine Ranch WATER DISTRICT

Jo Ann Corey, MPA

Environmental Compliance Specialist

Water Resources & Policy Department

Irvine Ranch Water District

15600 Sand Canyon Avenue

Irvine, CA 92619-7000

(949) 453-5326 - Direct

corey@irwd.com

>>> "Beavers, Jeffrey" <beavers@creanlutheran.org> 8/29/2019 8:19 AM >>>
Public Scoping Comments from Wednesday August 21, 2019 at 6pm meeting:

Comments from Jeffrey Beavers, CEO, Crean Lutheran High School. A not-for-profit high recognized service organization (RSO) private parochial high school located at 12500 Sand Canyon Avenue, which both shares a land border (athletic complex, and student parking lot), and is located adjacent to the Syphon Reservoir Proposed Expansion Project.

1. Top concerns are that of safety for both the athletic complex and the high school
2. Daily school operations and student safety and impact during exploration and construction, should the project move forward

    1. Including access to athletic complex, and parking
    2. Including path of travel for students on sidewalk at Sand Canyon and Portola intersection
    3. If IRWD adds additional public recreation features to this project, how might that impact our operations? And could there be an opportunity to add additional shared use parking?

3. On a positive note, we believe the project will make the 1070's dam structurally safer and are excited about that

1. With more water capacity we will want to closely monitor groundwater at the Athletic Complex
2. IRWD added a french drain on the North side of our property that we believe has helped with groundwater, we hope that with additional acreage of water it continues to keep ground water at a minimum

4. With additional acreage of water we hope consumers like us, with a split system domestic/recycled, may benefit from the possibilities of price reduction?
5. We appreciate the opportunity and communications from IRWD to know and discuss updates on this matter, including being able to help in updating the Emergency Evacuation Plan for the reservoir.

Please let me know if there are any questions about these comments. They shouldn't be a surprise, as we've had a pre meeting discussing each of these in more detail, thank you.

His peace,

Jeffrey S. Beavers, M.A., LMFT
Executive Director | Chief Executive Officer

CREAN LUTHERAN
HIGH SCHOOL

Proclaiming Jesus Christ through Excellence in Education!

CLHS 2019-20 Theme Verse:

Jesus said, "I am the way, and the truth, and the life. No one comes to the Father except through me." John 14:6

Crean Lutheran High School | 12500 Sand Canyon Avenue | Irvine, CA 92618

Office phone: 949.387.1199 (x2412) | 949.387.1200 fax

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
(858) 467-4201
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

August 30, 2019

Ms. Jo Ann Corey
Irvine Ranch Water District
Water Resources and Policy Department
15600 Sand Canyon Avenue
Irvine, CA 92618

Subject: Comments on the Notice of Preparation of a Draft Environmental Impact Report for the Syphon Reservoir Improvement Project (SCH # 2019080009)

Dear Ms. Corey:

The Department of Fish and Wildlife (Department) has reviewed the above-referenced Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the Syphon Reservoir Improvement Project, located in the unincorporated County of Orange, California. The following statements and comments have been prepared pursuant to the Department's authority as Trustee Agency with jurisdiction over natural resources affected by the project (California Environmental Quality Act [CEQA] Guidelines § 15386) and pursuant to our authority as a Responsible Agency under CEQA Guidelines section 15381 over those aspects of the proposed project that come under the purview of the California Endangered Species Act (Fish and Game Code § 2050 et seq.) and Fish and Game Code section 1600 et seq. The Department also administers the Natural Community Conservation Planning (NCCP) program. The Irvine Ranch Water District (IRWD) participates in the NCCP program through its role as a Participating Landowner under the County of Orange Central and Coastal Subregion NCCP/HCP (NCCP/HCP).

The proposed project would be built within the IRWD service area at the site of the existing Syphon Reservoir, located on the northeast side of Portola Parkway between Bee Canyon Access Road and State Route 133. The project would expand the reservoir's recycled water storage capacity from its current 500 acre-feet capacity to approximately 5,000 acre-feet by replacing the current 59-foot-high earthen engineered dam with a 136-foot-high dam of similar construction. The resulting increased recycled water storage capacity is expected to allow IRWD to meet the projected seasonal recycled water demands within its service area and decrease its dependence on imported water. Approximately 82 acres of upland and wetland vegetation communities would be inundated by the reservoir's expanded footprint. A large portion (precise acreage still to be determined) of the expansion area is located within the habitat Reserve System (Reserve) established by the NCCP/HCP and/or protected by use restrictions in the January 4, 2010, Grant Deed that originally conveyed the property to IRWD (IRWD Doc. D0204).

In advance of the proposed project, IRWD will conduct a geotechnical investigation to characterize the geologic and geotechnical baseline conditions of the site. The Department and the U.S. Fish and Wildlife Service (collectively the Wildlife Agencies) submitted comments on the Mitigated Negative Declaration that was completed for the geotechnical investigations project, and IRWD worked closely with the Wildlife Agencies to address concerns regarding impacts to biological resources protected by the Grant Deed and the Reserve. We anticipate similar close coordination among our agencies during the evaluation and review of this current project.

In order to assist IRWD in avoiding and minimizing potential project impacts on biological resources and maintaining consistency with the NCCP/HCP, the Department offers the following comments and recommendations based on its review of the NOP, its past project discussions with IRWD, and its knowledge of the habitat and resources present on site.

1. Recent surveys conducted between April 10 and July 8, 2019, documented that the habitat within and surrounding the proposed project area was occupied by up to 16 individual least Bell's vireo (*Vireo bellii pusillus*), a state and federally endangered species. In addition, the federally threatened coastal California gnatcatcher (*Polioptila californica californica*; gnatcatcher) has been historically documented breeding on site and were detected during the 2019 surveys, as were two California Species of Special Concern, the yellow breasted chat (*Icteria virens*) and the yellow warbler (*Setophaga petechia*). IRWD has initiated early discussions with the Wildlife Agencies to begin the process of identifying appropriate mitigation for potential impacts to sensitive species and their habitats that would ensure the proposed project is consistent with the NCCP/HCP and accounts for any past restoration and protection commitments associated with the Grant Deed. It is anticipated that discussions between our agencies will continue in advance of the finalization of the DEIR and that the final mitigation plan may involve (but is not limited to) some combination of off-site conservation and/or restoration of habitat as well as the utilization of take credits established through the NCCP/HCP. We look forward to these continued discussions and working with IRWD to develop an agreeable mitigation plan that is consistent with the requirements of the NCCP/HCP and minimizes impacts to sensitive biological resources within the project area. We recommend having a draft mitigation plan in place prior to the release of the DEIR to allow for public input during the review process. The Department is available to assist in facilitating any necessary meetings to achieve this outcome.

2. The NOP indicates the DEIR will evaluate the potential for compatible recreational opportunities to be implemented as a component of the proposed project. During past coordination meetings, the Department has agreed it is appropriate to evaluate potential recreational opportunities within the project site provided that they are consistent with the NCCP/HCP and the allowable uses in the Reserve. We recommend that any review of potential recreational

opportunities examine the impact the proposed uses could have on sensitive species and important biological resources on site, including gnatcatcher and least Bell's vireo, as well as evaluate the compatibility of recreation with the use restrictions in the Grant Deed. The restrictions currently stipulate that the land conveyed by the Grant Deed shall be used for (i) the protection of threatened and endangered species, (ii) preservation, restoration, and enhancement of the habitat for these species, and (iii) open space preservation and other related environmental purposes compatible with the uses described in (i) and (ii), and for no other purpose whatsoever beyond the specified use exceptions. These exceptions allow for the installation and maintenance of infrastructure, continuation of existing operations and maintenance activities, and the potential for reservoir improvements described by the NOP with appropriate approvals.

While not expressly prohibited, recreational use is not currently described as acceptable use of the Grant Deed property. Given the sensitive nature of the biological resources present and the conservation-based objectives of the overlying Grant Deed, the Department recommends limiting consideration of recreational opportunities to passive uses such as hiking and nature viewing (NCCP/HCP Section 5.3, pp. II-294). If, following thorough evaluation of the potential impacts to sensitive biological resources, it is determined that limited passive recreational use could be compatible and would not interfere with the conservation purposes of the property, it is the Department's understanding that an amendment to the Grant Deed language would be required to establish the recreation activity as an excepted and allowable use. This would require consent of the Foothill/Eastern Transportation Corridor Agency and the U.S. Fish and Wildlife Service in accordance with Section 7.2 of the Grant Deed. Any impacts incurred from trail creation or other impacts associated with recreational activity would also require appropriate mitigation and would need to account for the past restoration efforts and adequately replace any lost habitat that is protected by the Grant Deed.

3. The Department has responsibility for wetland and riparian habitats. It is the policy of the Department to strongly discourage development in wetlands or conversion of wetlands to uplands. We oppose any development or conversion that would result in a reduction of wetland acreage or wetland habitat values, unless, at a minimum, project mitigation assures there will be "no net loss" of either wetland habitat values or acreage. Mitigation measures to compensate for impacts to riparian habitat should be included in the DEIR to compensate for the loss of function and value of the impacted habitat.

    a. The Department also has regulatory authority over activities in streams and/or lakes that will divert or obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of any river, stream, or lake or use material from a river, stream, or lake. For any such activities, the project applicant (or "entity") must provide written notification to the Department pursuant to section 1600 et seq. of the Fish and Game Code. Based on this notification and other information, the Department determines whether a Lake and Streambed Alteration Agreement (LSAA) with the applicant is required prior to conducting the proposed activities. The Department's issuance of a LSAA for a project that is subject to CEQA will require CEQA compliance actions by the Department as a Responsible Agency. The Department as a Responsible Agency under CEQA may consider the Lead Agency's Environmental Impact Report for the project. To minimize additional requirements by the Department pursuant to section 1600 et seq. and/or under CEQA, the document should fully identify the potential impacts to riparian resources and provide adequate avoidance, mitigation, monitoring, and reporting commitments for issuance of the LSAA. The Department recommends including this information as a component of the overall mitigation plan to be developed for this project (see Comment 1 above).

The Department appreciates the opportunity to comment on the NOP and IRWD's ongoing communication during this process. We look forward to our continued relationship and the development of an agreeable mitigation plan that appropriately addresses project impacts and ensures project consistency with the NCCP/HCP. If you have any questions or comments regarding this letter, please contact Kyle Rice at (858) 467-4250, or kyle.rice@wildlife.ca.gov.

Sincerely,

Gail K. Sevrens
Environmental Program Manager
South Coast Region

ec: State Clearinghouse
Jonathan Snyder, U.S. Fish and Wildlife Service

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 · www.aqmd.gov

SENT VIA USPS AND E-MAIL: September 10, 2019
SyphonEIR@irwd.com
Jo Ann Corey, Environmental Compliance Specialist
Irvine Ranch Water District, Water Resources & Policy Department
15600 San Canyon Avenue
P.O. Box 57000
Irvine, CA 92619

Notice of Preparation of an Environmental Impact Report for the Proposed Syphon Reservoir Improvement Project

South Coast Air Quality Management District (South Coast AQMD) staff appreciates the opportunity to comment on the above-mentioned document. South Coast AQMD staff's comments are recommendations regarding the analysis of potential air quality impacts from the Proposed Project that should be included in the Environmental Impact Report (EIR). Please send South Coast AQMD a copy of the EIR upon its completion. Note that copies of the EIR that are submitted to the State Clearinghouse are not forwarded to South Coast AQMD. Please forward a copy of the EIR directly to South Coast AQMD at the address shown in the letterhead. **In addition, please send with the EIR all appendices or technical documents related to the air quality, health risk, and greenhouse gas analyses and electronic versions of all air quality modeling and health risk assessment files[1]. These include emission calculation spreadsheets and modeling input and output files (not PDF files). Without all files and supporting documentation, South Coast AQMD staff will be unable to complete our review of the air quality analyses in a timely manner. Any delays in providing all supporting documentation will require additional time for review beyond the end of the comment period.**

Air Quality Analysis

South Coast AQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. South Coast AQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from South Coast AQMD's Subscription Services Department by calling (909) 396-3720. More guidance developed since this Handbook is also available on South Coast AQMD's website at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ceqa-air-quality-handbook-(1993). South Coast AQMD staff also recommends that the Lead Agency use the CalEEMod land use emissions software. This software has recently been updated to incorporate up-to-date state and locally approved emission factors and methodologies for estimating pollutant emissions from typical land use development. CalEEMod is the only software model maintained by the California Air Pollution Control Officers Association (CAPCOA) and replaces the now outdated URBEMIS. This model is available free of charge at: www.caleemod.com.

South Coast AQMD has also developed both regional and localized significance thresholds. South Coast AQMD staff requests that the Lead Agency quantify criteria pollutant emissions and compare the results

[1] Pursuant to the CEQA Guidelines Section 15174, the information contained in an EIR shall include summarized technical data, maps, plot plans, diagrams, and similar relevant information sufficient to permit full assessment of significant environmental impacts by reviewing agencies and members of the public. Placement of highly technical and specialized analysis and data in the body of an EIR should be avoided through inclusion of supporting information and analyses as appendices to the main body of the EIR. Appendices to the EIR may be prepared in volumes separate from the basic EIR document, but shall be readily available for public examination and shall be submitted to all clearinghouses which assist in public review.

to South Coast AQMD's CEQA regional pollutant emissions significance thresholds to determine air quality impacts. South Coast AQMD's CEQA regional pollutant emissions significance thresholds can be found here at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf. In addition to analyzing regional air quality impacts, South Coast AQMD staff recommends calculating localized air quality impacts and comparing the results to localized significance thresholds (LSTs). LSTs can be used in addition to the recommended regional significance thresholds as a second indication of air quality impacts when preparing a CEQA document. Therefore, when preparing the air quality analysis for the Proposed Project, it is recommended that the Lead Agency perform a localized analysis by either using the LSTs developed by South Coast AQMD staff or performing dispersion modeling as necessary. Guidance for performing a localized air quality analysis can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the Proposed Project and all air pollutant sources related to the Proposed Project. Air quality impacts from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, such as sources that generate or attract vehicular trips, should be included in the analysis.

In the event that the Proposed Project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the Lead Agency perform a mobile source health risk assessment. Guidance for performing a mobile source health risk assessment ("*Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*") can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mobile-source-toxics-analysis. An analysis of all toxic air contaminant impacts due to the use of equipment potentially generating such air pollutants should also be included.

In addition, guidance on siting incompatible land uses can be found in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Health Perspective*, which can be found at: http://www.arb.ca.gov/ch/handbook.pdf. CARB's Land Use Handbook is a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process. Guidance[2] on strategies to reduce air pollution exposure near high-volume roadways can be found at: https://www.arb.ca.gov/ch/rd_technical_advisory_final.PDF.

Mitigation Measures

In the event that the Proposed Project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize these impacts. Pursuant to CEQA Guidelines Section 15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed. Several resources are available to assist the Lead Agency with identifying potential mitigation measures for the Proposed Project, including:

[2] In April 2017, CARB published a technical advisory, *Strategies to Reduce Air Pollution Exposure Near High-Volume Roadways: Technical Advisory*, to supplement CARB's Air Quality and Land Use Handbook: A Community Health Perspective. This technical advisory is intended to provide information on strategies to reduce exposures to traffic emissions near high-volume roadways to assist land use planning and decision-making in order to protect public health and promote equity and environmental justice. The technical advisory is available at: https://www.arb.ca.gov/ch/landuse.htm.

- Chapter 11 "Mitigating the Impact of a Project" of South Coast AQMD'S *CEQA Air Quality Handbook* South Coast AQMD's CEQA web pages available here: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies
- South Coast AQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook for controlling construction-related emissions and Rule 1403 – Asbestos Emissions from Demolition/Renovation Activities
- South Coast AQMD's Mitigation Monitoring and Reporting Plan (MMRP) for the 2016 Air Quality Management Plan (2016 AQMP) available here (starting on page 86): http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2017/2017-mar3-035.pdf
- CAPCOA's *Quantifying Greenhouse Gas Mitigation Measures* available here: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

Alternatives

In the event that the Proposed Project generates significant adverse air quality impacts, CEQA requires the consideration and discussion of alternatives to the project or its location which are capable of avoiding or substantially lessening any of the significant effects of the project. The discussion of a reasonable range of potentially feasible alternatives, including a "no project" alternative, is intended to foster informed decision-making and public participation. Pursuant to CEQA Guidelines Section 15126.6(d), the EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the Proposed Project.

Responsible Agency, South Coast AQMD Permits, and Rules

It is important to note that generally, operation of portable engines and portable equipment units of 50 horsepower or greater that emit particulate matter require a permit from South Coast AQMD or registration under the Portable Equipment Registration Program (PERP) through the California Air Resources Board (CARB)[3]. The Lead Agency should consult with South Coast AQMD's Engineering and Permitting staff to determine if there is any diesel-powered equipment during implementation that will require a South Coast AQMD permit or if the equipment will need to be registered under the PERP through CARB. If a permit from South Coast AQMD is required, South Coast AQMD should be identified as a Responsible Agency for the Proposed Project in the EIR. Any assumptions used in the Air Quality Analysis in the EIR will be used as the basis for permit conditions and limits for the Proposed Project. If there is any information in the permitting process suggesting that the Proposed Project would result in significant adverse air quality impacts not analyzed in the EIR or substantially more severe air quality impacts than those analyzed in the EIR, the Lead Agency should commit to reevaluating the Proposed Project's air quality impacts through a CEQA process (CEQA Guidelines Section 15162). For more information on permits and rules, please visit South Coast AQMD's webpage at: http://www.aqmd.gov/home/permits. Questions on permits can be directed to South Coast AQMD's Engineering and Permitting staff at (909) 396-3385. For more information on the PERP Program, please contact CARB at (916) 324-5869 or visit CARB's webpage at: https://ww2.arb.ca.gov/our-work/programs/portable-equipment-registration-program-perp.

Data Sources

South Coast AQMD rules and relevant air quality reports and data are available by calling South Coast AQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available at South Coast AQMD's webpage at: http://www.aqmd.gov.

[3] South Coast AQMD. *Portable Equipment Registration Program (PERP)*. Accessed at: http://www.aqmd.gov/home/permits/equipment-registration/perp

South Coast AQMD staff is available to work with the Lead Agency to ensure that project's air quality and health risk impacts are accurately evaluated and mitigated where feasible. If you have any questions regarding this letter, please contact me at lsun@aqmd.gov.

Sincerely,

Lijin Sun

Lijin Sun, J.D.
Program Supervisor, CEQA IGR
Planning, Rule Development & Area Sources

LS
ORC190802-03
Control Number

Community Development
1 Civic Center Plaza, Irvine, CA 92606-5208
cityofirvine.org
949-724-6000

September 12, 2019

Ms. Jo Ann Corey
Water Resources Department
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

Subject: **Notice of Preparation (NOP) for an Environmental Impact Report (EIR) for Syphon Reservoir Improvement Project**

Dear Ms. Corey:

Staff is in receipt of an NOP for an EIR for the Irvine Water Ranch District's (IRWD) Syphon Reservoir Improvement Project. The site is located on the northeast side of Portola Parkway between Bee Canyon Access Road and SR - 133. The project consists of increasing the reservoir's existing recycled water capacity to serve the community's water needs. To accomplish this, IRWD will replace an existing dam with one that increases reservoir capacity from approximately 500 acre-feet to 5,000 acre-feet.

The City staff has reviewed the NOP and has no comments. We look forward to reviewing the EIR when it is available. If you have any questions, you may contact me at 949-724-6364 or at jequina@cityofirvine.org.

Sincerely,

Justin Equina
Associate Planner

ec: Kerwin Lau, Manager of Planning Services
Marika Poynter, Principal Planner

Transportation Corridor Agencies™

September 12, 2019

Via Email: SyphonEIR@IRWD.com

Jo Ann Corey
Environmental Compliance Specialist
Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, California 92619-7000

Re: Notice of Preparation of an Environmental Impact Report for the Syphon Reservoir Improvement Project

Dear Ms. Corey:

The Foothill/Eastern Transportation Corridor Agency ("F/ETCA") has received and reviewed the Notice of Preparation of an Environmental Impact Report ("Notice") prepared in connection with the Syphon Reservoir Improvement Project ("Project"). As the Irvine Ranch Water District ("IRWD") acknowledges in the Notice, the Project site is subject to various restrictions ("CC&Rs") as listed in that certain Grant Deed, dated January 4, 2010 and recorded in the Official Records of Orange County on January 4, 2010 as Instrument No. 2010000000111 ("Grant Deed"). Pursuant to Section 6 of the Grant Deed, the F/ETCA is an intended third-party beneficiary of the CC&Rs. Further, Section 7.2 of the Grant Deed provides that no termination, amendment, modification or extension of any provision of the CC&Rs can be made without the prior written consent of the F/ETCA.

Further, pursuant to that certain Grant Deed dated January 4, 2010 and recorded in the Official Records of Orange County on January 4, 2010 as Instrument No. 2010000000110 from the F/ETCA to the Irvine Company LLC, the F/ETCA has a permanent easement on and across the Project site together with the right of ingress and egress over the property for purposes of monitoring and related activities. Please be advised that the F/ETCA requires continued access onto the Project site in order to comply with its ongoing permitting obligations.

We request IRWD to provide the undersigned with notice of any public meeting or proposed action by IRWD regarding the Project or the CC&Rs, and notice and copies of any draft amendment or modification of the Grant Deed or the CC&Rs, along with any other forthcoming documentation for the Project.

If you have questions or require additional information, please do not hesitate to contact me at 949.754.3475 or via email (vmcfall@thetollroads.com).

Sincerely,

for

Valarie McFall
Chief Environmental Planning Officer
Transportation Corridor Agencies

DEPARTMENT OF TRANSPORTATION
DISTRICT 12
1750 EAST FOURTH STREET, SUITE 100
SANTA ANA, CA 92705
PHONE (657) 328-6310
FAX (657) 328-6510
TTY 711
www.dot.ca.gov

Making Conservation
a California Way of Life.

WATER RESOURCES

SEP 13 2019

IRVINE RANCH
WATER DISTRICT

September 13, 2019

Jo Ann Corey
Irvine Ranch Water District
15600 Sandy Canyon Avenue
Irvine, CA 92618

File: IGR/CEQA
SCH#: 2019080009
IGR Log # 2019-01193
SR133 PM 12.906; SR 241
PM 27.496

Dear Ms. Corey:

Thank you for including the California Department of Transportation (Caltrans) in the review of the Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the Syphon Reservoir Improvement Project. The mission of Caltrans is to provide a safe, sustainable, and integrated efficient transportation system to enhance California's economy and livability.

The proposed project would increase the capacity of the existing recycled water reservoir to serve the community's seasonal and future recycled water needs. The reservoir capacity would increase from approximately 500 acre-feet (AF) to 5,000 AF. As part of the reservoir expansion, the existing engineered dam would be replaced with a new engineered dam that would meet and exceed the latest safety standards. The proposed project is located on the northeast side of Portola Parkway between Bee Canyon Access Road and State Route (SR) 133 in the County of Orange. The nearest State facility to the project site are SR-133 and SR-241.

Caltrans is a responsible agency on this project and has the following comments:

1. The Environmental Impact Report (EIR) should evaluate the potential impact to traffic and circulation during the construction phase that include: related vehicle trips and operational vehicle trips on local and regional roadways, particularly both SR-241 and SR-133.

2. Traffic assessment for the project requires a Traffic Impact Study (TIS). The following intersections on Caltrans right of way should be included in the TIS:
    - Northbound SR-133 and Irvine Boulevard on/off-ramps
    - Southbound SR-133 and Irvine Boulevard on/off-ramps
    - Northbound SR-241 and Portola Parkway on/off-ramps
    - Southbound SR-241 and Portola Parkway on/off-ramps

3. Prior to the construction stage, please include a Traffic Management Plan (TMP) to Caltrans for review and approval.

4. Caltrans wishes to caution that deeply buried archaeological resources have been discovered in the vicinity of the current project area, making the deployment of archaeological monitors during construction especially important for this undertaking.

5. Please be advised that Caltrans Encroachment Permit prohibits the discharge of groundwater onto State facilities. All State drainage facilities should be protected during construction and the existing flow pattern shall be maintained. Final construction plans will be reviewed by Caltrans Hydraulics Branch during Encroachment Permit Process.

6. In the event of any activity on Caltrans right of way an encroachment permit will be required. For specific details on Encroachment Permits procedure, please refer to Encroachment Permits Manual at: https://dot.ca.gov/programs/traffic-operations/ep

Please continue to keep us informed of this project and any future developments that could potentially impact State transportation facilities. If you have any questions or would like to meet with us regarding these comments, please do not hesitate to call Maryam Molavi at (657) 328-6280.

Sincerely,

Scott Shelley
Branch Chief, Regional-IGR-Transit Planning
District 12

September 17, 2019

NCL-19-034

Jo Ann Corey, Environmental Compliance Specialist
Irvine Ranch Water District
Water Resources & Policy Department
15600 San Canyon Avenue
Irvine, California, 92619

Subject: Notice of Preparation of an Environmental Impact Report for The Syphon Reservoir Improvement Project

Dear Ms. Corey,

Thank you for the opportunity to comment on the Notice of Preparation of an Environmental Impact Report for The Syphon Reservoir Improvement Project. The County of Orange offers the following comments for your consideration.

North OC Watershed Management Area

1. In Section 4.10 *Hydrology and Water Quality* (page 76) the document discusses discharge methods of effluent water generated as a component of geotechnical boring activities. One method discussed describes effluent water discharged to a local storm drain and the associated NPDES discharge permit from the Santa Ana Regional Water Quality Control Board. The Irvine Ranch Water District also may require permit coverage if the discharge is to an Orange County Flood Control District right of way. Information on this permit can be found at https://myoceservices.ocgov.com/. In addition, the document should discuss specifically which storm drain would likely be designated to incur effluent water.

If you have any questions regarding these comments, please contact Matt Tucker at (714) 955-0669 in North OC Watershed Management Area or Cindy Salazar at (714) 667-8870 in OC Development Services.

Sincerely,

Linda Bidar for

Richard Vuong, Manager, Planning Division
OC Public Works Service Area/OC Development Services
601 North Ross Street
Santa Ana, California 92701
Richard.Vuong@ocpw.ocgov.com

cc: Matt Tucker, North OC Watershed Management Area

To: JoAnn Corey Corey@IRWD.com

Scoping for the proposed EIR for the Enlargement of Syphon Reservoir

Please address the following concerns during the EIR process for the proposed enlargement of Syphon Reservoir:

1. In each of the next 30 years please project the amount of capacity needed for storage of recycled water based on the hydrology during the past 20 years and projected flows to Michaelson Reclamation plant using the 50 gal per person per day water use.

2. Taking the above information and using the same hydrology project the amount of purchased MWD water needed without a project taking into consideration the native water in Irvine Lake during each year.

3. Calculate the cost of Tertiary treatment and the cost of Pumping recycled water to the enlarged Syphon Reservoir versus the cost of MWD untreated water.

4. Evaluate the cost of an alternative project which specifically delivers winter surplus water to the Green Acres Project owned by the Orange County Water District (OCWD) and during non-storm periods to the OCWD GWRS project headworks, and when necessary to a blow-off value to be constructed where the Green Acres conveyance line crosses the Santa Ana River. Further evaluate the revenue receivable from OCWD to IRWD for water delivered to the Green Acres customers along with half the treatment savings derived by OCWD for using IRWD recycled water instead of Orange County Sanitation District (OCSD) Plant 2 water during non-storm events. Evaluate the cost of delivery through the existing pipelines (mostly owned by OCWD), potential revenue to be gained from OCWD for cost reductions caused by the deliveries, the reduced cost by NOT pumping water this water to the enlarged Syphon Reservoir versus the added purchase of MWD untreated water less the use of native water from Irvine Lake. Compare operation costs delta to the cost of building the proposed Enlargement to Syphon Reservoir using a twenty year payback. Assume that MWD rates do not increase over 3% on average over the 20 year period.

5. Evaluate other alternative projects that may eliminate the need for the proposed project as well as alternative sites such as enlarging Big Peters Reservoir.

6. Evaluate if necessary construction a parallel pipeline to the Green Acres pipeline to increase flows using the above assumptions.

7. Evaluate the impact on property values on the recently built homes in the vicinity of the proposed project.

8. Evaluate the cost and other impacts to the playing fields of Crean High School due to the proposed construction.

9. In evaluating the proposed expansion calculate the added weight impacts on the stability of the surrounding land, evaluate the likely hood of slides caused by the maximum credible earthquake and the dollar impacts to the community of a failure.

Thank you for this opportunity to add to the scope of the proposed project EIR. I look forward to getting answers to the above from the consultant that I have been sadly otherwise unable to get from the staff that advocates for this project.

Sincerely Yours,

Peer A. Swan

Member of the Board of Directors, IRWD

September 16, 2019

we return and in

To: JoAnn Corey Corey@IRWD.com

Scoping for the proposed EIR for the Enlargement of Syphon Reservoir

JoAnn, I talked to Paul Weghorst this morning and he said he would accept added comments and concerns the proposed enlargement of Syphon Reservoir:

Evaluate over a twenty year period the amount of low cost ground water that may be pumped from the Orange County Basin by decreasing the amount of recycled water use within IRWD and increasing MWD untreated usage in my item # 4 alternative project outlined in my prior submission. Add these savings to overall savings of the alternative outlined in my prior item #4.

Sincerely Yours,

Peer A. Swan

Member of the Board of Directors, IRWD

WATER RESOURCES

SEP 18 2019

IRVINE RANCH
WATER DISTRICT

September 17, 2019

Comment card

Irvine Ranch Water District
SYPHON RESERVOIR IMPROVEMENT PROJECT

Mail comments using this postage-paid card. Or email comments to **syphoneir@irwd.com**.
Comments must be received by 4 p.m. on Monday, Sept. 16, 2019.

Your name (required): Alice Loh

Organization:

Address (required): 38 Somerton, CA 92620

Phone: 949-590-0291

Comments:

1. I want to see how this project will impact neighborhood safety. My children went to the high school close by. Also I'm concerned about my home's safety

2. ~~w~~ I'm also curious if the project will impact my insurance cost and home value

syphonreservoirproject.com 949-453-5500

Comment card

Irvine Ranch Water District
SYPHON RESERVOIR IMPROVEMENT PROJECT

Mail comments using this postage-paid card. Or email comments to **syphoneir@irwd.com**.
Comments must be received by 4 p.m. on Monday, Sept. 16, 2019.

Your name (required): Adrienne Escoe
Organization: NA

Address (required): 48 Diamond, Irvine 92620
Phone: 949-825-7415

Comments: I could not attend the meeting 08/21/2019. Please consider the following in your plans:
1. Contingency tunnels or channels for spillage in the event of an earthquake, air crash, or terrorist damage that might cause dam failure.
2. The potential cost and availability of flood insurance for Stonegate Village homeowners.
3. Alternative sites that are not immediately above major residential areas.
Thank you.

syphonreservoirproject.com 949-453-5500

Comment card

Irvine Ranch Water District
SYPHON RESERVOIR IMPROVEMENT PROJECT

Mail comments using this postage-paid card. Or email comments to **syphoneir@irwd.com**.
Comments must be received by 4 p.m. on Monday, Sept. 16, 2019.

Your name (required): Valerie Gebhardt Organization: retired
Address (required): 40 Diamond Irvine 92620 Phone: 949-492-0421

Comments: I am opposed to the expansion of the syphon reservoir. Putting residents and students at increased risk is not an improvement. What is the scenario if the expanded reservoir has a catastrophic structural failure? What is the projected area of flooding? What size area would have to be evacuated? For insurance purposes, what area is reclassified as being in a flood zone? How much would this insurance cost? How much would this negative impact effect the values of homes in the area? What impact on businesses in area?
We do need water storage areas, but not in locations where it jeopardizes the safety of the community. Valerie Gebhardt

syphonreservoirproject.com 949-453-5500

Comment card

Irvine Ranch Water District
SYPHON RESERVOIR IMPROVEMENT PROJECT

Mail comments using this postage-paid card. Or email comments to **syphoneir@irwd.com**.
Comments must be received by 4 p.m. on Monday, Sept. 16, 2019.

Your name (required): Lawrence Gebhardt Organization: Retired

Address (required): 40 Diamond Irvine 92620 Phone: 949-932-0421

Comments: As a homeowner in Stonegate Village and a member of the HOA Board, I vehemently oppose this project. It is completely ludicrous to think our IRWD would put the entire Stonegate Village, including homes and schools, in harms way if an unforeseen disaster (earthquake, 100 yr. flood, etc.) occurs. The Village of Montecito, CA did not expect their flood disaster in Jan. '18 caused by rains and mud rolling down hill! Please consider a more carefully planned reservoir in another location. As a former OC Grand Jury member 2018-19, I will ask the current panel to investigate the EIR and supporting docs for this project.

Respectfully, Lawrence Gebhardt

syphonreservoirproject.com 949-453-5500

Comment card

Irvine Ranch Water District
SYPHON RESERVOIR IMPROVEMENT PROJECT

Mail comments using this postage-paid card. Or email comments to **syphoneir@irwd.com**.
Comments must be received by 4 p.m. on Monday, Sept. 16, 2019.

Your name (required): Michele Jacknik Organization: homeowner

Address (required): 46 Diamond, Irvine Phone:

Comments:

I oppose the proposed reservoir expansion because it would endanger Stonegate lives, property and 2 schools directly in the path of being inundated by a potential dam break. An 8.0 earthquake is a reality in the near future, as are other smaller, yet damaging seismic events. A failure due to natural causes or faulty construction poses a serious risk. Residents should not be forced to live with that threat or its consequences. A huge body of water above our homes is a disclosure that would affect property values and increase insurance rates. This site is not safe/ appropriate for expansion!

SyphonEIR - Syphon Reservoir Public Comments

From: Mark OBrien <mark.r.obrien@gmail.com>
To: <SyphonEIR@irwd.com>
Date: 9/11/2019 1:59 PM
Subject: Syphon Reservoir Public Comments

Hello Jo Ann Corey,

Thank you for an opportunity to respond to the Syphon Reservoir project proposal.

The Syphon Reservoir NOP (page 11) references a Geotechnical Investigations Project to evaluate potential geological or seismic hazards and their impact to the proposed Syphon reservoir facilities and dam.

Responding as a Stonegate Village homeowner, please consider for future discussion:

1. A potential for partial or catastrophic failure of the dam (however caused, but especially resulting from earthquakes), and any subsequent disaster response plans to imminent flood hazards and impact to downhill or topographically down gradient residential properties and schools, as well as any risk mitigation proposals such as spillways or water diversion capabilities.

2. Community-level financial impact for potential damages resulting from sudden and significant water release from a failure of the dam (however caused, but especially resulting from earthquakes), noting homeowner, earthquake, or flood insurance policies commonly exclude coverage for a reservoir breach or acts of God, or that homeowners and HOAs may incur costs of premium to attain flood coverage if available.

Best Regards,
Mark O'Brien
58 Rossmore, Irvine, 92620

Jo Ann Corey - Stonegate against Syphon Expansion

WATER RESOURCES

SEP 13 2019

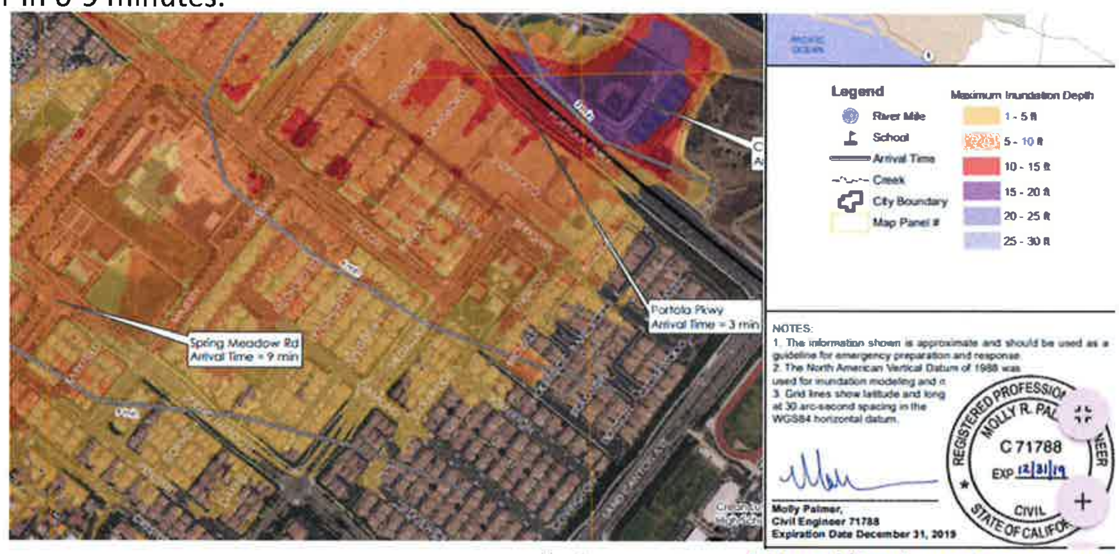
IRVINE RANCH WATER DISTRICT

From: "georgia.gao@gmail.com" <georgia.gao@gmail.com>
To: SyphonEIR <SyphonEIR@irwd.com>
Date: 9/13/2019 12:39 PM
Subject: Stonegate against Syphon Expansion

Irvine Ranch Water District
September 13, 2019
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, CA 92619-7000

Re: IRWD Syphon Reservoir Improvement Project
Attn: Jo Ann Corey, Environmental Compliance Specialist

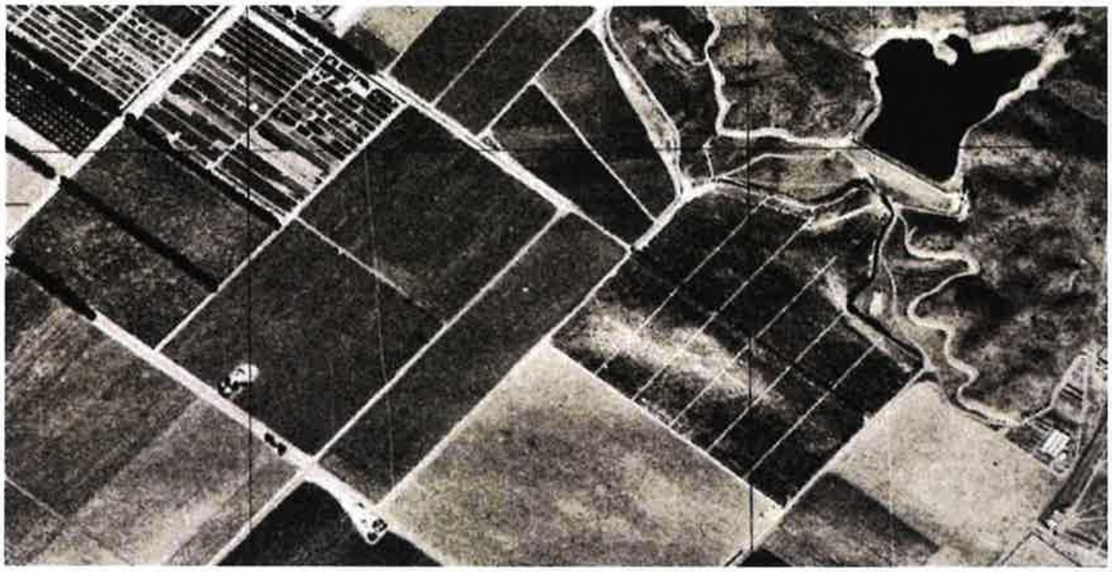
This letter is to provide our comments as requested by the public scoping meeting and express concern about the planned expansion of Syphon Reservoir by the Irvine Ranch Water District. The main concern is safety of the surrounding community.
Current inundation maps show two schools directly in the flood path. In the situation of a damn failure, the Crean Lutheran Athletic Complex is currently projected to be under 15-20 ft of water in less than 3 minutes. Stonegate Elementary School is projected to be under 5-10 feet of water in 6-9 minutes.



[adapted from https://fmds.water.ca.gov]

The projected increase in reservoir capacity from approximately 500 acre-feet (AF) to 5,000 AF would significantly worsen the scenario to the schools in case of a damn failure. This further increases the risk to the children of our community.
There is currently no document that illustrates the potential increased risk of flood to the surrounding community that would be expected from increasing the reservoir volume 10 times. The document "Notice of Preparation of an Environmental Impact Report" provided by Irvine Ranch Water District on August 2, 2019 conveniently avoids mentioning the hazard of dam failure. In case of a dam failure, there does not appear to be a viable spillway to divert water from schools and homes.
The current reservoir was constructed in 1949 at a time when the surrounding area did not have homes and schools, as seen the attached 1974 photo. Irvine's landscape has changed

considerably within the last few decades with an increased population near the existing reservoir's flood path.



[adapted from https://ngmdb.usgs.gov]

Specific questions that we demand to be addressed prior to building of the damn is
(1) How can IRWD guarantee our children's and community's safety with 5,000 AF of water at higher elevation so close homes and schools?
(2) What emergency response plan can be expected to save hundreds of lives in a few minutes in the setting of a catastrophic failure during an earthquake?
(3) Will IRWD provide compensation to homeowners for flood insurance and potential diminished property values as a result of the reservoir expansion?

Given that the current state of downstream hazard at Syphon Reservoir is "Extremely High" according to the California Department of Water Resources, we demand not only to stop plans for expanding Syphon Reservoir, but also to use funds appropriated for the expansion to fortify the existing damn to bring it up to current code. Further, we demand distribution of up to date inundation maps and projected inundation maps to current community members. Lastly, we demand that the Environmental Impact Report (EIR) address the potential of loss of life and property in a dam failure.

[adapted from https://fmds.water.ca.gov]

The following list of residents have assembled to provide the comments stated herein, which we hereby submit to be part of the EIR for the Syphon Reservoir Improvement Project.

Jie Gao 60 Weston, Irvine, Ca 92620 9493818680

Yu Fang 60 Weston, Irvine, Ca 92620

georgia.gao@gmail.com

Jo Ann Corey - From a concerned resident living in Stonegate community

From: Zhong Xiong <zhongxiong@gmail.com>
To: <syphonEIR@irwd.com>
Date: 9/13/2019 1:59 PM
Subject: From a concerned resident living in Stonegate community

WATER RESOURCES
SEP 13 2019
IRVINE RANCH WATER DISTRICT

Attn: Jo Ann Corey, Environmental Compliance Specialist

This letter is to provide our comments as requested by the public scoping meeting and express concern about the planned expansion of Syphon Reservoir by the Irvine Ranch Water District. The main concern is safety of the surrounding community.

Current inundation maps show two schools directly in the flood path. In the situation of a damn failure, the Crean Lutheran Athletic Complex is currently projected to be under 15-20 ft of water in less than 3 minutes. Stonegate Elementary School is projected to be under 5-10 feet of water in 6-9 minutes. The projected increase in reservoir capacity from approximately 500 acre-feet (AF) to 5,000 AF would significantly worsen the scenario to the schools in case of a damn failure. This further increases the risk to the children of our community.

There is currently no document that illustrates the potential increased risk of flood to the surrounding community that would be expected from increasing the reservoir volume 10 times. The document "Notice of Preparation of an Environmental Impact Report" provided by Irvine Ranch Water District on August 2, 2019 conveniently avoids mentioning the hazard of dam failure. In case of a dam failure, there does not appear to be a viable spillway to divert water from schools and homes.

The current reservoir was constructed in 1949 at a time when the surrounding area did not have homes and schools, as seen the attached 1974 photo. Irvine's landscape has changed considerably within the last few decades with an increased population near the existing reservoir's flood path. Specific questions that we demand to be addressed prior to building of the damn is (1) How can IRWD guarantee our children's and community's safety with 5,000 AF of water at higher elevation so close homes and schools? (2) What emergency response plan can be expected to save hundreds of lives in a few minutes in the setting of a catastrophic failure during an earthquake? (3) Will IRWD provide compensation to homeowners for flood insurance and potential diminished property values as a result of the reservoir expansion?

Given that the current state of downstream hazard at Syphon Reservoir is "Extremely High" according to the California Department of Water Resources, we demand not only to stop plans for expanding Syphon Reservoir, but also to use funds appropriated for the expansion to fortify the existing damn to bring it up to current code. Further, we demand distribution of up to date inundation maps and projected inundation maps to current community members. Lastly, we demand that the Environmental Impact Report (EIR) address the potential of loss of life and property in a dam failure.

A concerned resident living in Stonegate Community

--
Zhong (John) Xiong

Jo Ann Corey - Oppose the Syphon Project

WATER RESOURCES

SEP 13 2019

IRVINE RANCH WATER DISTRICT

From: Hongjian Zeng <zeng106@mail.chapman.edu>
To: <SyphonEIR@irwd.com>
Date: 9/13/2019 2:01 PM
Subject: Oppose the Syphon Project

Dear Board Members,

I am a resident of Stonegate Village and the homeowner. I and my wife living in Stonegate Village with my 3 kids for 3 years. We enjoyed the beautiful and peaceful surroundings of our community for the past years, until we heard about the Syhpon project proposed.

With this proposed project, the reservoir just across the Portola Springs Parkway will be extended 10 times bigger, and the dam will be 80 feet higher. This will post huge threat and danger to our property, our lives, and our community if something goes wrong. If some kind of disaster happened, our community would be flooded into water in minutes, including our house and the elementary school. Think about that possibility would waken me up in the night. I just couldn't imagine how this will affect our life in the future.

Though I understand this project would benefit the city of Irvine with more water supply available, I just do not want it so close to my property and community. When the Syphon Reservoir was built decades ago, it was far from the city, with not much population around it to minimize the possible damage. Now with the highly populated communities around, why don't you consider some other place to put this reservoir? You put great value to people's life and property decades ago, and I believe you will do the same now.

With the above thoughts, I strongly oppose the extension of Syphon Reservoir. I suggest the city choose another place to build this project.

Best regards,

Richard Zeng
Homeowner of
66 Dublin
Stonegate Village

From: Yongfeng Wang <ywangb13@gmail.com>
To: <syphonEIR@irwd.com>
Date: 9/13/2019 12:40 PM
Subject: No to this project

Hi, Jo

I am a resident living in stonegate!

I would like you to just answer only the following two questions with regard to syphon reservoir improvement project?

If you live at Stonegate, will you say yes to this project?
If you kids or grandchildren are studying at stonegate elementary Scholl, will you say yes to this project?

Thanks

Sent from my iPhone

WATER RESOURCES

SEP 13 2019

IRVINE RANCH
WATER DISTRICT

From: "jessie tsai (laxsv)" <jessie_tsai@morrisonexpress.com>
To: <syphoneir@irwd.com>
Date: 9/15/2019 9:55 PM
Subject: Syphon Reservoir Improvements Project

Name: Jessie Tsai
Organization: Stonegate Resident
Address: 52 Norwich, Irvine, CA 92620
Tel: (310) 955-0804
Comments: I strongly disagreed to expend the Syphon Reservoir. It's harmful to the Stonegate residence! Do not let this project pass! Thank you.

Sent from my iPhone

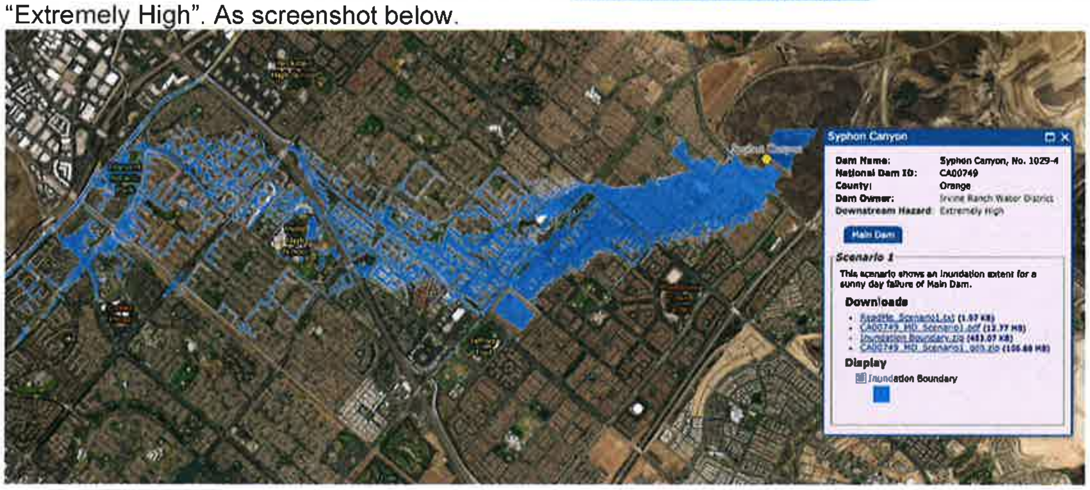
Jo Ann Corey - Comments for IRWD Syphon Reservoir Improvement Project

From: xiaoyan Qian <xy.qian@gmail.com>
To: <SyphonEIR@irwd.com>
Date: 9/15/2019 11:54 PM
Subject: Comments for IRWD Syphon Reservoir Improvement Project
Cc: xiaoyan Qian <xy.qian@gmail.com>

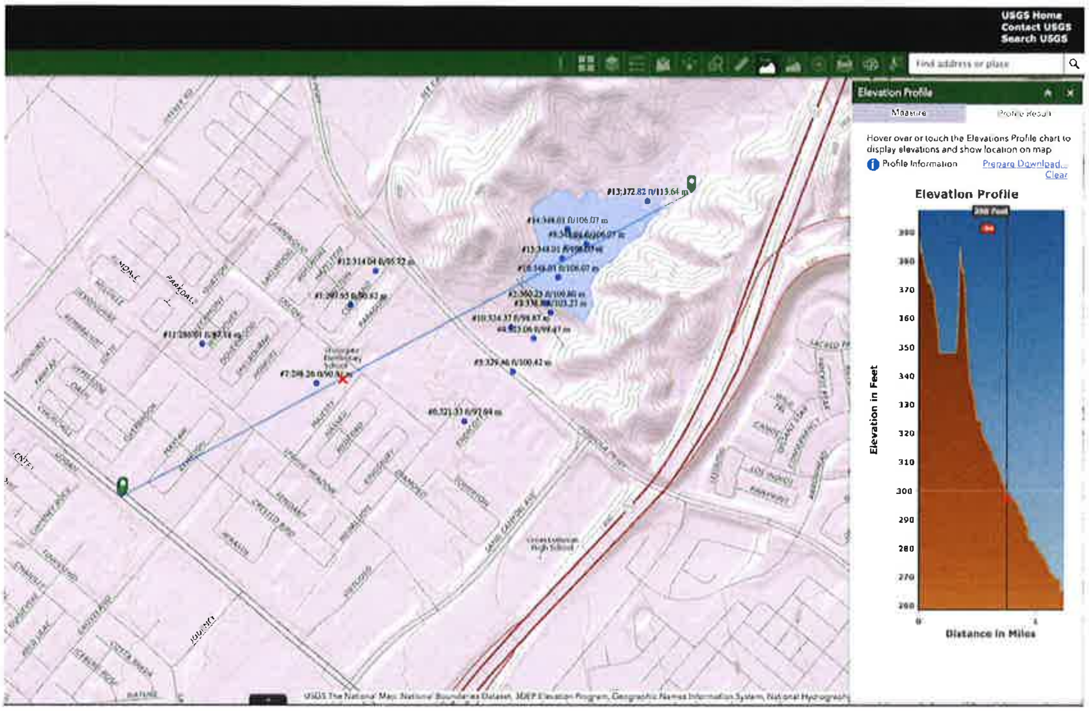
Re: IRWD Syphon Reservoir Improvement Project
Attn: Jo Ann Corey, Environmental Compliance Specialist

This letter is to provide my comments as requested by the public scoping meeting on August 21st and express strong concern about the
planned expansion of Syphon Reservoir by the Irvine Ranch Water District. The main concern is safety of the surrounding community and schools.

With the current Syphon Reservoir, based on the https://fmds.water.ca.gov/, the Downstream hazard is already "Extremely High". As screenshot below.



The current Syphon Reservoir was built on 1949, by then, there was no community close to the reservoir. But things changed dramatically since the past 30 years, Stonegate, Woodbury, Cypress Village, Eastwood are all the new high density community surrounding Syphon reservoir, even more dangerous is the Crean Lutheran High School Athletic Complex, which is directed under the dam in less then 400 ft, and also Stonegate elementary school is also less then 0.4 miles away from the dam. In case of a catastrophic failure, it could put over 1000 elementary school student's life into danger in less than 5 minutes.
The current Syphon reservoir's water surface is 376ft, and the basin of the reservoir is 348ft, so the depth of the water is 28 ft. However, the water surface of the newly proposed reservoir is 456 ft, which means the depth of the water will be 108 ft. In case of a catastrophic failure, no one will be able to survive such high flood wave.



Though it is good to hear that the "new dam would meet or exceed the latest safety standards" in the presentation, still no one can guarantee the new dam will never fail. It could be a super earthquake, or a mud slide after the wild fire, or even a terrorist attack. No one can ease the peace of mind for the resident live next to the new dam.

We all want to see a more green, more beautiful Irvine because we all live here, and it is our home. But we could not put thousands of Irvine residence's life in danger to get this, no matter what's the benefit it will bring.

In summary, I have a high concern for the surrounding communities and schools. We need further understand the safety assurance before move the project to the next phase.

Best regards,

Vivian Qian (Stonegate resident)

Sept 15th, 2019

Jo Ann Corey - Re: IRWD Syphon Reservoir Improvement Project

From: Noura Alaa <nouraalaa@gmail.com>
To: <SyphonEIR@irwd.com>
Date: 9/15/2019 8:10 PM
Subject: Re: IRWD Syphon Reservoir Improvement Project

September 15, 2019
Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, CA 92619-7000

WATER RESOURCES
SEP 16 2019
IRVINE RANCH WATER DISTRICT

Re: IRWD Syphon Reservoir Improvement Project

Attn: Jo Ann Corey, Environmental Compliance Specialist

This letter is to provide our comments as requested by the public scoping meeting and express concern about the planned expansion of Syphon Reservoir by the Irvine Ranch Water District. The main concern is safety of the surrounding community.

Current inundation maps show two schools directly in the flood path. In the situation of a damn failure, the Crean Lutheran Athletic Complex is currently projected to be under 15-20 ft of water in less than 3 minutes. Stonegate Elementary School is projected to be under 5-10 feet of water in 6-9 minutes.

The projected increase in dam height from 59 feet to 136 feet and reservoir capacity from approximately 500 acre-feet (AF) of water to 5,000 AF of water would significantly worsen the scenario to the schools in case of a damn failure. This further increases the risk to the children of our community.

There is currently no document that illustrates the potential increased risk of flood to the surrounding community that would be expected from increasing the reservoir volume 10 times. The document "Notice of Preparation of an Environmental Impact Report" provided by Irvine Ranch Water District on August 2, 2019 conveniently avoids mentioning the hazard of dam failure. In case of a dam failure, there does not appear to be a viable spillway to divert water from schools and homes. The scenario of dam failure must be considered as reservoir is located in a seismically active area with the Puente Hills fault located just 4.3 miles away.

The current reservoir was constructed in 1949 at a time when the surrounding area did not have homes and schools, as seen the attached 1974 photo. Irvine's landscape has changed considerably within the last few decades with an increased population near the existing reservoir's flood path.

Specific questions that we demand to be addressed prior to building of the damn is (1) How can IRWD guarantee our children's and community's safety with 5,000 AF of water at higher elevation so close homes and schools? (2) What emergency response plan can be expected to save thousands of lives in a few minutes in the setting of a catastrophic failure during an earthquake? (3) Will IRWD provide compensation to homeowners for flood insurance and potential diminished property values as a result of the reservoir expansion?

Given that the current state of downstream hazard at Syphon Reservoir is "Extremely High" according to the California Department of Water Resources, we demand not only to stop plans for expanding Syphon Reservoir, but also to use funds appropriated for the expansion to fortify the existing damn to bring it up to current code.

Further, we demand distribution of up to date inundation maps and projected inundation maps to current community members. Lastly, we demand that the Environmental Impact Report (EIR) address the potential of loss of life and property in a dam failure.

Please submit these comments to be part of the EIR for the Syphon Reservoir Improvement Project.

Noura Abdelmaaboud
Stonegate Resident

Jo Ann Corey - Comments for IRWD Syphon Reservoir Improvement Project Inbox x

From: chongming Qiao <chongmingqiao2010@gmail.com>
To: <SyphonEIR@irwd.com>
Date: 9/15/2019 11:57 PM
Subject: Comments for IRWD Syphon Reservoir Improvement Project Inbox x
Cc: chongming Qiao <chongmingqiao2010@gmail.com>

Re: IRWD Syphon Reservoir Improvement Project
Attn: Jo Ann Corey, Environmental Compliance Specialist

This letter is to provide my comments as requested by the public scoping meeting on August 21st and express strong concern about the
planned expansion of Syphon Reservoir by the Irvine Ranch Water District. The main concern is safety of the surrounding community and schools.

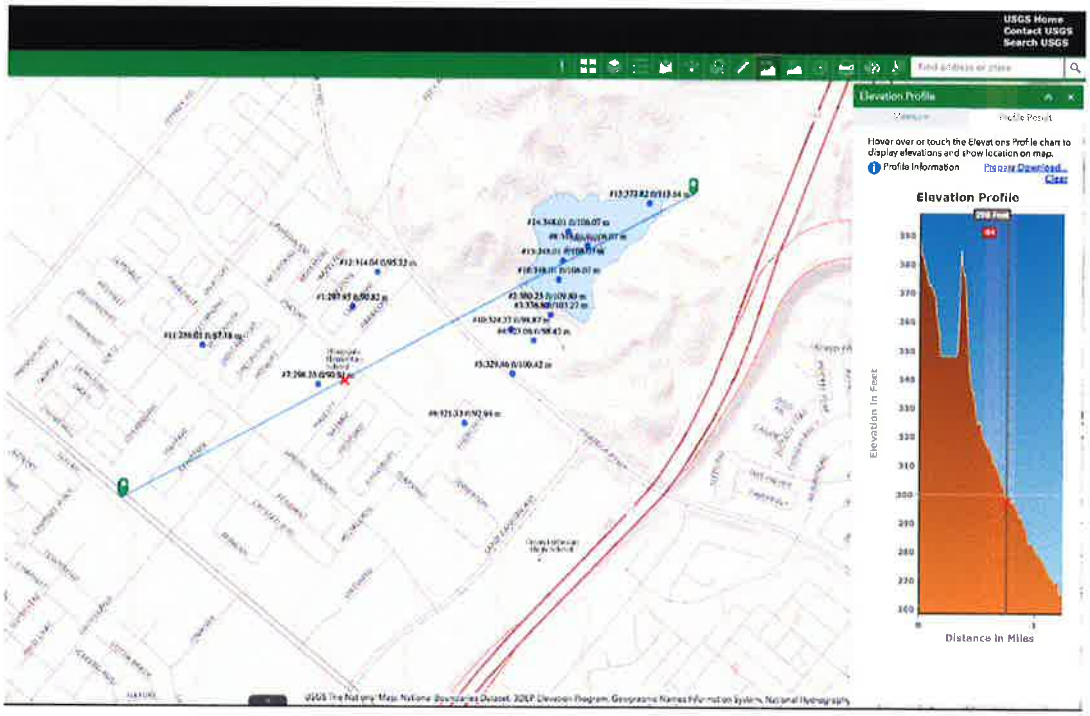
With the current Syphon Reservoir, based on the https://fmds.water.ca.gov/, the Downstream hazard is already "Extremely High". As screenshot below.

The current Syphon Reservoir was built on 1949, by then, there was no community close to the reservoir. But things changed dramatically since the past 30 years, Stonegate, Woodbury, Cypress Village, Eastwood are all the new high density community surrounding Syphon reservoir, even more dangerous is the Crean Lutheran High School Athletic Complex, which is directed under the dam in less then 400 ft, and also Stonegate elementary school is also less then 0.4 miles away from the dam. In case of a catastrophic failure, it could put over 1000 elementary school student's life into danger in less than 5 minutes.
The current Syphon reservoir's water surface is 376ft, and the basin of the reservoir is 348ft, so the depth of the water is 28 ft. However, the water surface of the newly proposed reservoir is 456 ft, which means the depth of the water will be 108 ft. In case of a catastrophic failure, no one will be able to survive such high flood wave.

WATER RESOURCES

SEP 16 2019

IRVINE RANCH
WATER DISTRICT



Though it is good to hear that the "new dam would meet or exceed the latest safety standards" in the presentation, still no one can guarantee the new dam will never fail. It could be a super earthquake, or a mud slide after the wild fire, or even a terrorist attack. No one can ease the peace of mind for the resident live next to the new dam.

We all want to see a more green, more beautiful Irvine because we all live here, and it is our home. But we could not put thousands of Irvine residence's life in danger to get this, no matter what's the benefit it will bring.

In summary, I have a high concern for the surrounding communities and schools. We need further understand the safety assurance before move the project to the next phase.

Best regards,

Mike Qiao (Stonegate resident)

Sept 15th, 2019

Jo Ann Corey - Re: IRWD Syphon Reservoir Improvement Project

From: Ahmed Sidky <asidky@gmail.com>
To: <SyphonEIR@irwd.com>
Date: 9/15/2019 8:09 PM
Subject: Re: IRWD Syphon Reservoir Improvement Project

September 15, 2019
Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, CA 92619-7000

Re: IRWD Syphon Reservoir Improvement Project

Attn: Jo Ann Corey, Environmental Compliance Specialist

This letter is to provide our comments as requested by the public scoping meeting and express concern about the planned expansion of Syphon Reservoir by the Irvine Ranch Water District. The main concern is safety of the surrounding community.

Current inundation maps show two schools directly in the flood path. In the situation of a damn failure, the Crean Lutheran Athletic Complex is currently projected to be under 15-20 ft of water in less than 3 minutes. Stonegate Elementary School is projected to be under 5-10 feet of water in 6-9 minutes.

The projected increase in dam height from 59 feet to 136 feet and reservoir capacity from approximately 500 acre-feet (AF) of water to 5,000 AF of water would significantly worsen the scenario to the schools in case of a damn failure. This further increases the risk to the children of our community.

There is currently no document that illustrates the potential increased risk of flood to the surrounding community that would be expected from increasing the reservoir volume 10 times. The document "Notice of Preparation of an Environmental Impact Report" provided by Irvine Ranch Water District on August 2, 2019 conveniently avoids mentioning the hazard of dam failure. In case of a dam failure, there does not appear to be a viable spillway to divert water from schools and homes. The scenario of dam failure must be considered as reservoir is located in a seismically active area with the Puente Hills fault located just 4.3 miles away.

The current reservoir was constructed in 1949 at a time when the surrounding area did not have homes and schools, as seen the attached 1974 photo. Irvine's landscape has changed considerably within the last few decades with an increased population near the existing reservoir's flood path.

Specific questions that we demand to be addressed prior to building of the damn is (1) How can IRWD guarantee our children's and community's safety with 5,000 AF of water at higher elevation so close homes and schools? (2) What emergency response plan can be expected to save thousands of lives in a few minutes in the setting of a catastrophic failure during an earthquake? (3) Will IRWD provide compensation to homeowners for flood insurance and potential diminished property values as a result of the reservoir expansion?

Given that the current state of downstream hazard at Syphon Reservoir is "Extremely High" according to the California Department of Water Resources, **we demand not only to stop plans for expanding Syphon Reservoir, but also to use funds appropriated for the expansion to fortify the existing damn to bring it up to current code.**

Further, we demand distribution of up to date inundation maps and projected inundation maps to current community members. Lastly, we demand that the Environmental Impact Report (EIR) address the potential of loss of life and property in a dam failure.

Please submit these comments to be part of the EIR for the Syphon Reservoir Improvement Project.

Ahmed Sidky, Ph, D.
Stonegate Resident

Jo Ann Corey - STOP Syphon Reservoir Improvement Project

From: Iris Kang <k_yrys@hotmail.com>
To: "syphoneir@irwd.com" <syphoneir@irwd.com>
Date: 9/16/2019 11:26 AM
Subject: STOP Syphon Reservoir Improvement Project

Hi Jo Ann Corey,

My name is YUN YUN KANG, I am a Stonegate resident at 39 Norwich. I am writing to ask you please STOP the Syphon Reservoir Improvement Project. Thank you.

YUN YUN

WATER RESOURCES

SEP 16 2019

IRVINE RANCH
WATER DISTRICT

Jo Ann Corey - Fwd: Syphon reservoir project located in a liquefaction and landslides overlap zone. Deadline comment submit 9/16/19 4pm

---

From: Yanna Cheng <yannaangel99@gmail.com>
To: <syphoneir@irwd.com>
Date: 9/16/2019 10:41 AM
Subject: Fwd: Syphon reservoir project located in a liquefaction and landslides overlap zone. Deadline comment submit 9/16/19 4pm
Attachments: Image-1.jpg; Stonegate against Syphon Expansion.docx

---

Subject: Syphon reservoir project located in a liquefaction and landslides overlap zone. Need to reconsider safty for having it around big commiuntiy and schools

Dear Jo Ann Corey,

We are very worried about our safety and we not only strongly oppose this project with the comment as attached document s below, but also would like to ask if we need to stop using it.
We understand the purpose to expand but the safety to our kids and our popular communities is a top priority.
Please do not expand it and also need to consider if it needs to stop using it since it is located in a liquefaction and landslides overlap zone.
There is no such big community in this area about 70 years ago. Thank you.
sincerely.
Guoshan Lai
Yanna Lai
103 Doverwood
Irvine, Ca 92620

Sent from my iPhone

Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, CA 92619-7000

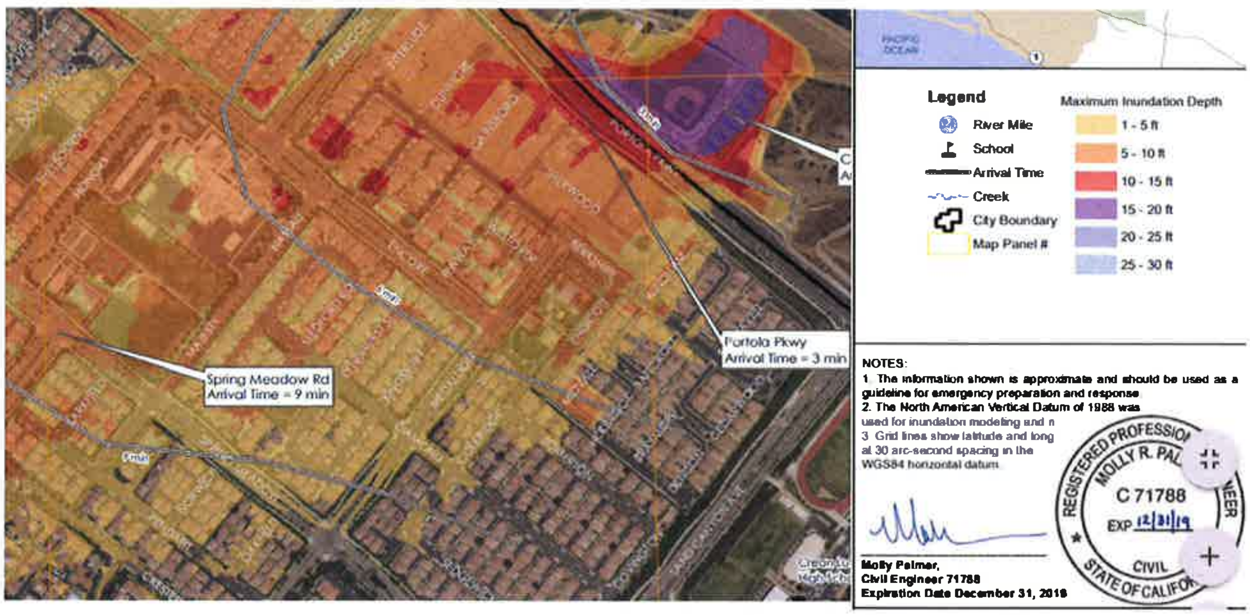
September 13, 2019

Re: IRWD Syphon Reservoir Improvement Project

Attn: Jo Ann Corey, Environmental Compliance Specialist

This letter is to provide our comments as requested by the public scoping meeting and express concern about the planned expansion of Syphon Reservoir by the Irvine Ranch Water District. The main concern is safety of the surrounding community.

Current inundation maps show two schools directly in the flood path. In the situation of a damn failure, the Crean Lutheran Athletic Complex is currently projected to be under 15-20 ft of water in less than 3 minutes. Stonegate Elementary School is projected to be under 5-10 feet of water in 6-9 minutes.

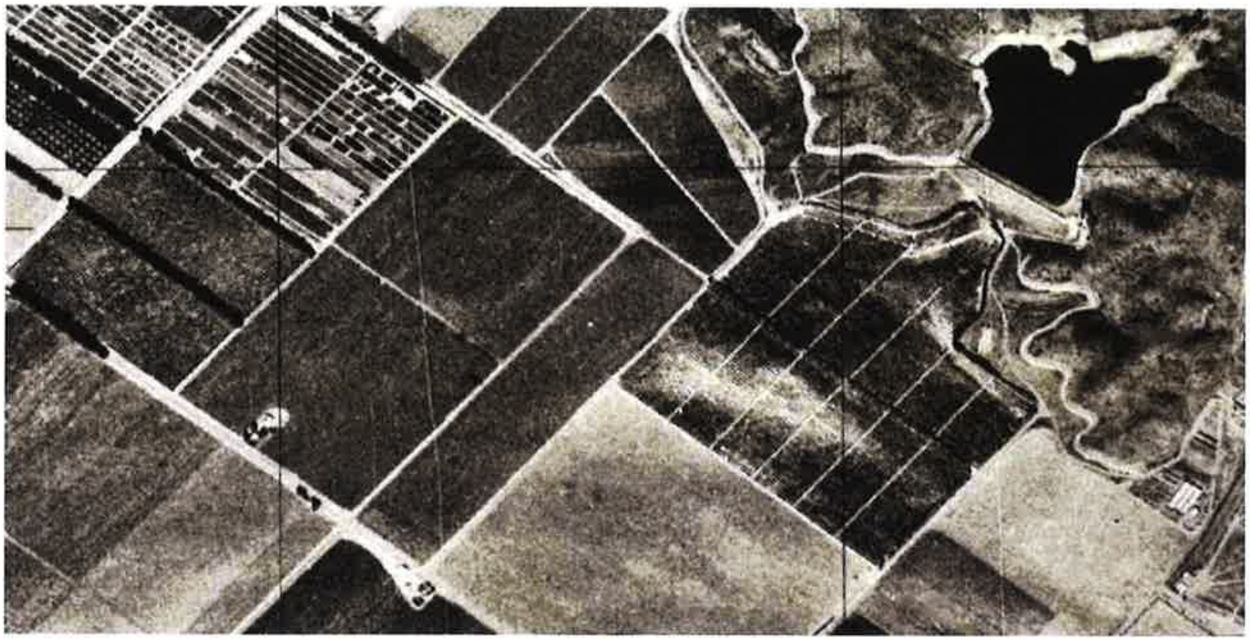


[adapted from https://fmds.water.ca.gov]

The projected increase in dam height from 59 feet to 136 feet and reservoir capacity from approximately 500 acre-feet (AF) of water to 5,000 AF of water would significantly worsen the scenario to the schools in case of a damn failure. This further increases the risk to the children of our community.

There is currently no document that illustrates the potential increased risk of flood to the surrounding community that would be expected from increasing the reservoir volume 10 times. The document "Notice of Preparation of an Environmental Impact Report" provided by Irvine Ranch Water District on August 2, 2019 conveniently avoids mentioning the hazard of dam failure. In case of a dam failure, there does not appear to be a viable spillway to divert water from schools and homes. The scenario of dam failure must be considered as reservoir is located in a seismically active area with the Puente Hills fault located just 4.3 miles away.

The current reservoir was constructed in 1949 at a time when the surrounding area did not have homes and schools, as seen the attached 1974 photo. Irvine's landscape has changed considerably within the last few decades with an increased population near the existing reservoir's flood path.



[adapted from https://ngmdb.usgs.gov]

Specific questions that we demand to be addressed prior to building of the damn is (1) How can IRWD guarantee our children's and community's safety with 5,000 AF of water at higher elevation so close homes and schools? (2) What emergency response plan can be expected to save thousands of lives in a few minutes in the setting of a catastrophic failure during an earthquake? (3) Will IRWD provide compensation to homeowners for flood insurance and potential diminished property values as a result of the reservoir expansion?

Given that the current state of downstream hazard at Syphon Reservoir is "Extremely High" according to the California Department of Water Resources, we demand not only to stop plans for expanding Syphon Reservoir, but also to use funds appropriated for the expansion to fortify the existing damn to bring it up to current code. Further, we demand distribution of up to date inundation maps and projected inundation maps to current community members. Lastly, we demand that the Environmental Impact Report (EIR) address the potential of loss of life and property in a dam failure.

[adapted from https://fmds.water.ca.gov]

Jo Ann Corey - 329 Signatures Against Syphon Reservoir Expansion Plan

From:	Joe Yan <zujieyan@gmail.com>
To:	"COREY@irwd.com" <COREY@IRWD.COM>
Date:	9/16/2019 3:55 PM
Subject:	329 Signatures Against Syphon Reservoir Expansion Plan
Cc:	"SYPHONeir@irwd.com" <SYPHONeir@IRWD.COM>
Attachments:	AgainstSyphonReservoirExpansionPlan.pdf; Syphon Reservoir Expansion Plan.pdf

Attn: Jo Ann Corey

My name is Joe Yan and I am a resident of Stonegate Village. Along with other residents in our community, we are greatly concerned about the expansion plan of the Syphon Reservoir.

Attached you will find the names, addresses, and signatures of 329 other residents who are also concerned with the safety of their homes, families and schools due to this expansion project.

Sincerely,

Joe Yan
Resident of Stonegate

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Pei Yang	105 Beechmont	Stonegate	[signature]
		"	
Linghua Jia	105 Beechmont	"	Jialinghua
JIE DENG	105 Beechmont	Stonegate	[signature]
B. Bayat	113 Beechmont	Stongate	[signature]
D. RAY	107 BEECHMONT		[signature]
Saritha. T	109 Beechmont	Stonegate	[signature]
Pawarna L.	103 Beechmont	Stonegate	[signature]
Dinkar S.	103 Beechmont	Stongate	S.D
Casey McCracken	101 Beechmont	Stonegate	[signature]
Allison McCracken	101 Beechmont	Stonegate	[signature]
Sheng Miao	202 Wyndover	Stonegate	[signature]
Heme Li	80 Thornhurst	Stonegute	[signature]
Stella Lin	80 Thornhurst	Stonegate	[signature]
Troy Lin	80 Thornhurst	Stonegate	[signature]
Sandy Chen	113 Cordial	Eastwood	[signature]
Lenny Chen	113 Cordial	Eastwood	[signature]
Ling Miao	76 Hazelton	Stonegate	[signature]
Vincent Lai	76 Hazelton	Stonegate	Vincent Lai
Jack Shi	202 Wyndover	Stonegate	[signature]
Alice Miao	202 Wyndover	Stonegate	[signature]
Ruzhen He	208 Wyndover	Stonegate	[signature]
Zejian Tao	208 Wyndover	Stonegate	[signature]
Christina Wang	210 Wyndover	Stonegate	[signature]
Kesamehoi	210 Wyndover	Stonegate	[signature]

V

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
SiJian Tong	212 wyndover	Stonegate	[signature]
Cicy Shen	212 wyndover	Stonegate	[signature]
Christine Wen	205 Parkdale	Stonegate	[signature]
Richard Wen	205 Parkdale	Stonegate	Richard Wen
Seongnam oh	102 Beechmont	Stonegate	[signature]
KY NGUYEN	207 PARKDALE	Stonegate	[signature]
DANIEL O'HARA	204 PARKDALE	STONEGATE	[signature]
Jeff Lo	211 WYNDOVER	STONEGATE	[signature]
AMY Lo	211 Wyndover	Stonegate	[signature]
Dong Xu	207 wyndover	Stonegate	[signature]
Xitin Ye	207 wyndover	"	[signature]
SuQun Kepple	202 Partale	Stongate	[signature]
Kerry Keple	202 Parkdale	Stonegate	Kerry Keple
Jean Feng	88 Melville	Stonegate	[signature]
David Li	88 Melville	Stonegate	[signature]
Vito Ferrante	39 Diamond	Stonegate	[signature]
Tisa Strenth	29 Flowerstalk	Stonegate	[signature]
Sonal Pare	8202 Mirasol	Stonegate	[signature]
SUMIT Roy	31 FLOWERSTALK	Stonegate	[signature]
Simon Dagon	7202 Mirasol lane 9260	Stonegate	[signature]
Iolia Ounsbaum	7308 Mirasol	Stonegate	[signature]
TOUSIF KHAN	19205 MIRASOL, IRVINE	STONEGATE	[signature]
Jennifer Kim	105 Gemstone	Stonegate	[signature]
Sarah Salamip	1623 Crested Bnd	Stonegate	[signature]
Kaidan Qu	100 saybrook	STG.	Kaidan Qu

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Gary G.	37 Dryhouse	Stonegate	[illegible]
Billy R.	35 Dryhouse	Stonegate	[illegible]
Jean J.	419 Clayhouse	[illegible]	[illegible]
[illegible]	106 Devonshire	Stonegate	[illegible]
Tim, Chen	23 Mayfair	Stonegate	[illegible]
~~[illegible]~~ Jessica Kim	136 Bramblet	Portola	[illegible]
James Hyun	175 [illegible] Brush	Portola	[illegible]
Jack Lee	38 Norwhich	Stonegate	[illegible]
Emily Kim	39 Norman	Stonegate	[illegible]
YANBiN Xu	113 Ovation	Stonegate	[illegible]
Jing Zhang	113 Ovation	Stonegate	[illegible]
Ping Wang	113 Ovation	Stonegate	[illegible]
[illegible]	212 overbrook	Stonegate	[illegible]
Michael	76 weston	Stonegate	
Cindy Zhou	206 wyndover	Stonegate	[illegible]
Kenny	82 weston	Stonegate	
Juhe Gao	200 overbrook	Stonegate	
FengYan Qi	231 Kempton	Stonegate	
MAHSA	70 CORTLAND	[illegible]	[illegible]
Jeff Coley	~~[illegible]~~ 31 Sorrento	~~[illegible]~~ Stonegate	[illegible]
NAdan	47 Ashdale	Stonegate	[illegible]
Sung Moon	147 OVERBROOK	Stonegate	[illegible]
Yihong Zhang	8~~8~~ Rossmore.	Stongate	[illegible]
Joseph Zimmy	205 Middale	Stonegate	[illegible]

Against Syphon Reservoir Expansion Plan Signature

City: Irvine Zipcode: CA 92620

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Sridhar Venkatesan	111 DOVER WOOD	STONEGATE	[illegible]
Indu Raghunathan	111 Doverwood	Stonegate	[illegible]
Sherman Chen	201 Parkdale	Stonegate	[illegible]
Yajun Wang	127 Doverwood	Stonegate	[illegible]
XIAOJUN JIANG	129 Doverwood	Stonegate	Xiaojun Jiang
Pallab Halder	133 Doverwood	Stonegate	[illegible]
BUDESHNA HALDER	133 DOVERWOOD	Stonegate	Halder
SOHINI HALDER	133 Doverwood	Stonegate	Soli Halder
Tae Hwang	135 Doverwood	Stonegate	[illegible]
MIN KIM	135 Doverwood	Stonegate	[illegible]
JACK CHAO	141 DOVERWOOD	Stonegate	J Chao
Brian Stek	246 Shelbourne	Stonegate	[illegible]
Yuan Tang	224 shelbourne	Stonegate	[illegible]
Xiaowei Wu	224 shelbourne	Stonegate	[illegible]
Lily Xue	214 shelbourne	stongate	[illegible]
ARNEL KASMALLY	212 Shelbourne	Stonegate	[illegible]
Farah Sheikh	210 shelbourne	stongate	[illegible]
Selmane Gouws	200 Shelbourne	Stonegate	[illegible]
Eiaan Gouws	200 Shelbourne	Stonegate	[illegible]
Shasha	105 Dover wood	Stongate	Shasha
Xiangying Zhu	101 Doverwood	Stonegate	[illegible]
Jun Lu	101 Doverwood	Stongate	Jun Lu

Against Syphon Reservoir Expansion Plan

Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Sdmaz	2202 Mirasol	Stonegate	
Helen Lee	72 Melville	Stonegate	
Young Han	76 Somerton	Stonegate	
Suresh Sau	89 Devonshire	Stonegate	
Jennifer Qiu	259 Gainsborough	Stonegate	Qiu
Zhimin Hu	50 Durham	Stonegate	Zhimin Hu
Mingxia Chen	103 Overbrook	Stongate	
Frank Cer	214 Wyndon	Stonegate	
Abbe Wong	206 Denison	Stonegate	
Abla O.	6305 Mirasol	Stonegate	
M Stokes	31 Oakfield	Stonegate	MStokes
Kulina Zaman	62 Dublin	Stonegate	
Lina	31 Sedgewick	Stonegate	

13

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Zujie Yan	78 Ashdale	Stonegate	[illegible]
Lily Wei	129 overbrook	STG	Lily Wei
XiuhuanXu	58 Interlude	STG	
HUA HOU	51 Sedgewick	Stonegate	[illegible]
Vivian Qion	63 Cortland	ST G	[illegible]
Shelly Han	91 Devonshire	STG	Shelly
Xiaoling Guo	159 overbrook		Xiaolingguo
Wen Geng	81 Woodmill	-	[illegible]
Lily Lin	39 Kingsbury	STG	[illegible]
yun pan	60 Devonshire	STG	[illegible]
peter	65 sherwood	STG	[illegible]
Shuyu Wang	72 Sedgewick	STG	[illegible]
Jie Gao	60 Weston	STG	[illegible]
William Ding	204 shelbourne	STG	[illegible]
Jasmine Ge	66 Interlude	STG	[illegible]
Xichen Wang	256 Kempton	STG	[illegible]
Qingyun Li	218 Kempton	STG	Qing
Sisi Gong	67 Interlude	STG	[illegible]
Xuemei Li	24 lacebark	STG	Xuemei Li
Shirley Li	50 Steeinway	STG	[illegible]
Shunsuel Li	36 OVATION	STG	[illegible]
Songnia Xiao	76 Haviland	STG	[illegible]
Guo zhang	87. KIMBAL	STG	Guo zhang
Annie Gu	62 Hazelton	STG	Anne
Qingshan Qian	62 Hazelton	STG	[illegible]

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
YuanYu Jin	~~244~~ Shelbourne Irvine	Stonegate	Yuan Yu Jin
Bei Fan	84 Nassau	"	Bei Fan
Jichun Zhang	209 Bancroft	"	[illegible]
John Kim	178 Overbrook	Stonegate	[illegible]
Joan Kumar	82 Melville	"	[illegible]
Na An	55 Haviland	"	[illegible]
Hua Yue	67 Elmdale	"	[illegible]
Baojun Yue	67 Elmdale	"	[illegible]
Fengqin Zhao	67 Elmdale	"	[illegible]
Chunli Weng	75 Hearst	"	CW.
Nan Ma	53 Sherwood		[illegible]
Bingbing Ma	53 Sherwood		[illegible]
Xia Yin	53 Sherwood		[illegible]
Li Ma	53 Sherwood		[illegible]
LiLi Wu	82 Rembrandt	"	[illegible]
Yiqi Wang	187 overbrook.		Y Wang
BoBu	53 TallowWood		BoBu
FloraWu	91 NASSAU		[illegible]
Zhuo Zhang	65 Birmingham		[illegible]
HuiLin Wang	119 Beechmont		[illegible]
Qi Lou	209 WYNDOVER		[illegible]
Yuan Ren	79 Kimbal		[illegible]
Lisheng Chen	79 Kimbal		[illegible]
Jing Huang	71 Kimbal		[illegible]
Guo zhang	71. Kimbal		[illegible]

25

79 77 76. 74 71

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Karim Bouhaim	124 Pendant	Stonegate	[illegible]
Lamiaa Khayat	124 Pendant	Stonegate	[illegible]
Xiliang Zhou	187 Overbrook	Stongate	Xiliang Zhou
Ningyuan Liu	74 Sedgewick	Stonegate	[illegible]
Altaaf Dawdjee	53 Hearst	Stonegate	[illegible]
Guang Li	61 Ashdale	"	Guangli
Warasa Chotirani	170 Overbrook	Stonegate	W.T. Chotirani
Thanirat Chotirani	170 Overbrook	Stonegate	[illegible]
Ming Lin	61 Durham	"	Ming Lin
Yingzhe Wang	59 Durham		王英喆
YINGNAN Li	62 Durham		李英男
Jie Chen	62 Durham		陈洁
Zimei Li	62 Durham		李紫梅
YuYing Gao	62 Durham		高玉英
Vanessa Ji	141 Doverwood	Stonegate	[illegible]
Stephanie Tsang	64 Interlude	"	[illegible]
Quan Chen	103 Doverwood, Irvine CA 92620		[illegible]
Min Zhang	78 Hazelton	Stonegate	[illegible]
Yisheng Sun	78 Hazelton	Stonegate	[illegible]
Xiyun Sun	78 Hazelton	Stonegate	[illegible]
Eric Zhou	46 larkfield	stonegate	Eric
Steven Z.	46 larkfield	Stonegate	Steven
Xiaoxia Wu	71 Crestwick	Stonegate	吴晓霞
William Ma	36 Somerton	Stonegate	William Ma
Ting Bu	129 overbrook	stonegate	Ting Bu

25

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
YONGQING WANG	118 Saybrook	Mendocino	[signature]
Jianing Yang	118 saybrook	Mendocino	[signature]
Bo Pan	88 Medford	Stonegate	[signature]
Sha Liu	65 Elmdale	Stonegate	[signature]
Xueou Xia	50 Haviland	Stonegate	夏雪欧
Peter Hu	120 saybrook	stonegate	[signature]
Yongzhen Yang	74 ASHDALE	"	[signature]
FRANK Wang	104 Saybrook	"	[signature]
C. Cheng	106 Saybrook	"	[signature]
Peimei Ding	67 Crestwick	Stonegate	[signature]
Feng Xu	65 Ashdale	Stonegate	[signature]
Wenyi Tang	84 Melville	Stonegate	[signature]
Jing Chen	43 Lyndhurst	Stonegate	[signature]
Jennifer So	56 ROSSMORE	Stonegate	[signature]
NING HUANG	221 Kenyton	Stonegate	[signature]
Zena Fan	55 Rossmore	Stonegate	[signature]
Sheng Li	62 Ashdale.	Stonegate	[signature]
Dan Chen	51 sherwood	Stonegate	[signature]
WeiWei Yin	53 Rexford	Stonegate	[signature]
Behzad Nouri	117 Saybrook	"	[signature]
Jiang Li	68 Rossmore	Stonegate	[signature]
Kuki Gu	28 Sedgewick	Stonegate	[signature]
Zhong Yang	37 Diamond	Stonegate	[signature]
Irene Wan	84 cortland	Stonegate	[signature]
Hongmei Chen	80 Ashdale	STG	[signature]

25

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Jin Yu	34 Lyndhurst	Stonegate	[illegible]
Annie Chou	27 Lydhurst	StoneGate	Annie Chou
JAMES KUO	31 LYNDHURST	STONEGATE	[illegible]
LINDA KUO	31 LYNDHURST	STONGATE	[illegible]
Tao Wang	37 Lyndhurst	Stonegate	[illegible]
Hong Li	37 ~~bd~~ Lyndhurst	Stonegate	[illegible]
Jun Zhang	43 Lyndhurst	Stongte	Jun Zhang
Jing Zhou	43 Lyndhoarst	Stongte	Jing Zhou
Jie Wu	42 Lyndhurst	stonegate	[illegible]
Lina AI	42 Lyndhurst	stonegate	[illegible]
Wu Kun	88 Nassau	Stonegate	[illegible]
Minzhang	34 Lyndhurst	Stonegate	[illegible]
Haoran Zhang	34 Lyndhurst	Stonegate	[illegible]

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
SHU WANG	52 Fenway	Stonegate	Shu Wang
YINGXU LI	52 Fenway	Stonegate	Y. Li
Hui-mei Lin	63 Fenway	Stonegate	[illegible]
Linlin Guan	51 Westover	Stonegate	[illegible]
Bing Lin	51 Westover	Stonegate	[illegible]
Angela Liu	51 Westover	Stonegate	Angela Liu
9492360042 Houk Choi	53 Westover	Stonegate	[illegible]
Thomas	70 Sherwood	Stonegate	[illegible]
Sophia	70 Sherwood	Stonegate	[illegible]
Yan Zhang	71 Sherwood	Stonegate	[illegible]
Kai Kiley	64 Sherwood	Stonegate	[illegible]
~~sha sha wang~~	~~60 Sherwood~~	~~Stonegate~~	~~Sha Sha Wang~~
Youngmi Choi	54 Sherwood	Stonegate	[illegible]
Hong Shan	51 Stwin Way		Hong Shan
Brandon Chang	51 Fenway	Stonegate	[illegible]
Wenguang Liu	58 Sherwood	Stonegate	Wenguang Liu
Jia Liu	79 Fenway	Stonegate	[illegible]

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Xuesong Zhang	74 Fenway.	STG	[illegible]
Haiyun Wang	42 Norwich	STG	[illegible]
Yun Liu	36 Somerton	Stonegate	Yun Liu
Yanna Cheng	103 Doverwood, Irvine.	Stongate	[illegible]
Dixuan Fan	65 Rexford		[illegible]
Lihuang Yu	127 Doverwood, Irvine	stonggate	Lihua Yu
Songhua Ye	103 Doverwood, Irvine	stongate	SONG HUA YE
WeiFeng Liang	67 RexFord	stonegate	[illegible]
Kai Liu	113 Fair haven	Stonegate	[illegible]
Guang Yu Ma	36 Somerton	GuangYuMa	Guang Yu Ma
Min Zhang	34 Lyndhurst	Stonegate	[illegible]
Yin Yu	34 Lyndhurst	Stonegate	[illegible]
Pingping Wu	68 weston	stonegate	PingPing Wu
Shunquan Wang	63 Weston	stonegate	Shunquan Wang

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print) Home Address(required) Community Signature

Name (Print)	Home Address	Community	Signature
Kristine Li	52 Hearst, Irvine 92620	Stonegate	[signature]
ROBERT Tyler	52 HEARST, IRVINE 92620	STONEGATE	[signature]
Weibing Zhang	59 Dublin, Irvine 92620	Stonegate	[signature]
Xiaolan Zhang	59 Dublin Irvine 92620	Stonegate	[signature]
Hengying Jia	60 Walden, Irvine 92620	"	
Honggang Song	"	"	
Yitian Song	"	"	
Angela Chow	99 Coleridge Irvine 92620		[signature]
CAL NGUYEN	34 LACEBARK, Irvine, CA 92618	"	[signature]
Gurhan TORUNER	19108 Mirasol, Irvine 92620	Stonegate	[signature]
Katie Hong	77 Walden Irvine CA	Stonegate	[signature]
Vicky Chan	80 Walden Irvine CA	Stonegate	[signature]
Smitha Kancharla	21 Lacebark, Irvine CA	Stonegate east	K Smitha
GOKULAKANNAN	23208 VIRTUOSO, IRVINE CA	Stonegate east	[signature]

14

Against Syphon Reservoir Expansion Plan

Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Lei Shi	65 Interlude	STG	[illegible]

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Nana Huang	42 somerton	Stonegate	[illegible]
YIFENG MEI	42 somerton	Stonegate	[illegible]

Syphon Reservoir Improvement Project

The following list of residents have assembled to provide the comments stated herein, which we hereby submit to be part of the EIR for the Syphon Reservoir Improvement Project.

Name (required)	Address (required)
THEODORE LEE	73 WOODHILL
[illegible]	79 WOODHILL
Julie Nakagawa	79 Woodhill
Kevin Feng	75 Woodhill
Su Cui	75 Woodhill
Sandra Hu	78 Woodhill
Tony Tsai	80 Woodhill
Leo Yu	34 Lyndhurst
Junkyu Choi	50 Dunmore
Joseph Du	95 Coleridge

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Feng Wang	27 Norwich	stonegate	Feng Wang
Yue Yuan	123 Beechmont	Stonegate	[illegible]
Jiang Wu	123 Beechmont	Stonegato	[illegible]

Against Syphon Reservoir Expansion Plan

Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Jin Min Lian	54 Gainsbora	STG	Jin Min Lian
Yujing Nie	74 Diamond	STG	[illegible]
Linda Dong	35 Kingsbury	STG	Lindadong
Dongyu Cui	31 Coleridge	STG	[illegible]

Against Syphon Reservoir Expansion Plan Signature

Irvine, ~~CA 92620 Orange~~ ~~Stonegate~~ CA 92620

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Yin Yue	218 Shelbourne	Stonegate	Yin Yue
Yajing Yang	11308 Vinewoso		Yajing Yang
Amy wee	242 Mayfair	"	Amy Lee
Yasuyuki	55 Sedgewick		[illegible]
Li Qian Yang	27 Diamond	"	Li Qian Yang

5

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Liese Yu	34 Lyndhurst	stonegate	[illegible]

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print) Home Address(required) Community Signature

Name (Print)	Home Address	Community	Signature
Layla Sun	58 Elmdale Irvine 92620	Stonegate	[signature]
Hoyoung Kwak	58 Pendant Irvine 92620	Stonegate	[signature]
Joshua Ralls	28 Diamond Irvine, CA 92620	Stonegate	[signature]
Christiane Thadjini	107 Churchill, Irvine, CA 92620	Stonegate	[signature]
Dalys Kovacic	118 Fairhaven, Irvine CA	Stonegate	[signature]
Chiuwen L Cheng	54 Diamond. Irvine 92620	Stonegate	[signature]
Dennis Kush	1842 Brookshire Ave Tustin CA	Stonegate	[signature]
Kayleesh	5303 Virtuoso Irvine	Stonegate	[signature]
Youna Choi	1925 Crested Bird, Irvine	Stonegate	[signature]

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print) Home Address(required) Community Signature

Name (Print)	Home Address	Community	Signature
Anna Gao	58 Elmdale, Irvine 92620	Stonegate	
Yitian Song	59 Dublin, Irvine	Stonegate	

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Maria Sung	8201 Mirasol Irvine 92620	Stonegate	[illegible]
Chen Xiao Qing	113 saybrook Irvine, 92620	Stonegate	陈晓清
Yang Hahm	28 Somerton Irvine 92620	"	[illegible]
Vanessa Santor	202 [illegible]	"	[illegible]

Against Syphon Reservoir Expansion Plan

Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print)	Home Address(required)	Community	Signature
Helen Cho	52 Steinway Irvine	Stonegate	[illegible]
J. Tean	6C Carrington	Stonegate	[illegible]
Zhuo Zhang	65 Burmingham Irvine	〃	[illegible]
Cuoz Todesu	614 Piedmont	〃	[illegible]
Tracey Chu	53 Stanza, Irvine	〃	T. Chu
ShangYun Lee	40 Somerton Irvine, CA 92620	〃	[illegible]
Rosario Rodriguez	53 Rembrandt	〃	[illegible]
CHEUK YAN YANG	46 CORALWOOD, IRVINE, CA 92618	STONEGATE EAST	[illegible]
Mindy Chu	100 Diamond, Irvine 92620	Stonegate	[illegible]
Sasa Bahadori	77 Nassau, 92620	Stonegate	[illegible]
Negar Eslimi	106 Oasis, Irvine, CA 92620	Stonegate	[illegible]

11

Against Syphon Reservoir Expansion Plan Signature

Note: If you already signed this form somewhere else, please don't sign it again. Thank you.

Name (Print) Home Address(required) Community Signature

Name (Print)	Home Address	Community	Signature
Josephine Cheung	219 Cedarwood	Stonegate	[illegible]
Mi [illegible]	68 Interlude	Geon Garee	[illegible]
[illegible]	119 FAIRHAVEN	Stonegate	[illegible]
Jina Kim	13210 Virtuoso		[illegible]
GRACE SNEAD	75 Flower stalk	Stonegate ~~East~~	[illegible]
Meng Yuan	79 Fenway	Stonegate	meng
Sachin Chandramohan	109 Oasis	Stonegate	Sachin
Ramlah Farooq	131 Thornhurst	Stonegate	[illegible]
Jiauna Kim	21 Oakfield	Stonegate	[illegible]
SUSAN CHO	272 BANCROFT	Stonegate	[illegible]
[illegible]	56 Cumming	Stonegate	[illegible]
Anna Gao	58 Elmdale.	Stonegate	[illegible]

12

Jo Ann Corey - No to Syphon reservoir

From: Amy P <amyuyen777@gmail.com>
To: <SyphonEir@irwd.com>
Date: 9/16/2019 9:16 AM
Subject: No to Syphon reservoir

To Whom It May Concern:
I am a resident of Stonegate and am writing to voice my concern about the planned expansion of Syphon Reservoir by the Irvine Ranch Water District in regard to safety of our surrounding community and the financial implications from dam failure.
It has been brought to my attention that Stonegate Elementary School, which my daughter currently attends, is one of the two schools directly in the flood path should the dam be compromised. Within a matter of less than 10 minutes, give or take, our school will be be under 5-10 feet of water while Crean Lutheran Athletic Complex is projected at less than 5 minutes should this happen. What are the current measures being taken should this happen or to prevent it?
To me, it doesn't make sense to build a reservoir 10 times bigger when we currently haven't addressed these current issues. Count me as a no to building the Syphon reservoir.

--
Warmest regards,

Amy Pham
310-692-5225

Jo Ann Corey - Objection against 10 x extension of reserve

From: Justin Choi <JChoi@mercuryinsurance.com>
To: "syphoneir@irwd.com" <syphoneir@irwd.com>
Date: 9/16/2019 8:23 AM
Subject: Objection against 10 x extension of reserve

All Korean who leaves in Stonegate community has concerns about earth quake related flood.

Please stop or explain what kind of countermeasures you will place.

Thank you.
Justin Choi

Jo Ann Corey - Strongly disagree with the Syphon Reservoir Improvement Project

From: YP <yunpan2000@gmail.com>
To: <syphoneir@irwd.com>
Date: 9/16/2019 1:23 PM
Subject: Strongly disagree with the Syphon Reservoir Improvement Project

To whom who concerns,

As a Stonegate resident, we strongly disagree the extension of Syphon Reservoir project.

This will put our children and residents at risk in our densely populated areas. The current reservoir was constructed in 1949 at a time when the surrounding area did not have homes and schools, Irvine's landscape has changed considerably within the last few decades with an increased population near the existing reservoir's flood path.

So the first thing to do is to close it off instead of expanding.

Name: Yun Pan

Address: 60 Devonshire, Irvine CA 92620

Yun Pan

9/16/2019 1:22pm

WATER RESOURCES

SEP 16 2019

IRVINE RANCH
WATER DISTRICT

From: guo lina <lnguo@hotmail.com>
To: "syphoneir@irwd.com" <syphoneir@irwd.com>
Date: 9/16/2019 8:05 AM
Subject: Strongly against the extension of Syphone Reserviror

To whom who concerns,

As a Stonegate resident, we strongly disagree the project proposal for the extension of Syphone Reserviror. It will increase flood risk and put the community and elementary school to a dangerous place. Therefore, we strongly against this project and Please choose another place if need.

Thanks for your attention,
Best regards,
Lina Guo

55 Filbert, Irvine, 92620

Sent from my iPhone

WATER RESOURCES

SEP 16 2019

IRVINE RANCH
WATER DISTRICT

Jo Ann Corey - Concerned about Syphon Reservoir expansion

From: Pei Yang <yangpei@hotmail.com>
To: "syphoneir@irwd.com" <syphoneir@irwd.com>
Date: 9/16/2019 9:06 AM
Subject: Concerned about Syphon Reservoir expansion

Hello,

I'm emailing to express my, and all of our neighbor's deep concern of the expansion plan for the Syphon Reservoir near Stonegate community. It's great threat to the safety of our elementary school kids and the entire community. Please build it somewhere else where it's not so close to residential area and schools!

Thank you for listening to the residents voice!

Pei Yang (Stonegate resident)

Jo Ann Corey - Community concerns about Syphon reservoir & dam expansion. ATTN Jo Ann Corey, Environmental Compliance Specialist

From:	Amanda Yu <aescott83@gmail.com>
To:	<SyphonEIR@irwd.com>
Date:	9/16/2019 11:55 AM
Subject:	Community concerns about Syphon reservoir & dam expansion. ATTN Jo Ann Corey, Environmental Compliance Specialist
Attachments:	Stonegate against Syphon Expansion.docx; syphon reservoir expansion 9_2019 sig & ltr.pdf; CA00749_MD_Scenario1 (1).pdf; IRWD Petition

Good afternoon Mrs. Jo Ann Corey,

Attached is a word document letter & pdf supplemental with resident signatures as well as enlarged graphics detailing our neighborhood concerns regarding the Syphon reservoir & dam expansion.

There is also a pdf from a petition on change.org that has been circulating. Please refer to the word docx I have attached for our most recent updated version of the letter.

You have likely received more emails and letters sent from others in the community with additional signatures.

There may also be additional comment cards arriving this week, post marked prior to the Sept 16 4pm deadline.

I appreciate IRWD seriously taking into account the community & neighborhood's concern.

Cordially,
Amanda Scott-Yu

WATER RESOURCES

SEP 16 2019

IRVINE RANCH
WATER DISTRICT

Irvine Ranch Water District
Water Resources & Policy Department
15600 Sand Canyon Avenue
P.O. Box 57000
Irvine, CA 92619-7000

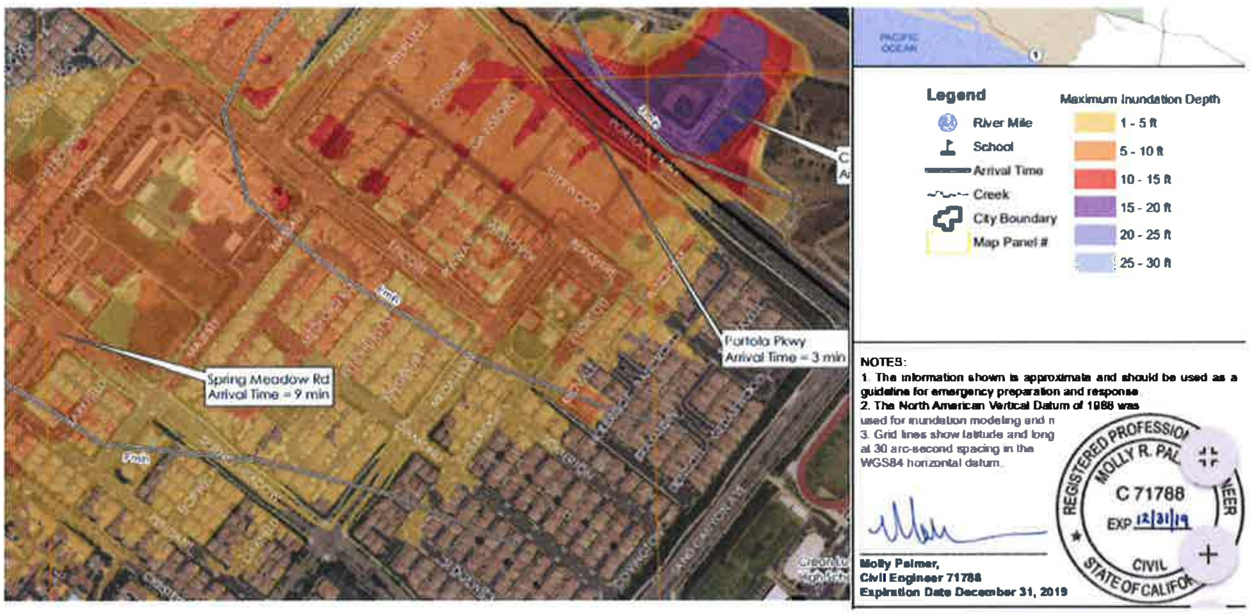
September 13, 2019

Re: IRWD Syphon Reservoir Improvement Project

Attn: Jo Ann Corey, Environmental Compliance Specialist

This letter is to provide our comments as requested by the public scoping meeting and express concern about the planned expansion of Syphon Reservoir by the Irvine Ranch Water District. The main concern is safety of the surrounding community.

Current inundation maps show two schools directly in the flood path. In the situation of a damn failure, the Crean Lutheran Athletic Complex is currently projected to be under 15-20 ft of water in less than 3 minutes. Stonegate Elementary School is projected to be under 5-10 feet of water in 6-9 minutes.

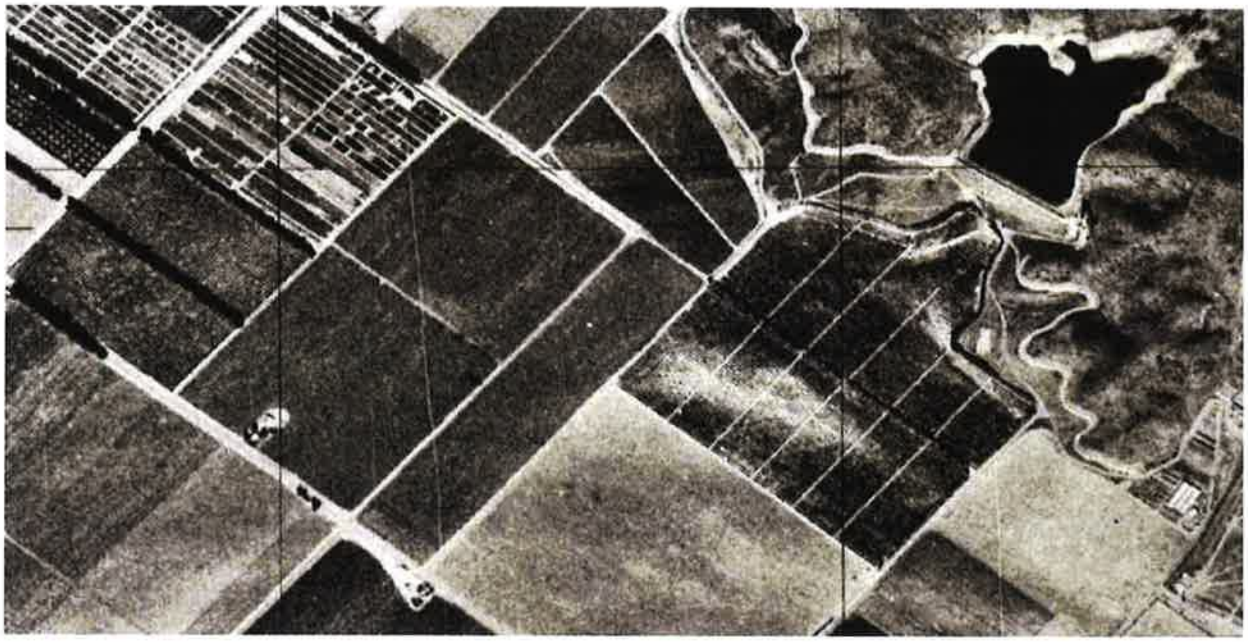


[adapted from https://fmds.water.ca.gov]

The projected increase in dam height from 59 feet to 136 feet and reservoir capacity from approximately 500 acre-feet (AF) of water to 5,000 AF of water would significantly worsen the scenario to the schools in case of a damn failure. This further increases the risk to the children of our community.

There is currently no document that illustrates the potential increased risk of flood to the surrounding community that would be expected from increasing the reservoir volume 10 times. The document "Notice of Preparation of an Environmental Impact Report" provided by Irvine Ranch Water District on August 2, 2019 conveniently avoids mentioning the hazard of dam failure. In case of a dam failure, there does not appear to be a viable spillway to divert water from schools and homes. The scenario of dam failure must be considered as reservoir is located in a seismically active area with the Puente Hills fault located just 4.3 miles away.

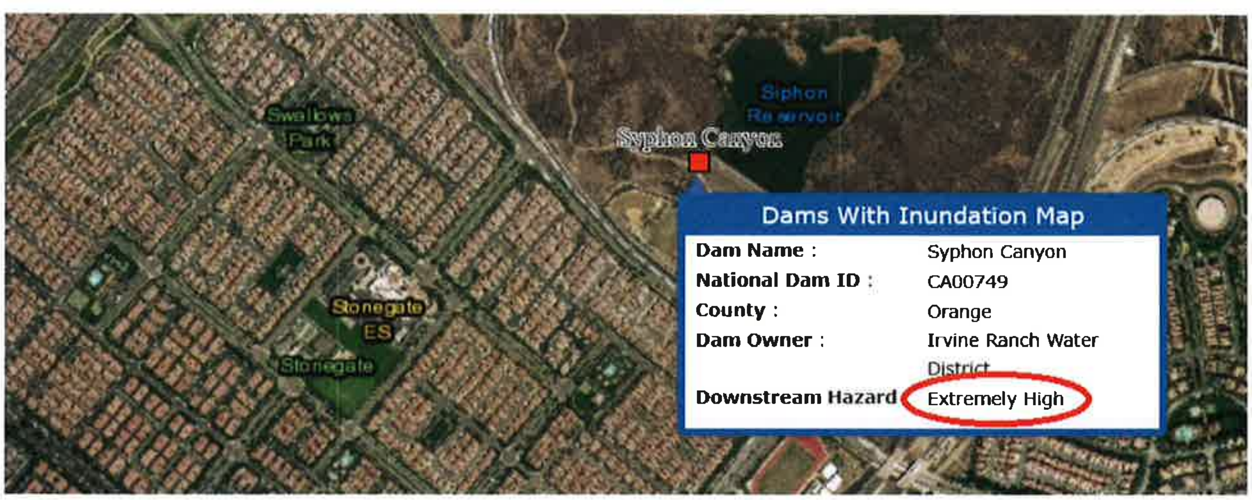
The current reservoir was constructed in 1949 at a time when the surrounding area did not have homes and schools, as seen the attached 1974 photo. Irvine's landscape has changed considerably within the last few decades with an increased population near the existing reservoir's flood path.



[adapted from https://ngmdb.usgs.gov]

Specific questions that we demand to be addressed prior to building of the damn is (1) How can IRWD guarantee our children's and community's safety with 5,000 AF of water at higher elevation so close homes and schools? (2) What emergency response plan can be expected to save thousands of lives in a few minutes in the setting of a catastrophic failure during an earthquake? (3) Will IRWD provide compensation to homeowners for flood insurance and potential diminished property values as a result of the reservoir expansion?

Given that the current state of downstream hazard at Syphon Reservoir is "Extremely High" according to the California Department of Water Resources, we demand not only to stop plans for expanding Syphon Reservoir, but also to use funds appropriated for the expansion to fortify the existing damn to bring it up to current code. Further, we demand distribution of up to date inundation maps and projected inundation maps to current community members. Lastly, we demand that the Environmental Impact Report (EIR) address the potential of loss of life and property in a dam failure.



[adapted from https://fmds.water.ca.gov]

The following list of residents have assembled to provide the comments stated herein, which we hereby submit to be part of the EIR for the Syphon Reservoir Improvement Project.

Syphon Reservoir Improvement Project

The following list of residents have assembled to provide the comments stated herein, which we hereby submit to be part of the EIR for the Syphon Reservoir Improvement Project.

Name (required)	Address (required)
RAJNI JOSHI	51 FILBERT, IRVINE, 92620
Amanda + Mike Yu	53 Filbert Irvine 92620
Lina Guo	55 Filbert, Irvine, 92620
Sojung Lee	50 Filbert Irvine 92620
Tina Anderson	52 ~~Filbert~~ Irvine 92620
SRI & KANTHI GUNTURI	54 FILBERT IRVINE 92620
Faisal Al Shubeeri	58 Filbert Irvine 92620
Kyong Chol Kim	60 Filbert Irvine 92620
TANVIR MAHTAB	62 DUBLIN IRVINE 92620
Avery Tang	81 Walden, Irvine, 92620
Chong Liu	81 Walden, Irvine, 92620
VEENA NANJWANI	50 DUBLIN, IRVINE, 92620
Yuan Feng + Jian Li	55 Dublin Irvine 92620
JEFF AND CATHY MURAI	51 HEARST, IRVINE, CA 92620
RYAN TRAN	57 FILBERT IRVINE 92620
Bonnie Hui-Callahan	79 Diamond, Irvine, CA 92620.
Tim Callahan	79 Diamond, Irvine, CA 92620.
Qing Ian Xu	
Jin zhang	
Mohammed bakesh	64 gainsboro
Hongyu Li	81 Devonshire, Irvine
Kevin Long	25 Lyndhurst, Irvine, CA 92620
Kuang Kwok	
Ren Hammond	110 Gemstone 92620
CHAKRI KUNAPAREDDY	

Earthquake Zones of Required Investigation
CGS Homepage
Esri World Geocoder
Legend
Colors may vary due to transparency and overlapping data.
Fault Traces
Accurately Located
Approximately Located
Approximately Located, Queried
Inferred
Inferred, Queried
Concealed
Concealed, Queried
Aerial Photo Lineament
Fault Zone
Liquefaction Zone
Landslide Zone
Liquefaction Landslide Overlap Zone
Area Not Evaluated for Liquefaction or Landslides
Parcels
Parcel is in an Earthquake Fault Zone, a Liquefaction Zone, and a Landslide Zone
Irvine Blvd
Jeffrey Rd
Kollwyn
Eastern-Trans-Corr-SB
Eastern-Trans-Corr-NB
Eastern-Transportation-Corridor
149
-117.709 33.717 Degrees

SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018

Legend

- River Mile
- School
- Arrival Time
- Creek
- City Boundary
- Map Panel #

Maximum Inundation Depth

- 1 - 5 ft
- 5 - 10 ft
- 10 - 15 ft
- 15 - 20 ft
- 20 - 25 ft
- 25 - 30 ft

NOTES:
1. The information shown is approximate and should be used as a guideline for emergency preparation and response.
2. The North American Vertical Datum of 1988 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum.

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

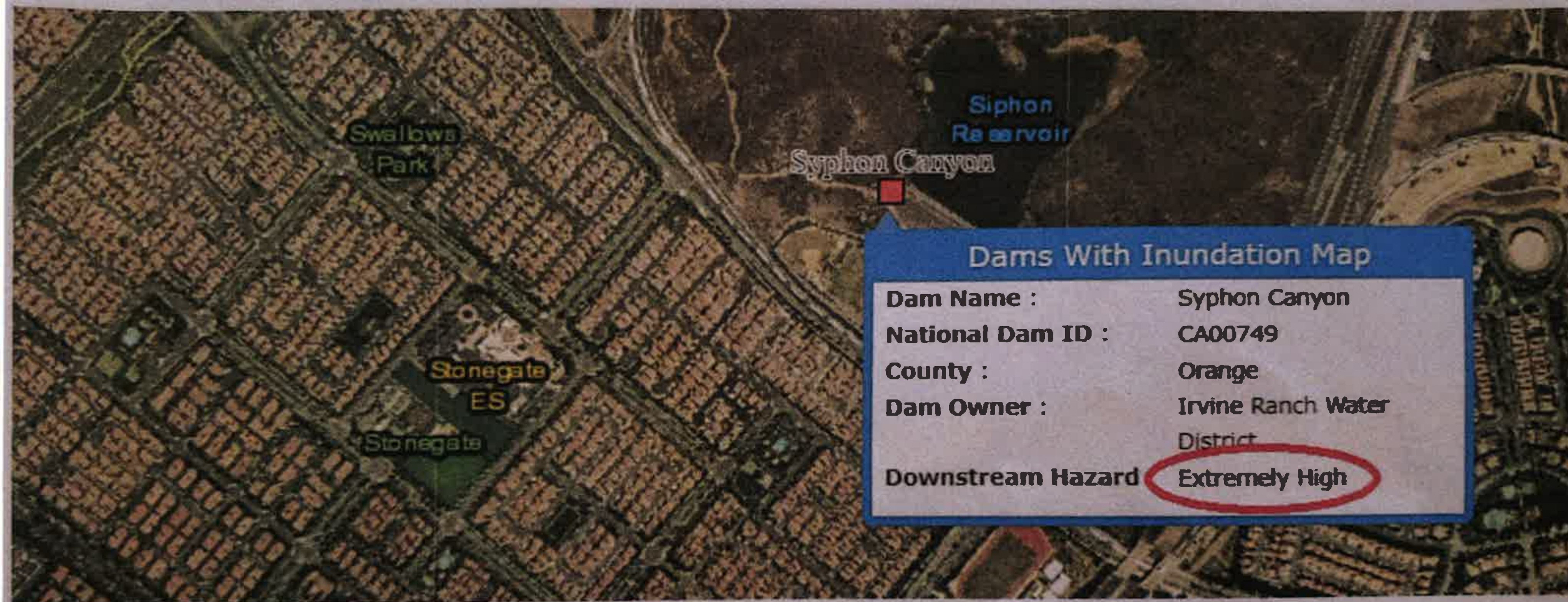
PANEL 1 of 8

Scale 1:6,000

0 250 500 750 Feet
0 100 200 Meters

N

STETSON ENGINEERS INC.



[adapted from https://fmds.water.ca.gov]

Frances
Kathryn
Syphon Canyon
Dam Name: Syphon Canyon, No. 1029-4
National Dam ID: CA00749
County: Orange
Dam Owner: Irvine Ranch Water District
Downstream Hazard: Extremely High
Main Dam
Scenario 1
This scenario shows an inundation extent for a sunny day failure of Main Dam.
Downloads
(1.97 KB)
CA00749 MD Scenario1.pdf (12.77 MB)
Inundation Boundary.zip (453.07 KB)
(105.88 MB)
Display
Inundation Boundary

Stonegate against Syphon Reservoir

S G started this petition to Irvine ranch water district

The construction of IRWD Syphon Reservoir presents a huge flooding risk to two school areas (Stonegate Elementary & Crean Lutheran Athletic Complex) and hundreds of homes in the Stonegate Community.

The projected increase in reservoir capacity from approximately 500 acre-feet (AF) to 5,000 AF (by raising the dam height from **59 feet to 136 feet)** would significantly worsen the scenario to the schools in case of a dam failure.

In the situation of a dam failure, the Crean Lutheran Athletic Complex is currently projected to be **under 15-20 ft of water in less than 3 minutes.** Stonegate Elementary School is projected to be **under 5-10 feet of water in 6-9 minutes.**

DEMAND THAT IRWD ENVIRONMENTAL IMPACT REPORT (EIR) ADDRESS THE POTENTIAL OF LOSS OF LIFE AND PROPERTY IN A DAM FAILURE SCENARIO.

More Information available at http://stonegatefloodrisk.info

Updates

Post an update

Keep your supporters engaged with a news update. Every update you post will be sent as a separate email to signers of your petition.

100 supporters — 2 days ago

S G started this petition — 3 days ago

Reasons for signing

I'm signing because...

Jyoti Razdan · 3 days ago

You cannot endanger schools and communities living close to this dam

♡ 1

Avi Rai · 3 days ago

Safety of the communities close by.

♡ 1

View all reasons for signing

175 have signed. Let's get to 200!

Irvine Ranch Water District: Stonegate against Syphon...

Share on Facebook

Send a Facebook message

Send an email to friends

Tweet to your followers

Copy link

Show this petition to more potential supporters

Promote this petition

Signatures

Name	Location	Date
Sri Gunturi	Irvine, CA	2019-09-13
Jake Gerrity	Irvine, CA	2019-09-13
Tom Kwolik	Irvine, CA	2019-09-13
Rachel Wong	Irvine, CA	2019-09-13
Lina Guo	Irvine, CA	2019-09-13
Carrie Gleason	Sedalia, US	2019-09-13
Amy Bui	La Habra, CA	2019-09-13
Cindy On	Irvine, CA	2019-09-13
Michael Yu	Irvine, CA	2019-09-13
Frank Wang	Irvine, CA	2019-09-13
Rajnj Joshi	Lakeside, CA	2019-09-13
Angela Huang	Irvine, CA	2019-09-13
rajani kumar	irvine, CA	2019-09-13
Joe Yan	Irvine, CA	2019-09-13
Shraddha Uphale	Irvine, CA	2019-09-13
Wei Chen	Irvine, CA	2019-09-13
CHUNLI weng	Irvine, CA	2019-09-13
Jason Zhang	Irvine, CA	2019-09-13
Shelly Han	Gardena, CA	2019-09-13
Smitha Kancharla	Irvine, US	2019-09-13

Name	Location	Date
Jie Gao	Irvine, CA	2019-09-13
Nirupama Krishnaiah	Irvine, CA	2019-09-13
Avi Rai	Irvine, CA	2019-09-13
Raj Yerapotini	Irvine, CA	2019-09-13
Ying Yu	Irvine, CA	2019-09-13
Na An	Irvine, CA	2019-09-13
JEAN Fen	Irvine, CA	2019-09-13
David li	Irvine, CA	2019-09-13
Yun Pan	Irvine, CA	2019-09-13
Vic Li	Irvine, CA	2019-09-13
Vani Juvvala	Irvine, CA	2019-09-13
Srini Kancharla	Irvine, US	2019-09-14
Vicky Yu	Irvine, CA	2019-09-14
Gargee Parikh	Mira Loma, CA	2019-09-14
Purvi Dave	Irvine, CA	2019-09-14
Bhuvana Nidadavolu	Irvine, CA	2019-09-14
Kiran Chalasani	Riverside, CA	2019-09-14
Narmada Gummadi	Irvine, US	2019-09-14
Manisha Prasad	Irvine, CA	2019-09-14
Tina Anderson	Irvine, CA	2019-09-14
Monica Bhagat	Irvine, CA	2019-09-14
shylesh nadig	Irvine, CA	2019-09-14

Name	Location	Date
Ritu Arora	Irvine, CA	2019-09-14
Jyoti Razdan	Irvine, CA	2019-09-14
ritu Taneja	Irvine, CA	2019-09-14
Lovely Goyal	Irvine, CA	2019-09-14
Hina Naita	Irvine, CA	2019-09-14
Anamika Bhattacharya	Irvine, CA	2019-09-14
Divya Sankhala	Irvine, CA	2019-09-14
Vidya Malepati	Costa Mesa, US	2019-09-14
Suma Gowdru	Irvine, CA	2019-09-14
Shiva Subramanya	Irvine, CA	2019-09-14
Manasi Pitkar	Irvine, CA	2019-09-14
Umesh Satyanarayana	Tustin, CA	2019-09-14
Div Swamy	Arcadia, CA	2019-09-14
Vidhi Laddha	Irvine, CA	2019-09-14
Uma Lakshmanan	Irvine, CA	2019-09-14
Amanda Yu	Irvine, CA	2019-09-14
Yolanda Chang	Irvine, CA	2019-09-14
Anand Karri	Irvine, CA	2019-09-14
Kavita Fatehpuria	Irvine, CA	2019-09-14
Appi reddy Kandikonda	Irvine, CA	2019-09-14
Srilatha Kandikonda	Irvine, CA	2019-09-14
Chetan Bhatnagar	Irvine, CA	2019-09-14

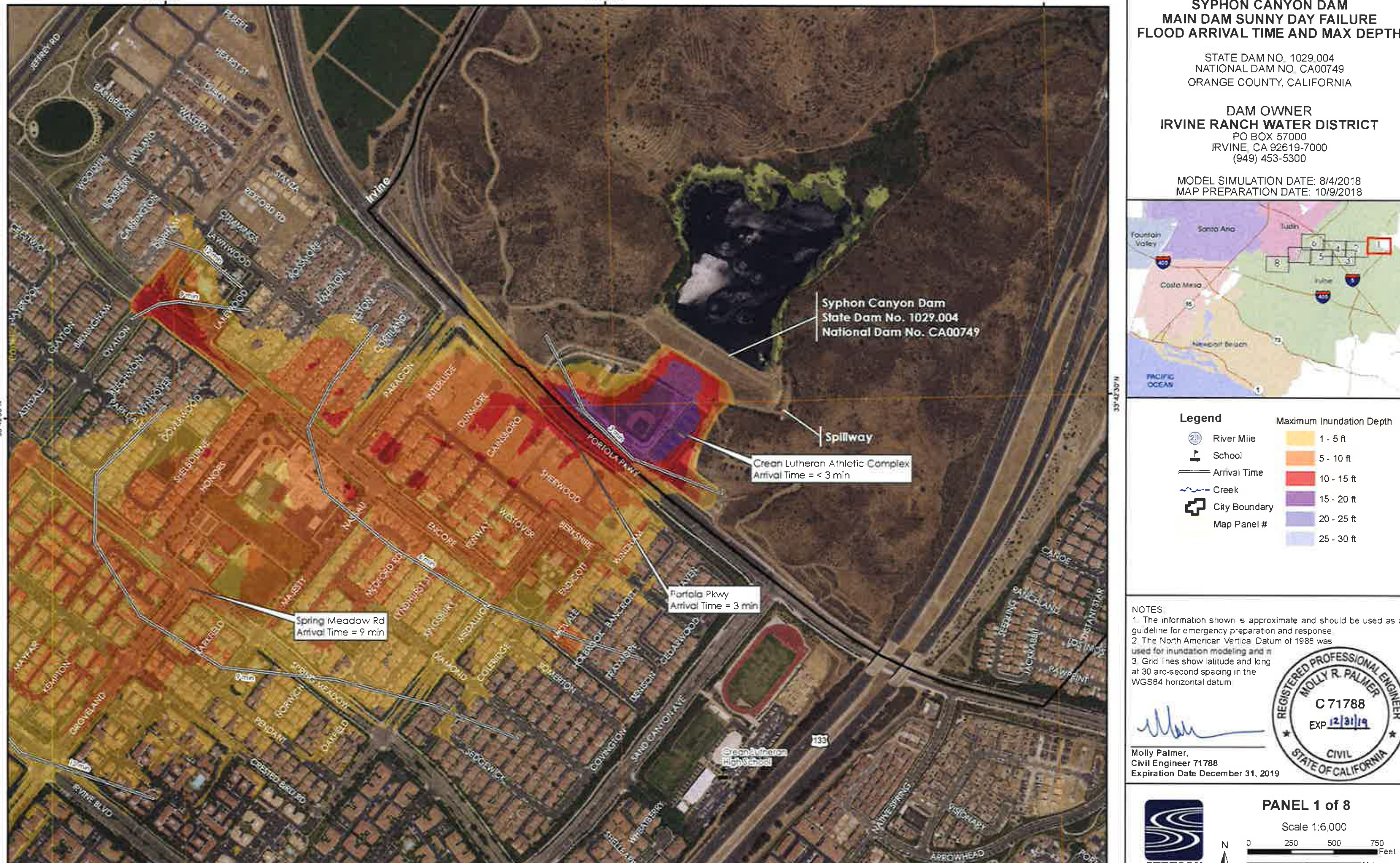
Name	Location	Date
Megh Govindu	Irvine, CA	2019-09-14
Yamini Krishnaswamy	Irvine, CA	2019-09-14
Subhankar BHATTACHARYA	Irvine, CA	2019-09-14
Mahesh Panchrapula	Irvine, CA	2019-09-14
Ben Singh	Irvine, CA	2019-09-14
Nikki Lienau	Irvine, CA	2019-09-14
Anamika Bhatia	Irvine, CA	2019-09-14
Alagiri Venkatachalapathy	Irvine, CA	2019-09-14
Jayanthi Thiruvengadam	Pomona, US	2019-09-14
Si Gilbert	Irvine, CA	2019-09-14
Rajani Pancharapula	Irvine, CA	2019-09-14
Ning Huang	Irvine, CA	2019-09-14
Michael Liao	Irvine, CA	2019-09-14
Joyce Lee	Irvine, CA	2019-09-14
Jiayi Huang	Irvine, CA	2019-09-14
yun liu	Irvine, CA	2019-09-14
Sukho Lee	Irvine, CA	2019-09-14
Shu An	Irvine, CA	2019-09-14
Cathy zhang	Irvine, CA	2019-09-14
Payal Kadakia	Irvine, CA	2019-09-14
Chong Liu	Irvine, CA	2019-09-14
nana huang	Irvine, CA	2019-09-14

Name	Location	Date
Srinivas Thetakali	Irvine, CA	2019-09-14
Ananth Raghavendra	Irvine, CA	2019-09-14
Mathew P	Mountain View, CA	2019-09-14
Wei yu	Irvine, CA	2019-09-14
Namrata Mansu	Irvine, CA	2019-09-14
Sanjay Dhar	Irvine, CA	2019-09-14
Sanjay Dhar	Irvine, CA	2019-09-14
John Wu	Irvine, CA	2019-09-14
Daniel Ohara	Irvine, CA	2019-09-14
Loc Vu	Irvine, CA	2019-09-14
Minh Huynh	Irvine, CA	2019-09-14
Paul Foucart	Irvine, CA	2019-09-14
YANBIN XU	Fontana, CA	2019-09-14
Aadra Lee	Irvine, CA	2019-09-14
Shafi Shaik	Irvine, CA	2019-09-14
Seema Shukla	Irvine, CA	2019-09-14
Qichen Wang	Irvine, CA	2019-09-14
xiao chen	Irvine, US	2019-09-14
Elena Cheng	Irvine, CA	2019-09-14
Vera Wang	Irvine, CA	2019-09-14
Derek Li	Irvine, CA	2019-09-14
Satish Natla	Irvine, CA	2019-09-14

Name	Location	Date
Kun Yang Kim	Irvine, CA	2019-09-14
Shirley Li	Irvine, CA	2019-09-14
Nan Ma	Irvine, CA	2019-09-14
Jiang Li	Irvine, CA	2019-09-14
rajeswari Dhurjati	Irvine, CA	2019-09-14
Sarah Hwang	Irvine, CA	2019-09-14
Deepa Agrawal	Irvine, CA	2019-09-14
fang xie	Irvine, CA	2019-09-14
Amit P	Irvine, CA	2019-09-14
Leon Chen	Irvine, CA	2019-09-14
Xia Yin	Irvine, CA	2019-09-14
Maggie Wong	San Clemente, CA	2019-09-14
Sudhakar Peddi	Irvine, CA	2019-09-14
Sachin ChandraMohan	Irvine, CA	2019-09-14
Hongwu Ren	Devonshire › Irvine, CA	2019-09-14
Sridevi Mallela	Irvine, CA	2019-09-14
Jimmy Wang	Irvine, CA	2019-09-15
Lawrence Hsu	Irvine, CA	2019-09-15
linda sexton	Poulsbo, US	2019-09-15
Maunil Mehta	Irvine, CA	2019-09-15
Joanne Vu	Irvine, CA	2019-09-15
Caroline Kelly	Tuscaloosa, US	2019-09-15

Name	Location	Date
Mathew Dickinson	Spokane Valley, US	2019-09-15
karyn Kronz	Anchorage, US	2019-09-15
Zahid Mehmood	Brooklyn, US	2019-09-15
Minh Tong	Irvine, CA	2019-09-15
Samreen Manjra	Irvine, CA	2019-09-15
Sadia Moinuddin	Anaheim, CA	2019-09-15
Yihong Zhang	Irvine, US	2019-09-15
Vanessa Jia	Irvine, CA	2019-09-15
KEVIN LIU	Irvine, CA	2019-09-15
Christine Bowe	Irvine, US	2019-09-15
Jing Liu	Irvine, CA	2019-09-15
Marie Myrlande Alfred	Miramar, US	2019-09-15
Cicy Shen	Irvine, CA	2019-09-15
James Chen	Irvine, CA	2019-09-15
Afsheen Manjra	Irvine, CA	2019-09-15
Bo Yao	Irvine, CA	2019-09-15
Jeff Murai	Irvine, CA	2019-09-15
Joy Lu	Irvine, CA	2019-09-15
Robert Tyler	Irvine, CA	2019-09-15
Bob Pan	Irvine, CA	2019-09-15
Kristine Li	Irvine, CA	2019-09-15
Jolly Jain	Irvine, CA	2019-09-15

Name	Location	Date
John Zhang	Irvine, CA	2019-09-15
Wenny Weng	Dana Point, CA	2019-09-15
yihe wang	Irvine, CA	2019-09-15
Sasa Bahadori	Oceanside, CA	2019-09-15
Annette Kim	Irvine, CA	2019-09-15
Carol Seto	Irvine, CA	2019-09-15
Martin Kim	Irvine, CA	2019-09-15
Susie Ergun	Irvine, CA	2019-09-16
Crystal Schreck	Irvine, CA	2019-09-16
Wayne Lee	Irvine, CA	2019-09-16
Yi-Ling Hsieh	Irvine, CA	2019-09-16
Kenneth Anderson	Irvine, CA	2019-09-16
Jia Zheng	Irvine, CA	2019-09-16
chongming Qiao	Irvine, CA	2019-09-16
Vivian Qian	Irvine, CA	2019-09-16
Wendy Ke	Irvine, CA	2019-09-16



SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018

Legend

- River Mile
- School
- Arrival Time
- Creek
- City Boundary
- Map Panel #

Maximum Inundation Depth

- 1 - 5 ft
- 5 - 10 ft
- 10 - 15 ft
- 15 - 20 ft
- 20 - 25 ft
- 25 - 30 ft

NOTES:
1. The information shown is approximate and should be used as a guideline for emergency preparation and response.
2. The North American Vertical Datum of 1988 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum.

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

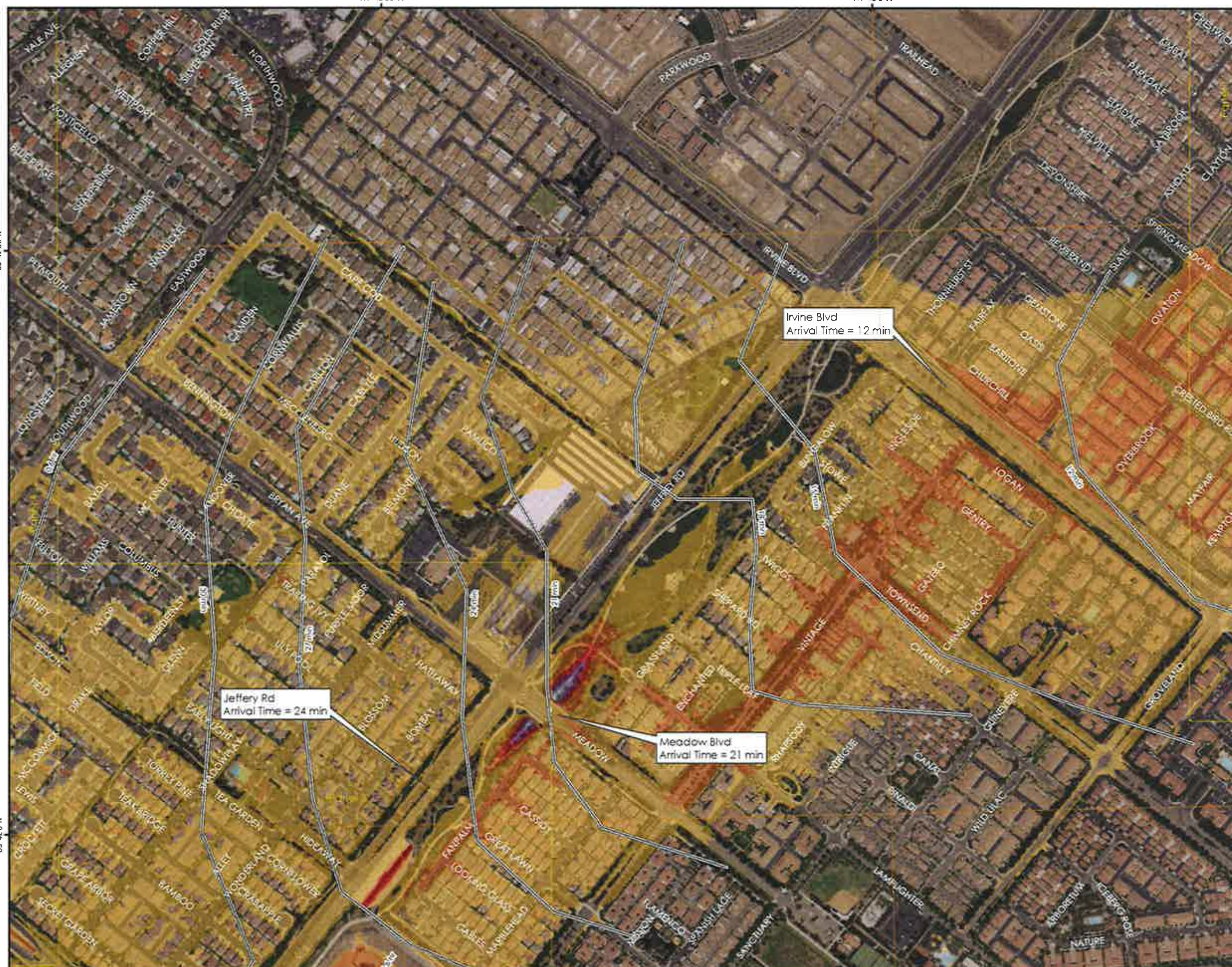
REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

STETSON ENGINEERS INC.

PANEL 1 of 8

Scale 1:6,000

0 250 500 750 Feet
0 100 200 Meters



SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018

Legend

- River Mile
- Arrival Time
- Creek
- City Boundary
- Map Panel #

Maximum Inundation Depth

- 1 - 5 ft
- 5 - 10 ft
- 10 - 15 ft
- 15 - 20 ft
- 20 - 25 ft
- 25 - 30 ft

NOTES:
1. The information shown is approximate and should be used as a guideline for emergency preparation and response
2. The North American Vertical Datum of 1986 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum

REGISTERED PROFESSIONAL ENGINEER MOLLY R. PALMER C 71788 EXP 12/31/19 CIVIL STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

STETSON ENGINEERS INC.

PANEL 2 of 8

Scale 1:6,000

N

0 250 500 750 Feet
0 100 200 Meters

SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018

Legend

- River Mile
- School
- Arrival Time
- Creek
- City Boundary
- Map Panel #

Maximum Inundation Depth

- 1 - 5 ft
- 5 - 10 ft
- 10 - 15 ft
- 15 - 20 ft
- 20 - 25 ft
- 25 - 30 ft

NOTES:
1. The information shown is approximate and should be used as a guideline for emergency preparation and response
2. The North American Vertical Datum of 1988 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

STETSON ENGINEERS INC.

PANEL 3 of 8

Scale 1:6,000

0 250 500 750 Feet
0 100 200 Meters

SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018

Legend

River Mile
Fire Station
School
Arrival Time
Creek
City Boundary
Map Panel #

Maximum Inundation Depth
1 - 5 ft
5 - 10 ft
10 - 15 ft

NOTES:
1. The information shown is approximate and should be used as a guideline for emergency preparation and response
2. The North American Vertical Datum of 1988 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

STETSON ENGINEERS INC.

PANEL 4 of 8

Scale 1:6,000

0 250 500 750 Feet
0 100 200 Meters

SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018

Legend

River Mile
Fire Station
School
Arrival Time
Creek
City Boundary
Map Panel #

Maximum Inundation Depth

1 - 5 ft
5 - 10 ft
10 - 15 ft

NOTES:
1. The information shown is approximate and should be used as a guideline for emergency preparation and response
2. The North American Vertical Datum of 1988 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum.

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

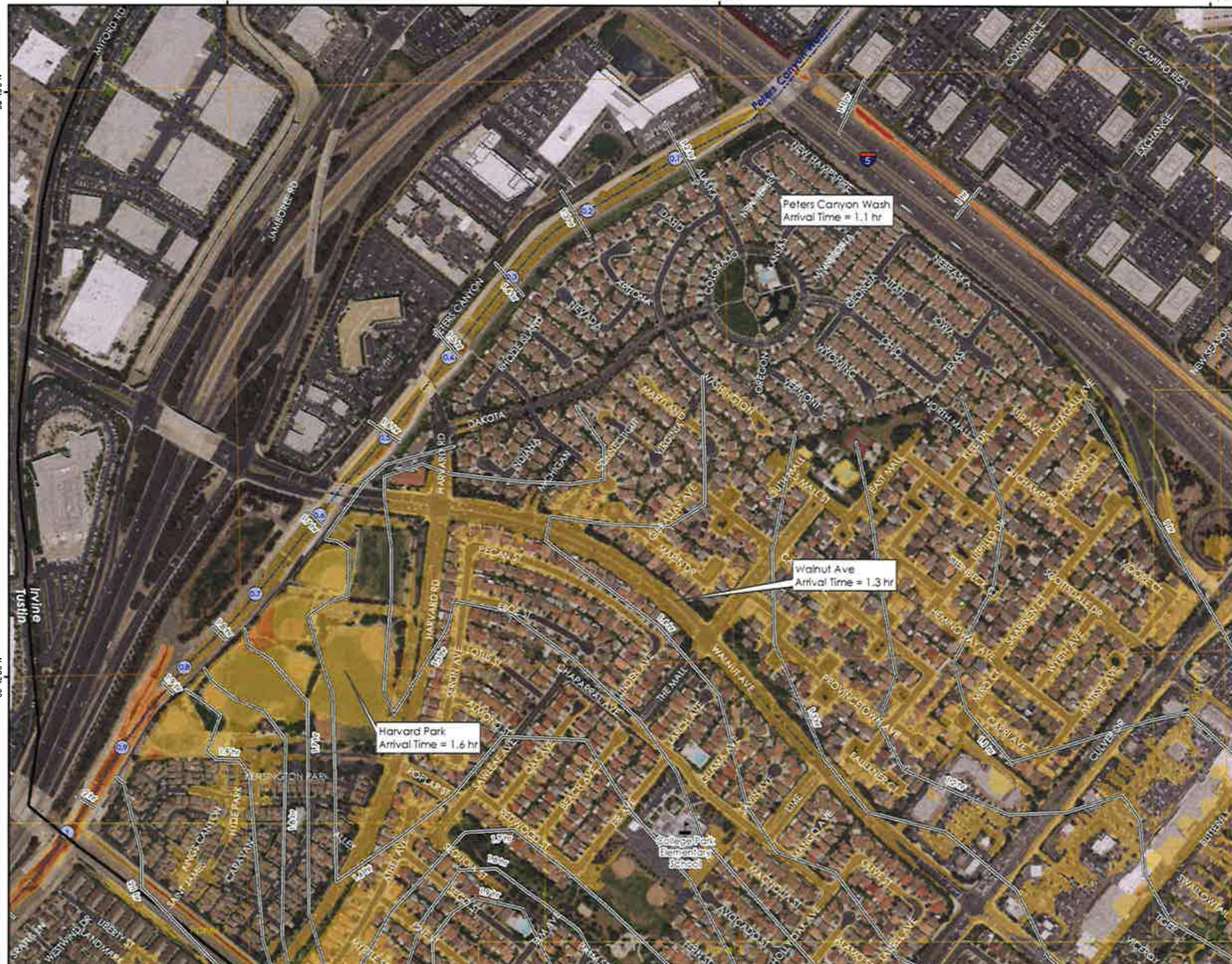
Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

STETSON ENGINEERS INC.

PANEL 5 of 8

Scale 1:6,000

0 250 500 750 Feet
0 100 200 Meters



SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018

Legend

- River Mile
- School
- Arrival Time
- Creek
- City Boundary
- Map Panel #

Maximum Inundation Depth

- 1 - 5 ft
- 5 - 10 ft
- 10 - 15 ft

NOTES
1. The information shown is approximate and should be used as a guideline for emergency preparation and response
2. The North American Vertical Datum of 1988 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum.

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

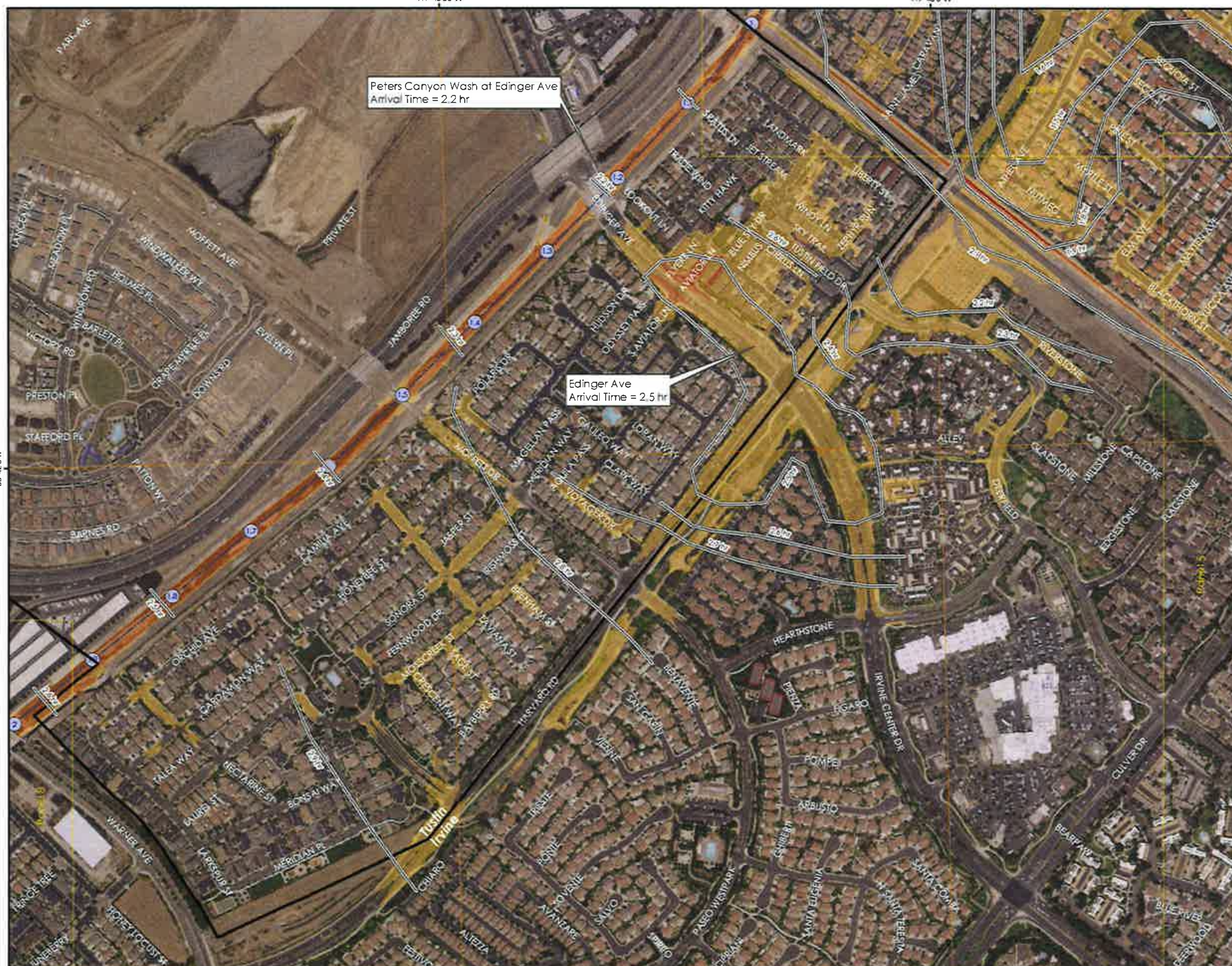
Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

STETSON ENGINEERS INC.

PANEL 6 of 8

Scale 1:6,000

0 250 500 750 Feet
0 100 200 Meters



SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018

Legend

- River Mile
- Arrival Time
- Creek
- City Boundary
- Map Panel #

Maximum Inundation Depth

- 1 - 5 ft
- 5 - 10 ft
- 10 - 15 ft

NOTES:
1. The information shown is approximate and should be used as a guideline for emergency preparation and response.
2. The North American Vertical Datum of 1988 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum.

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

STETSON ENGINEERS INC.

PANEL 7 of 8

Scale 1:6,000

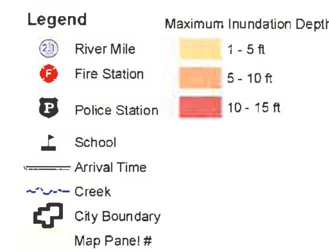
0 250 500 750 Feet
0 100 200 Meters

SYPHON CANYON DAM
MAIN DAM SUNNY DAY FAILURE
FLOOD ARRIVAL TIME AND MAX DEPTH

STATE DAM NO. 1029.004
NATIONAL DAM NO. CA00749
ORANGE COUNTY, CALIFORNIA

DAM OWNER
IRVINE RANCH WATER DISTRICT
PO BOX 57000
IRVINE, CA 92619-7000
(949) 453-5300

MODEL SIMULATION DATE: 8/4/2018
MAP PREPARATION DATE: 10/9/2018



NOTES
1. The information shown is approximate and should be used as a guideline for emergency preparation and response
2. The North American Vertical Datum of 1988 was used for inundation modeling and n
3. Grid lines show latitude and long at 30 arc-second spacing in the WGS84 horizontal datum

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

STETSON ENGINEERS INC.

PANEL 8 of 8

Scale 1:6,000

0 250 500 750 Feet
0 100 200 Meters

Attachment 8: Scoping Meeting Verbal Comments

IRWD Scoping Meeting – Syphon Reservoir Improvement Project
Public Comment Notes

Gregg La Cagnina, Stonegate resident

- Expresses understanding of project benefits
- Primary concern is safety of children in the Stonegate neighborhood, at Stonegate Elementary, and at Crean Lutheran High School
- States concern for lack of inundation zone mapping in the Notice of Preparation, and its impact on the community's ability to fully understand project impacts
- Flooding: How would the project affect home values and cost of insurance?
- States that flood risks associated with the project would add to the existent fire risks in the community
- Requests explanation for selection of project location, project size, lack of inundation map

Richard Zeng, Stonegate homeowner

- States agreement with concerns raised by Gregg La Cagnina
- States concern about costs and burdens associated with the project
- Requests that first evaluation of the project includes data that will allow the community to understand the costs and other effects on the community

Michele Jacknik

- Will the project trigger a requirement for flood insurance?

Jeffrey Beavers, Exec Officer, Crean Lutheran High School

- Looks forward to continuing dialogue with IRWD
- States concern for safety of students, families, faculty, and staff at Crean Lutheran high school
- Looks forward to learning more information about the safety features being implemented, and potentially learning about lower water rates as a result of using recycled water as part of a split water system

Tim Cheng, co-president, Asian American Senior Citizens Service Center (AASCSC)

- Asks if the reservoir will be open/accessible for public recreation after project completion, similar to the San Joaquin Marsh Reservoir

IRWD Scoping Meeting – Syphon Reservoir Improvement Project
Public Comment Notes

<u>Jeffrey Beavers Exec Officer, Crean Lutheran High School (x2)</u>

- Expresses appreciation for notices sent by IRWD regarding participation in the emergency evacuation planning process

<u>Michele Jacknick (X2)</u>

- States concern about project impacts to traffic on Sand Canyon Avenue during construction and onward

<u>Vivien Chen, Stonegate homeowner</u>

- Requests specifications for the dam (new length and width)
- Earthquake risks: How will safety features of the dam guarantee disaster prevention?
- States that water bills have increased dramatically over the past few years
- Requests information about additional water costs, and how the project will be funded

Appendix B

Air Quality and Greenhouse Gas Emissions Technical Report

ESA

SYPHON RESERVOIR IMPROVEMENT PROJECT

Air Quality and Greenhouse Gas Technical Report

Prepared for
Irvine Ranch Water District
15600 Sand Canyon Ave.
Irvine, CA 92618

March 2021

ESA

SYPHON RESERVOIR IMPROVEMENT PROJECT

Air Quality and Greenhouse Gas Technical Report

Prepared for
Irvine Ranch Water District
15600 Sand Canyon Ave.
Irvine, CA 92618

March 2021

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001
esassoc.com

ESA

D201700445.00

OUR COMMITMENT TO SUSTAINABILITY | ESA helps a variety of public and private sector clients plan and prepare for climate change and emerging regulations that limit GHG emissions. ESA is a registered assessor with the California Climate Action Registry, a Climate Leader, and founding reporter for the Climate Registry. ESA is also a corporate member of the U.S. Green Building Council and the Business Council on Climate Change (BC3). Internally, ESA has adopted a Sustainability Vision and Policy Statement and a plan to reduce waste and energy within our operations. This document was produced using recycled paper.

TABLE OF CONTENTS

Air Quality and Greenhouse Gas Technical Report

Page

Appendices

List of Figures

List of Tables

ACRONYMS AND ABBREVIATIONS

Acronym	Description
AAQS	Ambient Air Quality Standards
AB	Assembly Bill
AF	Acre feet
amsl	above mean sea level
AQMP	Air Quality Management Plan
BACT	Best available control technology
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAPCOA	California Air Pollution Control Officers
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	Methane
City	City of Irvine
CNRA	California Natural Resources Agency
CO	Carbon monoxide
CO_2e	Carbon dioxide equivalent
COG	Council of Governments
County	County of Orange
CPF	Cancer Potency Factor
DMV	Department of motor vehicles
DPM	Diesel Particulate Matter
GDP	Gross domestic product
GHG	Greenhouse Gas
GWP	Global warming potential
HAP	Hazardous air pollutants
HFC	hydrofluorocarbons
HI	Hazard Index
H_2S	Hydrogen Sulfide
I	Interstate
IPCC	Intergovernmental Panel on Climate Change
IRWD	Irvine Ranch Water District
kWh	Kilowatt hour
LCFS	Low Carbon Fuel Standard
$MTCO_2e$	Metric tons carbon dioxide equivalent

Acronym	Description
MMT	Million metric tons
NAAQS	National Ambient Air Quality Standards
NHTSA	National highway traffic safety administration
N_2O	Nitrous Oxide
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Oxides of nitrogen
OEHHA	Office of Environmental Health Hazard Assessment
Pavley	AB 1493
Pb	lead
PFC	perfluorocarbons
PM2.5	Particulate matter of 2.5 micrometers or less
PM10	Particulate matter of 10 micrometers or less
ppb	Parts per billion
ppm	Parts per million
Project	Syphon Reservoir Improvement Project
PVC	Polyvinyl chloride
REL	Recommended Exposure Level
ROG	Reactive organic gasses
RTP	Regional Transportation Plan
SAFE	Safer Affordable Fuel-Efficient vehicle rule
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SF_6	Sulfur hexafluoride
SIP	State implementation plan
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_2	Sulfur dioxide
SO_4^{2-}	sulfates
SRA	Source receptor area
TAC	Toxic air contaminant
URF	Unit Risk Factor
USEPA	U.S. Environmental Protection Agency
VMT	Vehicle miles traveled
VOC	Volatile organic compounds
ZEV	Zero-emission vehicles

EXECUTIVE SUMMARY

The purpose of this Air Quality and Greenhouse Gas Technical Report is to assess and discuss the impacts of potential air quality and greenhouse gas (GHG) emission impacts that may occur with the implementation of the proposed Syphon Reservoir Improvement Project (proposed project) located in unincorporated County of Orange and within the City of Irvine's (City) sphere of influence. The Syphon Reservoir is an existing recycled water storage reservoir in Irvine Ranch Water District's (IRWD's) service area. The proposed project would increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam. The proposed project would allow the storage of additional recycled water produced at the Michelson Water Recycling Plant (WRP) during periods of low demand (winter months) for use during periods of high demand (summer months).

The analysis describes the existing air quality and GHG environment in the vicinity of the project limits, estimates future air pollutant and GHG emissions resulting from construction and operation of the project, and identifies the potential for significant air quality and GHG emission impacts based on applicable threshold of significance. Air pollutant and GHG emissions calculation worksheets and technical data used in this analysis are provided in Appendices A through F of this report. The findings of the analyses are as follows:

- The incremental increase in regional emissions from construction of the project would exceed the regional significance thresholds for nitrogen oxides (NO_X) emissions set forth by the South Coast Air Quality Management District (SCAQMD). With implementation of mitigation measures, NO_X emissions would be reduced to below the regional NO_X significance threshold. Thus, construction of the Project with implementation of mitigation would not result in a regional violation of applicable air quality standards or jeopardize the timely attainment of such standards in the South Coast Air Basin (the Air Basin).
- The increase in on-site emissions from construction of the Project would exceed the localized significance threshold for NO_X emission set forth by the SCAQMD. With implementation of mitigation measures, NO_X emissions would be reduced to below the localized NO_X significance threshold. Thus, construction of the Project with implementation of mitigation would not result in a localized violation of applicable air quality standards or expose off-site receptors to substantial levels of regulated air contaminants.
- The incremental increase in regional emissions from operation of the Project would not exceed the regional significance thresholds set forth by the SCAQMD. Thus, operation of the Project would not result in a regional violation of applicable air quality standards or jeopardize the timely attainment of such standards in the Air Basin.
- The increase in on-site emissions from operation of the Project would not exceed the localized significance thresholds set forth by the SCAQMD. Thus, operation of the Project would not result in a localized violation of applicable air quality standards or expose off-site receptors to substantial levels of regulated air contaminants.

- Emissions from the increase in traffic due to operation of the Project would not have a significant impact upon 1-hour or 8-hour local carbon monoxide (CO) concentrations due to mobile source emissions. Thus, the Project would not result in a localized violation of CO air quality standards or expose off-site receptors to substantial levels of CO emissions.
- Construction of the Project would not generate emissions of toxic air contaminants (TAC) that would exceed the SCAQMD health risk significance threshold of an incremental increase in cancer risk of 10 in one million. However, with implementation of mitigation measures required to reduce regional and local emissions, TAC emissions would be further reduced. Thus, construction of the Project would not expose off-site receptors to substantial levels of regulated air contaminants.
- Operation of the Project would not generate TAC emissions that would exceed the SCAQMD health risk significance threshold of an incremental increase in cancer risk of 10 in one million. Thus, operation of the Project would not expose off-site receptors to substantial levels of regulated air contaminants.
- Construction and operation of the Project would not result in the generation of odors affecting a substantial number of people. Therefore, odor impacts would be less than significant.
- The Project would not conflict with applicable strategies in the SCAQMD Air Quality Management Plan and would not exceed growth projections for the area. The Project would not result in a significant cumulative air quality impact.
- The Project would not result in the generation of GHG emissions that would have a significant impact and would not conflict with applicable plans, policies and strategies to reduce GHG emissions. The Project would not result in significant GHG emission impacts.

SECTION 1
Introduction

The Syphon Reservoir is an existing recycled water storage reservoir in IRWD's service area. The proposed project would increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam. The proposed project would allow the storage of additional recycled water produced at the Michelson WRP during periods of low demand (winter months) for use during periods of high demand (summer months).

This Air Quality and GHG Technical Report evaluates the Syphon Reservoir Improvement Project's potential air quality impacts and GHG emissions, as well as its potential cumulative impacts. The Air Quality analysis describes and evaluates the pollutant emission and related air quality impacts that could result from construction and operation of the proposed project. The report contains: (1) a description of the existing land uses as they pertain to air emissions; (2) a summary of the federal, State, and local regulations related to air quality, including those set forth within the SCAQMD Air Quality Management Plan (AQMP), and applicable County of Orange (County) plans; and (3) an analysis of the potential impacts related to air quality associated with the implementation of the proposed project, as well as identification of potentially feasible measures that could mitigate significant impacts.

The GHG analysis addresses the potential impacts of GHG emissions from the proposed project. The section contains: (1) a summary of the relationship between GHG emissions and global climate change; (2) an overview of applicable plans, policies, and regulations related to GHG emissions; (3) an assessment of current GHG emissions at the County, State, national, and global levels; (4) a quantitative analysis of future GHG emissions associated with construction and operation of the proposed project; and (5) an analysis of the consistency of the proposed project with applicable regulations, plans, and policies to reduce GHGs as set forth by the State of California, SCAQMD, Southern California Association of Governments (SCAG) and the County of Orange.

The objectives of this air quality and GHG report are to:

1. Describe the existing air quality and GHG environment and regulatory framework for the Project;
2. Evaluate the project's construction and operational-related air quality and GHG emissions and the potential for significant impacts;
3. For identified significant impacts, provide feasible mitigation measures to reduce impacts.

The analysis was developed based on project-specific construction and operational characteristics of the proposed project as provided by IRWD and included in Appendix A. Calculations and modeling outputs are included in Appendix B through F.

The assumptions and GHG modeling included in this analysis is used in detail to inform the modeling of the Energy Impacts for the Draft EIR. While the energy impacts are discussed separately in the Energy section of the Draft EIR, the additional modeling and summary results of the energy analysis are included as Appendix G to this document.

1.1 Project Location

The proposed project would be implemented within IRWD's service area at the location of the existing Syphon Reservoir, northeast of Portola Parkway between Bee Canyon Access Road and State Route 133 (SR-133) in the County of Orange. The Crean Lutheran High School Athletic Complex is located between Portola Parkway and the toe of the existing dam. Residential neighborhoods are located on the southwest side of Portola Parkway. The ground surrounding the reservoir is hilly with ridgelines and terraced slopes.

1.2 Existing Site Conditions

The existing engineered dam is comprised of compacted on-site geologic materials, approximately 59 feet high, with a crest length of 843 feet and width of 10 to 12 feet. The surface area of the existing reservoir is approximately 28 acres when filled to capacity, and the current capacity of the reservoir below the existing spillway crest is approximately 535 acre-feet (AF). The 2011 topography survey of the dam indicates its crest is at an elevation of 387.7 feet above mean sea level (amsl).

The existing dam spillway was constructed as a 12-foot wide, broad-crested weir, located at the left abutment of the dam with a crest at 380 feet amsl. The reservoir would not receive water from rivers or streams. The reservoir includes a small watershed that is approximately 205 acres and not capable of generating significant amounts of runoff that need to be managed through the use of the spillway.

1.3 Project Description

The proposed project primarily involves the expansion of three on-site facilities: Syphon Reservoir Dam, Syphon Reservoir, and the Syphon Treatment Facilities. Other operational design features would include an internal seepage control system within the new engineered dam; a circulation/aeration system for the reservoir; new onsite access and maintenance roads; a wetland mitigation area; and potential recreational facilities.

The delivery of recycled water to and from Syphon Reservoir would be accomplished with existing offsite facilities. Modifications to offsite facilities would be limited to the addition of pumps within the existing structures as further described below. Existing offsite conveyance facilities would be used to deliver tertiary-treated recycled water from the Michelson WRP to the Eastwood Recycled Water Pump Station, and then to Syphon Reservoir via an existing 36-inch recycled water pipeline. The pump station structure is currently under construction. When completed, the Eastwood Recycled Water Pump Station can accommodate the Syphon Reservoir Improvement Project with additional pump equipment. Installation of the additional pump equipment would be coordinated as a separate "equipping project" in parallel to the construction of the proposed Syphon Reservoir improvements. The existing Highline Canal would be abandoned in place and no longer used to deliver water to Syphon Reservoir from IRWD's Rattlesnake Reservoir. Under normal operating conditions, all flow out of Syphon Reservoir would be conveyed back to Eastwood Recycled Water Pump Station through the same 36-inch recycled water pipeline, for connection to IRWD's recycled water distribution system.

1.3.1 Dam Replacement

The proposed project would replace the existing engineered dam with a new engineered dam, which would be an earth-fill embankment with upstream and downstream slopes. Onsite materials would be obtained from excavation of the existing earthen embankment dam and spillway, excavation below the new dam footprint and borrow excavations within the existing and proposed reservoir area. The proposed project would require an estimated 2.3 million cubic yards of fill, of which approximately 2.2 million cubic yards would be available onsite. Approximately 0.1 million cubic yards (100,000 cubic yards) of material would be imported from offsite sources, including rock, gravel and other materials required to construct portions of the dam. Similar to the existing dam, it is a requirement of the California Department of Water Resources, Division of Safety of Dams requirements that a spillway be included with the new dam to protect the reservoir from overtopping. The new spillway would be constructed and lined with reinforced concrete to prevent erosion of the abutment and embankment materials.

1.3.2 Reservoir Enlargement

The replacement dam would increase the reservoir's capacity from approximately 500 AF to approximately 5,000 AF. The existing reservoir ground surface would be excavated non-uniformly to obtain approximately 2.2 million cubic yards of material to construct the new engineered dam.

A new approximately 42-inch inlet/outlet conduit would be constructed to connect two proposed inlet/outlet ports along the north-facing reservoir slope to the existing onsite 36-inch inlet/outlet pipeline that ends near the toe of the existing dam. Similar to the existing reservoir, the proposed project would require a water circulation/aeration system to maintain water quality within the reservoir. The water circulation/aeration system will be detailed during final design, but would likely consist of a compressed air distribution system or surface mixer/aeration system.

1.3.3 Treatment Facilities

The existing strainer and disinfection facilities would be demolished, reconstructed and expanded at the toe of the new dam to provide filtration, chlorination and de-chlorination facilities (treatment facilities). The treatment facilities could be constructed at one of two locations, both of which are located close to the toe of the existing dam. The layout would consist of an enclosed masonry building. The footprint of the proposed treatment facilities would be determined during the detailed design, but is anticipated to be approximately 40 feet by 160 feet. A masonry block wall building would house the storage tanks, metering pumps, and control system.

1.3.4 Access and Maintenance Roads

The primary access point for construction traffic and future IRWD operation and maintenance is anticipated to be from the intersection at Portola Parkway and Sand Canyon Avenue. As part of the proposed project, the existing intersection and associated traffic lights would be modified to allow construction and future IRWD access through the intersection into the District's property. Construction vehicles and IRWD vehicles would also leave the site through the same intersection. Cross walks and associated pedestrian signals would also be modified to allow safe pedestrian crossing in both directions.

An unpaved road currently exists on the District's property in the vicinity of the intersection at Portola Parkway and Sand Canyon Avenue, which was used to access and maintain the existing Highline Canal. As part of the proposed project, this dirt road would be utilized and improved to allow two lanes (one in each direction) for ingress and egress for the construction and IRWD operation traffic. As part of the access road improvements, it is anticipated that excavation into the existing slope and construction of a retaining wall may be necessary to allow trucks to make the left turn onto the existing highline canal road after passing through the intersection. Potential secondary construction access may be considered through existing IRWD maintenance roads off of Bee Canyon Access Road. If used, these roads would be considered as one-way access points and limited to specific construction activities as further determined during the detailed design phase.

1.3.5 On-Site Wetland and Riparian and Mitigation Areas

At least 12.3 acres of riparian/wetland habitat consisting of native woody riparian vegetation and freshwater marsh habitat is proposed to be established onsite to replace habitat displaced by construction. Both freshwater marsh and woody riparian vegetation are proposed to be placed within a large patch at the northeast end of the proposed reservoir. Also, much of the woody riparian replacement habitat would be situated within a strip that would extend around the proposed reservoir at the same elevation as the planned water surface elevation when the reservoir is full. A shallow trough would be constructed around the reservoir perimeter (excluding the dam face), which would support native trees and shrubs (e.g., willows, mulefat, etc.) forming a belt of riparian vegetation around the upper edge of the artificial lake. In addition to reserving a strip around the edge of the expanded reservoir for woody riparian habitat, an approximately 6- to 8-acre wetland area would also be established within a flat area extending northeast of the expanded reservoir.

1.3.6 Recreational Facilities

During project design, IRWD would consider passive recreational facilities compatible with the project site. Recreational facilities could include a walking trail along existing access roads at the project site. This proposed walking trail could be located in the south and west portions of the project site, beginning at the new permanent access road at Portola Parkway and Sand Canyon Avenue and traveling along that route, across the dam crest, and following the alignment of the existing Highline Canal, which would be abandoned with implementation of the proposed project. Offsite recreational facilities are not part of this project and would be analyzed under separate environmental review if/when future offsite recreational facilities are established. Final design would determine the appropriateness and location of the proposed walking trail on existing access roads and any other optional recreational facilities.

1.3.7 Additional Geotechnical Investigations

IRWD previously completed a comprehensive geotechnical investigation of the site from which the resulting data would be used during final design to develop the detailed construction documents. During the design phase, additional geotechnical investigations may need to be performed. If additional investigations are deemed necessary, the investigations may include the performance of exploratory test pits, soil borings, packer testing, and/or non-intrusive geologic investigations and observations. The additional geotechnical investigations, if needed, would remain within the proposed limits of disturbance defined by the project and would be mitigated as part of the overall project.

1.3.8 Technical Advisory Group

During the design phase, IRWD intends to establish an independent Technical Advisory Group (TAG) comprised of nationally recognized industry experts in the disciplines of dam geology/site characterization, seismic analysis, hydrology/hydraulics, dam construction, and potential failure mode analysis and RIDM. The purpose of the TAG is to provide an independent assessment of the design development including, but not limited to, review of design criteria, design details, technical approach, and other aspects of the design engineer’s work to confirm the project design is in full compliance with governing standards and requirements.

1.4 Project Construction

Construction of the proposed project is estimated to require a total of 41 months. The preconstruction activities would begin in the fall of 2022 and would involve approximately 5 months of access road improvements. Preconstruction would be followed by approximately 36 months for construction of the new dam, reservoir, and associated facilities, depending on weather conditions and other variables. Construction is currently anticipated to begin in 2023. Most construction activities would be limited to 7:00 a.m. to 7:00 p.m. Monday through Friday and 9:00 am to 6:00 p.m. on Saturday. If construction work is conducted outside of these hours, IRWD would secure a variance/waiver from the appropriate entity. Construction of the proposed project would include activities implemented in phases as outlined below, which may involve overlap. Construction of the proposed project would include activities implemented in phases as outlined below in **Table 1**, which may involve overlap.

TABLE 1
CONSTRUCTION SCHEDULE

Phases	Start Date	End Date
Preconstruction Activities		
Drain Reservoir[a]	9/12/2022	2/24/2023
Vegetation Clearing	9/12/2022	11/4/2022
Access Routes/Intersection Improvements	9/12/2022	1/27/2023
Excavation of Sediment/Existing Dam		
Mobilization, site prep/Staging Areas	1/30/2023	3/24/2023
Upstream Excavation and Foundation Treatment	3/27/2023	8/11/2023
Dam Excavation and Foundation Treatment	8/14/2023	11/3/2023
Construction of Dam/Spillway/Reservoir		
Install Inlet/Outlet	9/25/2023	11/10/2023
Install Embankment to Bottom of Blanket Drain	11/13/2023	1/5/2024
Install Blanket Drain	1/8/2024	3/29/2024
Install Chimney/Remaining Embankment	4/1/2024	2/28/2025
Spillway Construction	12/9/2024	4/25/2025
Construction of Filtration/Chlor/Dechlor Facility	3/3/2025	1/30/2026
Wetlands/Riparian Installation	3/3/2025	5/23/2025
Installation of Recreation Facilities	4/2/2025	7/18/2025
Demobilization	2/2/2026	3/13/2026

Notes:
a) This phase was not modeled as it is remote activity that requires no on-site work.

Source: IRWD, 2020

1.5 Air Quality and Greenhouse Gas Fundamentals

1.5.1 Air Quality

Criteria Pollutants

Elevated concentrations of certain air pollutants in the atmosphere have been recognized to cause notable health problems and consequential damage to the environment either directly or in reaction with other pollutants. In the United States, such pollutants have been identified and are regulated as part of the overall endeavor to prevent further deterioration and facilitate improvement in air quality. The following pollutants are regulated by the United States Environmental Protection Agency (USEPA) and are subject to emissions control requirements adopted by federal, State and local regulatory agencies. These pollutants are referred to as “criteria air pollutants” as a result of the specific standards, or criteria, which have been adopted pertaining to them. The USEPA established the National Ambient Air Quality Standards (NAAQS) to “provide public health protection, including protecting the health of ’sensitive’ populations such as asthmatics, children, and the elderly,” (USEPA 2016a) allowing “an adequate margin of safety” (42 USC Section 7409;

CAA Section 109). California Ambient Air Quality Standards (CAAQS) were "established to protect the health of the most sensitive groups in our communities" and "defines the maximum amount of a pollutant averaged over a specified period of time that can be present in outdoor air without any harmful effects on people or the environment" (CARB 2020a). NAAQS and CAAQS for each of the monitored pollutants and their effects on health are discussed below.

Ozone: Ozone is a secondary pollutant formed by the chemical reaction of volatile organic compounds (VOCs) and nitrogen oxides (NO_X) in the presence of sunlight under certain meteorological conditions, such as high temperature and stagnation episodes. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable.

According to the USEPA, ozone can cause the muscles in the airways to constrict potentially leading to wheezing and shortness of breath (USEPA 2019a). Ozone can make it more difficult to breathe deeply and vigorously; cause shortness of breath and pain when taking a deep breath; cause coughing and sore or scratchy throat; inflame and damage the airways; aggravate lung diseases such as asthma, emphysema and chronic bronchitis; increase the frequency of asthma attacks; make the lungs more susceptible to infection; continue to damage the lungs even when the symptoms have disappeared; and cause chronic obstructive pulmonary disease (USEPA 2019a).

Long-term exposure to ozone is linked to aggravation of asthma and is likely to be one of many causes of asthma development. Long-term exposures to higher concentrations of ozone may also be linked to permanent lung damage, such as abnormal lung development in children (USEPA 2019a). According to the California Air Resources Board (CARB), inhalation of ozone causes inflammation and irritation of the tissues lining human airways, causing and worsening a variety of symptoms, and exposure to ozone can reduce the volume of air that the lungs breathe in and cause shortness of breath (CARB 2020b).

The USEPA states that people most at risk from breathing air containing ozone include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers (USEPA 2019a). Children are at greatest risk from exposure to ozone because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, which increases their exposure (USEPA 2019a). According to CARB, studies show that children are no more or less likely to suffer harmful effects than adults; however, children and teens may be more susceptible to ozone and other pollutants because they spend nearly twice as much time outdoors and engaged in vigorous activities compared to adults (CARB 2020b). Children breathe more rapidly than adults and inhale more pollution per pound of their body weight than adults and are less likely than adults to notice their own symptoms and avoid harmful exposures (CARB 2020b). Further research may be able to better distinguish between health effects in children and adults (CARB 2020b).

Volatile Organic Compounds: VOCs are organic chemical compounds of carbon and are not "criteria" air pollutants themselves; however, in combination with NO_X they form ozone, and are regulated to prevent the formation of ozone (USEPA 2017a). According to CARB, some VOCs are highly reactive and play a critical role in the formation of ozone. Potential health effects of ozone exposure are discussed above. Other VOCs can result in adverse health effects from direct exposure and are classified by the State of California as toxic air contaminants or Hazardous Air Pollutants (HAPs) by the USEPA (CARB 2020c; USEPA 2018a). The health effects of VOCs, as Toxic Air contaminants/Hazardous Air Pollutants (TACs/HAPs), are discussed more thoroughly below.

VOCs are typically formed from combustion of fuels and/or released through evaporation of organic liquids. Fuel combustion can occur in internal combustion sources, such as motor vehicle usage, landscape and other portable equipment, and stationary generators, or external combustion, such as for water and space heating. Evaporation sources include fueling operations, consumer products (e.g., cleaning solutions), and architectural coatings (USEPA 2017b).

Nitrogen Dioxide (NO_2) and Nitrogen Oxide: NO_X is a term that refers to a group of compounds containing nitrogen and oxygen. As mentioned above, NO_X combines with VOCs to form ozone. The health effects associated with the formation of ozone were discussed above under Ozone. The primary compounds of air quality concern include NO_2 and nitric oxide (NO). Ambient air quality standards have been promulgated for NO_2, which is a reddish-brown, reactive gas (CARB 2020d).

The principal form of NO_X produced by combustion is NO, but NO reacts quickly in the atmosphere to form NO_2, creating the mixture of NO and NO_2 referred to as NO_X. Major sources of NO_X include emissions from cars, trucks and buses, power plants, and off-road equipment. The terms NO_X and NO_2 are sometimes used interchangeably. However, the term NO_X is typically used when discussing emissions, usually from combustion-related activities, and the term NO_2 is typically used when discussing ambient air quality standards. Where NO_X emissions are discussed in the context of the thresholds of significance or impact analyses, the discussions are based on the conservative assumption that all NO_X emissions would oxidize in the atmosphere to form NO_2.

According to the USEPA, short-term exposures to NO_2 can potentially aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to emergency rooms while longer exposures to elevated concentrations of NO_2 may contribute to the development of asthma and potentially increase susceptibility to respiratory infections (USEPA 2016b). According to CARB, controlled human exposure studies that show that NO_2 exposure can intensify responses to allergens in allergic asthmatics (CARB 2020d).

In addition, a number of epidemiological studies have demonstrated associations between NO_2 exposure and premature death, cardiopulmonary effects, decreased lung function growth in children, respiratory symptoms, emergency room visits for asthma, and intensified allergic responses (CARB 2020d). Infants and children are particularly at risk from exposure to NO_2 because they have disproportionately higher exposure to NO_2 than adults due to their greater breathing rate for their body weight and their typically greater outdoor exposure duration while in adults, the greatest risk is to people who have chronic respiratory diseases, such as asthma and chronic obstructive pulmonary disease (CARB 2020d).

CARB states that much of the information on distribution in air, human exposure and dose, and health effects is specifically for NO_2 and there is only limited information for NO and NO_X, as well as large uncertainty in relating health effects to NO or NO_X exposure (CARB 2020d).

Carbon Monoxide (CO): CO is primarily emitted from combustion processes and motor vehicles due to the incomplete combustion of fuel, such as natural gas, gasoline, or wood, with the majority of outdoor CO emissions from mobile sources (CARB 2020e).

According to the USEPA, breathing air with a high concentration of CO reduces the amount of oxygen that can be transported in the blood stream to critical organs like the heart and brain and at very high levels, which are possible indoors or in other enclosed environments, CO can cause dizziness, confusion, unconsciousness and death (USEPA 2016c). Very high levels of CO are not likely to occur outdoors; however, when CO levels are elevated outdoors, they can be of particular concern for people with some types of heart disease since these people already have a reduced ability for getting oxygenated blood to their hearts and are especially vulnerable to the effects of CO when exercising or under increased stress (USEPA 2016c). In these situations, short-term exposure to elevated CO may result in reduced oxygen to the heart accompanied by chest pain also known as angina (USEPA 2016c).

According to CARB, the most common effects of CO exposure are fatigue, headaches, confusion, and dizziness due to inadequate oxygen delivery to the brain (CARB 2020e). For people with cardiovascular disease, short-term CO exposure can further reduce their body's already compromised ability to respond to the increased oxygen demands of exercise, exertion, or stress; inadequate oxygen delivery to the heart muscle leads to chest pain and decreased exercise tolerance (CARB 2020e). Unborn babies, infants, elderly people, and people with anemia or with a history of heart or respiratory disease are most likely to experience health effects with exposure to elevated levels of CO (CARB 2020e).

Sulfur Dioxide (SO_2): According to the USEPA, the largest source of SO_2 emissions in the atmosphere is the burning of fossil fuels by power plants and other industrial facilities while smaller sources of SO_2 emission include industrial processes such as extracting metal from ore; natural sources such as volcanoes; and locomotives, ships and other vehicle and heavy equipment that burn fuel with a high sulfur content (USEPA 2019b). In 2006, California phased-in the ultra-low-sulfur diesel regulation limiting vehicle diesel fuel to a sulfur content not exceeding 15 parts per million, down from the previous requirement of 500 parts per million, substantially reducing emissions of sulfur from diesel combustion (CARB 2004).

According to the USEPA, short-term exposures to SO_2 can harm the human respiratory system and make breathing difficult (USEPA 2019b). According to CARB, health effects at levels near the State one-hour standard are those of asthma exacerbation, including bronchoconstriction accompanied by symptoms of respiratory irritation such as wheezing, shortness of breath and chest tightness, especially during exercise or physical activity and exposure at elevated levels of SO_2 (above 1 parts per million [ppm]) results in increased incidence of pulmonary symptoms and disease, decreased pulmonary function, and increased risk of mortality (CARB 2020f). Children, the elderly, and those with asthma, cardiovascular disease, or chronic lung disease (such as bronchitis or emphysema) are most likely to experience the adverse effects of SO_2 (CARB 2020f; USEPA 2019b).

Particulate Matter (PM10 and PM2.5): Particulate matter air pollution is a mixture of solid particles and liquid droplets found in the air (USEPA 2018b). Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye while other particles are so small they can only be detected using an electron microscope (USEPA 2018b). Particles are defined by their diameter for air quality regulatory purposes: inhalable particles with diameters that are generally 10 micrometers and smaller (PM10); inhalable particles with diameters that are 2.5 micrometers or less (PM2.5) (USEPA 2018b). Thus, PM2.5 comprises a portion or a subset of PM10.

Sources of PM10 emissions include dust from construction sites, landfills and agriculture, wildfires and brush/waste burning, industrial sources, and wind-blown dust from open lands (CARB 2020g). Sources of PM2.5 emissions include combustion of gasoline, oil, diesel fuel, or wood (CARB 2020g). PM10 and PM2.5 may be either directly emitted from sources (primary particles) or formed in the atmosphere through chemical reactions of gases (secondary particles) such as SO_2, NO_X, and certain organic compounds (CARB 2020g).

According to CARB, both PM10 and PM2.5 can be inhaled, with some depositing throughout the airways; PM10 is more likely to deposit on the surfaces of the larger airways of the upper region of the lung, while PM2.5 is more likely to travel into and deposit on the surface of the deeper parts of the lung, which can induce tissue damage, and lung inflammation (CARB 2020g). Short-term (up to 24-hours duration) exposure to PM10 has been associated primarily with worsening of respiratory diseases, including asthma and chronic obstructive pulmonary disease, leading to hospitalization and emergency department visits (CARB 2020g). The effects of long-term (months or years) exposure to PM10 are less clear, although studies suggest a link between long-term PM10 exposure and respiratory mortality. The International Agency for Research on Cancer published a review in 2015 that concluded that particulate matter in outdoor air pollution causes lung cancer (CARB 2020g).

Short-term exposure to PM2.5 has been associated with premature mortality, increased hospital admissions for heart or lung causes, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and restricted activity days. Long-term exposure to PM2.5 has been linked to premature death, particularly in people who have chronic heart or lung diseases, and reduced lung function growth in children (CARB 2020g). According to CARB, populations most likely to experience adverse health effects with exposure to PM10 and PM2.5 include older adults with chronic heart or lung disease, children, and asthmatics. Children and infants are more susceptible to harm from inhaling pollutants such as PM10 and PM2.5 compared to healthy adults because they inhale more air per pound of body weight than do adults, spend more time outdoors, and have developing immune systems (CARB 2020g).

Lead (Pb): Major sources of lead emissions include ore and metals processing, piston-engine aircraft operating on leaded aviation fuel, waste incinerators, utilities, and lead-acid battery manufacturers (USEPA 2017c). In the past, leaded gasoline was a major source of lead emissions; however, the removal of lead from gasoline has resulted in a decrease of lead in the air by 98 percent between 1980 and 2014 (USEPA 2017c).

Lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system, and affects the oxygen carrying capacity of blood (USEPA 2017c). The lead effects most commonly encountered in current populations are neurological effects in children, such as behavioral problems and reduced intelligence, anemia, and liver or kidney damage (CARB 2020h). Excessive lead exposure in adults can cause reproductive problems in men and women, high blood pressure, kidney disease, digestive problems, nerve disorders, memory and concentration problems, and muscle and joint pain (CARB 2020h).[1]

Other Criteria Pollutants (California Only)

The California Ambient Air Quality Standards regulate the same criteria pollutants as the NAAQS but in addition, regulate State-identified criteria pollutants, including sulfates, hydrogen sulfide, visibility-reducing particles, and vinyl chloride (CARB 202a). With respect to the State-identified criteria pollutants (i.e., sulfates, hydrogen sulfide, visibility reducing particles, and vinyl chloride), the Project would either not emit them (i.e., hydrogen sulfide and vinyl chloride), or they would be accounted for as part of the pollutants estimated in this analysis (i.e., sulfates and visibility reducing particles). For example, visibility reducing particles are associated with particulate matter emissions and sulfates are associated with SO_2 emissions. Both particulate matter and SO_2 are included in the emissions estimates for the project. A description of the health effects of the State-identified criteria air pollutants is provided below.

Sulfates (SO_4^{2-}): Sulfates in the environment occur as a result of SO_2 (sulfur dioxide) being converted to SO_4^{2-} compounds in the atmosphere where sulfur is first oxidized to SO_2 during the combustion process of sulfur containing, petroleum-derived fuels (e.g., gasoline and diesel fuel) (CARB 2020i). Exposure to SO_4^{2-}, which are part of PM2.5, results in health effects similar to those from exposure to PM2.5 including reduced lung function, aggravated asthmatic symptoms, and increased risk of emergency department visits, hospitalizations, and death in people who have chronic heart or lung diseases (CARB 2020i). Population groups with higher risks of experiencing adverse health effects with exposure to SO_4^{2-} include children, asthmatics, and older adults who have chronic heart or lung diseases (CARB 2020i).

Hydrogen Sulfide (H_2S): H_2S is a colorless gas with a strong odor of rotten eggs. The most common sources of H_2S emissions are oil and natural gas extraction and processing, and natural emissions from geothermal fields. Industrial sources of H_2S include petrochemical plants and kraft paper mills. H_2S is also formed during bacterial decomposition of human and animal wastes, and is present in emissions from sewage treatment facilities and landfills (CARB 2020j). Exposure to H_2S can induce tearing of the eyes and symptoms related to overstimulation of the sense of smell, including headache, nausea, or vomiting; additional health effects of eye irritation have only been reported with exposures greater than 50 ppm, which is considerably higher than the odor threshold (CARB 2020j). H_2S is regulated as a nuisance based on its odor detection level; if the standard were based on adverse health effects, it would be set at a much higher level (CARB 2020j). According

1 While the SCAQMD CEQA Air Quality Handbook contains a thresholds of significance of significance for lead, project construction and operation would not include sources of lead emissions and would not exceed the thresholds of significance for lead. Unleaded fuel and unleaded paints have virtually eliminated lead emissions from commercial land use projects such as the Project. As a result, lead emissions are not further evaluated.

to CARB, there are insufficient data available to determine whether or not some groups are at greater risk than others (CARB 2020j).

Visibility-Reducing Particles: Visibility-reducing particles are any particles in the atmosphere that obstruct the range of visibility by creating haze (CARB 2020k). These particles vary in shape, size and chemical composition, and come from a variety of natural and manmade sources including windblown metals, soil, dust, salt, and soot. Other haze-causing particles are formed in the air from gaseous pollutant (e.g., sulfates, nitrates, organic carbon particles) which are the major constituents of fine PM, such as PM2.5 and PM10, and are caused from the combustion of fuel. CARB's standard for visibility reducing particles is not based on health effects, but rather on welfare effects, such as reduced visibility and damage to materials, plants, forests, and ecosystems. The health impacts associated with PM2.5 and PM10 are discussed above under Particulate Matter.

Vinyl Chloride: Vinyl chloride is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products and are generally emitted from industrial processes and other major sources of vinyl chloride have been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents (CARB 2020l). Short-term health of effects of exposure to high levels of vinyl chloride in the air include central nervous system effects, such as dizziness, drowsiness, and headaches while long-term exposure to vinyl chloride through inhalation and oral exposure causes liver damage and has been shown to increase the risk of angiosarcoma, a rare form of liver cancer in humans (CARB 2020l). Most health data on vinyl chloride relate to carcinogenicity; thus, the people most at risk are those who have long-term exposure to elevated levels, which is more likely to occur in occupational or industrial settings; however, control methodologies applied to industrial facilities generally prevent emissions to the ambient air (CARB 2020l).

Air Toxics

Toxic Air Contaminants (TACs): TACs, or hazardous air pollutants (HAPs) as defined by the USEPA, are defined as those contaminants that are known or suspected to cause serious health problems, but do not have a corresponding ambient air quality standard (USEPA 2017d). For consistency within this document they will be referred to as TACs. TACs are also defined as an air pollutant that may increase a person's risk of developing cancer and/or other serious health effects. TACs are emitted by a variety of industrial processes such as petroleum refining, electric utility and chrome plating operations, commercial operations such as gasoline stations and motor vehicle exhaust. TACs may exist as PM10 and PM2.5 or as vapors (gases). TACs include metals, other particles, gases absorbed by particles, and certain vapors from fuels and other sources. The emission of a TAC does not automatically create a health hazard. Other factors, such as the amount of the TAC, its toxicity, how it is released into the air, the weather, and the terrain, all influence whether the emission could be hazardous to human health. Emissions of TACs into the air can be damaging to human health and to the environment. Human exposure to TACs at sufficient concentrations and durations can result in cancer, poisoning, and rapid onset of sickness, such as nausea or difficulty in breathing. Other less measurable effects include immunological, neurological, reproductive, developmental, and respiratory problems. TACs deposited onto soil or into lakes and streams affect ecological systems and eventually human health through consumption of contaminated food. The carcinogenic potential of TACs is a particular public health concern because many scientists currently believe that there is no "safe" level of exposure to carcinogens. Any exposure to a carcinogen poses some risk of contracting cancer (CARB 2020m).

The public's exposure to TACs is a significant public health issue in California. The Air Toxics "Hotspots" Information and Assessment Act is a State law requiring facilities to report emissions of TACs to air districts (CARB 2020n). The program is designated to quantify the amounts of potentially HAPs released, the location of the release, the concentrations to which the public is exposed, and the resulting health risks. The State Air Toxics Program (AB 2588) identified over 200 TACs, including the 188 TACs identified in the Clean Air Act (CAA) (CARB 2020m).

The USEPA has assessed this expansive list and identified 21 TACs as Mobile Source Air Toxics (MSATs) (USEPA 2004). MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. USEPA also extracted a subset of these 21 MSAT compounds that it now labels as the nine priority MSATs: 1,3-butaidene, acetaldehyde, acrolein, benzene, diesel particulate matter (DPM)/diesel exhaust organic gases, ethylbenzene, naphthalene, and polycyclic organic matter (POM). While these nine MSATs are considered the priority transportation toxics, USEPA stresses that the lists are subject to change and may be adjusted in future rules (USDOT 2016).

Diesel Exhaust: According to the California Almanac of Emissions and Air Quality, the majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most important being particulate matter from the exhaust of diesel-fueled engines, i.e., DPM (CARB 2020o). DPM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances.

Diesel exhaust is composed of two phases, gas and particle, and both phases contribute to the health risk. The gas phase is composed of many of the urban HAPs, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde and polycyclic aromatic hydrocarbons. The particle phase is also composed of many different types of particles by size or composition. Fine and ultra-fine diesel particulates are of the greatest health concern and may be composed of elemental carbon with adsorbed compounds such as organic compounds, sulfate, nitrate, metals and other trace elements. Diesel exhaust is emitted from a broad range of diesel engines; the on-road diesel engines of trucks, buses and cars and the off-road diesel engines that include locomotives, marine vessels and heavy-duty equipment. Although DPM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present.

The most common exposure to DPM is breathing air that contains diesel exhaust. The fine and ultra-fine particles are respirable (similar to PM2.5), which means that they can avoid many of the human respiratory system defense mechanisms and enter deeply into the lung. Exposure to DPM comes from both on-road and off-road engine exhaust that is either directly emitted from the engines or lingering in the atmosphere.

Diesel exhaust causes health effects from long-term chronic exposures. The type and severity of health effects depends upon several factors including the amount of chemical exposure and the duration of exposure. Individuals also react differently to different levels of exposure. There is limited information on exposure to only DPM, but there is enough evidence to indicate that inhalation exposure to diesel exhaust causes chronic health effects as well as having cancer-causing potential.

Because it is part of PM2.5, DPM also contributes to the same non-cancer health effects as PM2.5 exposures. These effects include premature death, hospitalizations and emergency department visits for exacerbated chronic heart and lung disease, including asthma, increased respiratory symptoms, and decreased lung function in children. Several studies suggest that exposure to DPM may also facilitate development of new allergies. Those most vulnerable to non-cancer health effects are children whose lungs are still developing and the elderly who often have chronic health problems (CARB 2020o).

1.5.2 Greenhouse Gases

Global climate change refers to changes in average climatic conditions on Earth as a whole, including changes in temperature, wind patterns, precipitation and storms. Historical records indicate that global climate changes have occurred in the past due to natural phenomena; however, current data increasingly indicate that the current global conditions differ from past climate changes in rate and magnitude. Global climate change attributable to anthropogenic (human) GHG emissions is currently one of the most important and widely debated scientific, economic and political issues in the United States and the world. The extent to which increased concentrations of GHGs have caused or will cause climate change and the appropriate actions to limit and/or respond to climate change is the subject of significant and rapidly evolving regulatory efforts at the federal and state levels of government.

GHGs are compounds in the Earth's atmosphere that play a critical role in determining temperature near the Earth's surface. More specifically, these gases allow high-frequency shortwave solar radiation to enter the Earth's atmosphere, but retain some of the low frequency infrared energy that otherwise is radiated back from the Earth towards space, resulting in a warming of the atmosphere.

Not all GHGs possess the same capacity to induce atmospheric warming; as a result, the warming contribution of a GHG is commonly quantified in the common unit of carbon dioxide equivalent (CO_2e) over a 100-year period, by applying the appropriate global warming potential (GWP) value.[2] By using the applicable GWP for each GHG, Project-related emissions can be tabulated in the common unit of metric tons per year CO_2e. GWP ratios are provided by the Intergovernmental Panel on Climate Change (IPCC). Historically, GHG emission inventories were calculated using the GWPs from the IPCC's Second Assessment Report (SAR), published in 1996. The IPCC has since updated the GWP values based on the latest science in its Fourth Assessment Report (IPCC AR4) and Fifth Assessment Report (IPCC AR5), published in 2007 and 2014, respectively (IPCC

[2] GWPs and associated CO_2e values were developed by the IPCC, and published in its Second Assessment Report (SAR) in 1996. Historically, GHG emission inventories have been calculated using the GWPs from the IPCC's SAR. The IPCC updated the GWP values based on the latest science in its AR4. The CARB reports GHG emission inventories for California using the GWP values from the IPCC AR4.

2007; IPCC 2014). California Air Resources Board (CARB) uses the AR4 GWPs in the statewide GHG emissions inventory, in the current Climate Change Scoping Plan, and in the current version of the California Emissions Estimator Model (CalEEMod®) that is used to calculate CO_2e values for construction as well as operations for existing and proposed project build-out conditions. Compounds that are regulated as GHGs are discussed below (CARB 2019; CARB 2017a; CAPCOA 2017).

Carbon Dioxide (CO_2): CO_2 is the most abundant anthropogenic GHG in the atmosphere and is primarily generated from fossil fuel combustion from stationary and mobile sources. CO_2 is the reference gas (GWP of 1) for determining the GWPs of other GHGs. CO_2 accounted for approximately 83 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Methane (CH_4): CH_4 is emitted from biogenic sources (i.e., resulting from the activity of living organisms), incomplete combustion in forest fires, anaerobic decomposition of organic matter in landfills, manure management, and leaks in natural gas pipelines. The GWP of CH_4 is 25 in the IPCC AR4. CH_4 accounted for approximately 9 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Nitrous Oxide (N_2O): N_2O produced by human-related sources including agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. The GWP of N_2O is 298 in the IPCC AR4. N_2O emissions accounted for approximately 3 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Hydrofluorocarbons(HFCs): HFCs are fluorinated compounds consisting of hydrogen, carbon, and fluorine. They are typically used as refrigerants in both stationary refrigeration and mobile air conditioning systems. The GWPs of HFCs range from 124 for HFC-152a to 14,800 for HFC-23 in the IPCC AR4. HFCs and PFCs (see below) combined accounted for approximately 5 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Perfluorocarbons (PFCs): PFCs are fluorinated compounds consisting of carbon and fluorine. They are primarily created as a byproduct of aluminum production and semiconductor manufacturing. The GWPs of PFCs range from 7,390 to 17,700 in the IPCC AR4.

Sulfur Hexafluoride (SF_6): SF_6 is a fluorinated compound consisting of sulfur and fluoride. It is a colorless, odorless, nontoxic, nonflammable gas. It is most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity. SF_6 has a GWP of 22,800 in the IPCC AR4. SF_6 emissions accounted for less than 1 percent of anthropogenic GHG emissions (CO_2e) in California in 2016.

Effects of Global Climate Change

The scientific community's understanding of the fundamental processes responsible for global climate change has improved over the past decade, and its predictive capabilities are advancing. However, there remain scientific uncertainties in, for example, predictions of local effects of climate change, occurrence, frequency, and magnitude of extreme weather events, effects of aerosols, changes in clouds, shifts in the intensity and distribution of precipitation, and changes in oceanic circulation. Due to the complexity of and inability to accurately model Earth's climate system, the uncertainty surrounding climate change may never be completely eliminated. Nonetheless, the IPCC's AR5 states that it is extremely likely that the dominant cause of the observed warming since the mid-20th century is the anthropogenic increase in GHG concentrations (IPCC 2014). A report from the National Academy of Sciences concluded that 97 to 98 percent of the climate researchers most actively publishing in the field support the tenets of the IPCC in that climate change is very likely caused by human (i.e., anthropogenic) activity (Anderegg 2010).

The IPCC's AR4, found that the potential impacts in California due to global climate change include: loss in snow pack; sea-level rise; more extreme heat days per year; more high ozone days; more extreme forest fires; more severe droughts punctuated by extreme precipitation events; increased erosion of California's coastlines and sea water intrusion into the Sacramento and San Joaquin Deltas and associated levee systems; and increased pest infestation (OPR 2018). The Fourth Assessment's findings are consistent with climate change studies published by the California Natural Resources Agency (CNRA) since 2009, starting with the *California Climate Adaptation Strategy* as a response to the Governor's Executive Order S-13-2008. In 2014, the CNRA rebranded the first update of the 2009 adaptation strategy as the *Safeguarding California Plan* (CNRA 2009; CNRA 2014). The 2018 update to *Safeguarding California Plan* identifies hundreds of ongoing actions and next steps state agencies are taking to safeguard Californians from climate impacts within a framework of 81 policy principles and recommendations (CNRA 2018).

In 2016, the CNRA released *Safeguarding California: Implementation Action Plans* in accordance with Executive Order B-30-15, identifying a lead agency to lead adaptation efforts in each sector. In accordance with the 2009 *California Climate Adaptation Strategy*, the California Energy Commission (CEC) was directed to develop a website on climate change scenarios and impacts that would be beneficial for local decision makers. The website, known as Cal-Adapt, became operational in 2011 (Cal-adapt 2020). The information provided on the Cal-Adapt website represents a projection of potential future climate scenarios comprised of local average values for temperature, sea-level rise, snowpack and other data representative of a variety of models and scenarios, including potential social and economic factors.

Below is a summary of some of the potential effects that could be experienced in California as a result of global warming and climate change.

Temperature Increase

The primary effect of adding GHGs to the atmosphere has been a rise in the average global temperature. The impact of human activities on global temperature is readily apparent in the observational record. Since 1895, the contiguous United States has observed an average temperature increase of 1.5°F per century (NOAA 2019). The 5-year period between 2014 and 2018) is the warmest on record for the contiguous United States (NOAA 2019). The average temperature for the contiguous United States was 52.7 degrees Fahrenheit placing it at 0.7 degrees higher than the 20th century average and ranking 2019 within the warmest third of the 125 years of record with the 20 warmest years have occurred over the past 22-year period (NOAA 2020).

The Fourth Assessment indicates that average temperatures in California could rise 5.6°F to 8.8°F by the end of the century, depending on the global trajectory of GHG emissions (OPR 2018). According to the Cal-Adapt website, the portion of the state in which the project site is located could result in an average increase in temperature of approximately 4.2° to 6.9°F by 2070–2090, compared to the baseline period of 1961–1990.

With climate change, extreme heat conditions and heat waves are predicted to impact larger areas, last longer, and have higher temperatures. Heat waves, defined as three or more days with temperatures above 90°F, are projected to occur more frequently by the end of the century. Extreme heat days and heat waves can negatively impact human health. Heat-related illness includes a spectrum of illnesses ranging from heat stress, cardiovascular and respiratory complications, kidney disease, to severe heat exhaustion and life-threatening heat stroke (C2ES n.d.).

Wildfires

The hotter and dryer conditions expected with climate change will make forests more susceptible to extreme wildfires. One study found that, if GHG emissions continue to rise, the frequency of extreme wildfires burning over approximately 25,000 acres would increase by nearly 50 percent, and the average area burned statewide each year would increase by 77 percent, by the year 2100. In the areas that have the highest fire risk, wildfire insurance is estimated to see costs rise by 18 percent by 2055 and the fraction of property insured would decrease (Westerling 2018).

Air Quality

Higher temperatures, conducive to air pollution formation, could worsen air quality in California and make it more difficult for the state to achieve air quality standards. Climate change may increase the concentration of ground-level ozone in particular, which can cause breathing problems, aggravate lung diseases such as asthma, emphysema, chronic bronchitis, and cause chronic obstructive pulmonary disease but the magnitude of the effect, and therefore, its indirect effects, are uncertain. Emissions from wildfires can lead to excessive levels of particulate matter, ozone, and volatile organic compounds (Kenward 2013). Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state (USEPA 2017e).

Precipitation and Water Supply

There is a high degree of uncertainty with respect to the overall impact of global climate change on future water supplies in California. Studies indicate considerable variability in predicting precise impacts of climate change on California hydrology and water resources. Increasing uncertainty in the timing and intensity of precipitation will challenge the operational flexibility of California's water management systems. Warmer, wetter winters would increase the amount of runoff available for groundwater recharge; however, this additional runoff would occur at a time when some basins are either being recharged at their maximum capacity or are already full. Conversely, reductions in spring runoff and higher evapotranspiration because of higher temperatures could reduce the amount of water available for recharge (CNRA 2014).

Hydrology and Sea-Level Rise

As discussed above, climate changes could potentially affect: the amount of snowfall, rainfall and snowpack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea-level rise and coastal flooding; coastal erosion; and the potential for saltwater intrusion. Sea-level rise can be a product of global warming through two main processes: expansion of seawater as the oceans warm, and melting of ice over land. A rise in sea levels could result in coastal flooding and erosion and could jeopardize California's water supply. Sea level could rise as much as 2 feet along most of the U.S. coastline. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events (CNRA 2014).

Agriculture

California has a massive agricultural industry that represents 11.3 percent of total US agricultural revenue. Higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, a changing climate presents significant risks to agriculture due to "potential changes to water quality and availability; changing precipitation patterns; extreme weather events including drought, severe storms, and floods; heat stress; decreased chill hours; shifts in pollinator lifecycles; increased risks from weeds, pest and disease; and disruptions to the transportation and energy infrastructure supporting agricultural production (CNRA 2014)."

Ecosystems and Wildlife

Increases in global temperatures and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. Increased concentrations of GHGs are likely to accelerate the rate of climate change. Scientists expect that the average global surface temperature could rise by 2–11.5°F (1.1–6.4°C) by 2100, with significant regional variation (NRC 2010). Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. With climate change, ecosystems and wildlife will be challenged by the spread of invasive species, barriers to species migration or movement in response to changing climatic conditions, direct impacts to species health, and mismatches in timing between seasonal life-cycle events such as species migration and food availability (CNRA 2014).

1.6 Regulatory Framework

This section provides a summary of pertinent federal, State, and local statutes, regulations, plans, and policies that have been adopted that address air quality.

1.6.1 Federal

Clean Air Act

The 1963 CAA was the first federal legislation regarding air pollution control and has been amended numerous times in subsequent years, with the most recent amendments occurring in 1990. At the federal level, USEPA is responsible for implementation of certain portions of the CAA including mobile source requirements.

The CAA establishes federal air quality standards and specifies future dates for achieving compliance. The CAA also mandates that the State submit and implement a State Implementation Plan (SIP) for areas not meeting these standards. SIPs must include pollution control measures that demonstrate how the NAAQS will be met. The 1990 amendments to the CAA identify specific emission reduction goals for areas not meeting the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA that are most applicable to the proposed project include Title I (Nonattainment Provisions).

Title I requirements are implemented for the purpose of attaining NAAQS for the following criteria air pollutants: ozone; NO_2; CO; SO_2; PM10; and lead. The NAAQS were amended in July 1997 to include an 8-hour standard for ozone and to adopt a NAAQS for PM2.5. The NAAQS were also amended in September 2006 to include an established methodology for calculating PM2.5 as well as revoking the annual PM10 threshold. **Table 2** shows the NAAQS currently in effect for each criteria air pollutant.

In *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497 (2007), twelve states and cities, including California, together with several environmental organizations, sued to require the USEPA to regulate GHGs as pollutants under the CAA. The United States Supreme Court ruled that GHGs fit within the CAA's definition of a pollutant and the USEPA had the authority to regulate GHGs.

TABLE 2
AMBIENT AIR QUALITY STANDARDS

Pollutant	Average Time	California Standards [a]		National Standards [b]		
		Concentration[c]	Method[d]	Primary[c,e]	Secondary[c,f]	Method[g]
ozone [h]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
NO_2 [i]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemi-luminescence	100 ppb (188 µg/m^3)	None	Gas Phase Chemi-luminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		53 ppb (100 µg/m^3)	Same as Primary Standard	
CO	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10mg/m^3)		9 ppm (10 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	

Pollutant	Average Time	California Standards [a]		National Standards [b]		
		Concentration[c]	Method[d]	Primary[c,e]	Secondary[c,f]	Method[g]
SO_2 [j]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Fluorescence; Spectro-photometry (Pararosaniline Method)[9]
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[j]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas) [j]	—	
PM10[k]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
PM2.5 [k]	24 Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3 [k]	15 µg/m^3	
Lead [l,m]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[m]	Same as Primary Standard	
	Rolling 3-Month Average [m]	--		0.15 µg/m^3		
Visibility Reducing Particles [n]	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more due to particles when relative humidity is less than 70 percent.		**No Federal Standards**		
Sulfates (SO_4)	24 Hour	25 µg/m^3	Ion Chroma-tography	**No Federal Standards**		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence	**No Federal Standards**		
Vinyl Chloride [l]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chroma-tography	**No Federal Standards**		

- [a] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
- [b] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 micrograms/per cubic meter (µg/m^3) is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
- [c] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
- [d] Any equivalent procedure which can be shown to the satisfaction of the California Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.
- [e] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
- [f] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
- [g] Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.
- [h] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

Pollutant	Average Time	California Standards [a]		National Standards [b]		
		Concentration[c]	Method[d]	Primary[c,e]	Secondary[c,f]	Method[g]

- [i] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb.
- [j] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated non-attainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
- [k] On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$.
- [l] CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
- [m] The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated non-attainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
- [n] In 1989, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

SOURCE: CARB 2016a; CARB 2020a-c; CARB 2020d-l

On December 7, 2009, the USEPA Administrator signed two distinct findings regarding GHGs under CAA section 202(a):

- **Endangerment Finding:** The current and projected concentrations of the six key GHGs—CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6—in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare.

These findings did not, by themselves, impose any requirements on industry or other entities. However, these actions were a prerequisite for implementing GHG emissions standards for motor vehicles.

On-Road Vehicle Rules

Heavy-Duty Vehicles

GHG emissions and fuel efficiency standards for medium- and heavy-duty trucks have been jointly developed by the USEPA and the National Highway Traffic Safety Administration (NHTSA). For vocational vehicles, which consist of a variety of work vehicles including dump trucks, the Phase 1 Heavy-Duty Vehicle Greenhouse Gas Regulation started with model year 2014 and the standard requires up to a 10 percent reduction in CO_2 emissions by model year 2017 over the 2010 baseline. The Phase 2 standards start in model year 2021 and require the phase-in of a 12 to 24 percent reduction in CO_2 emission reduction from vocational vehicles by model year 2027 over the 2017 baseline.

Light-Duty Vehicles

In August 2018, the USEPA and NHTSA proposed the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule that would, if adopted, maintain the CAFE and CO_2 standards applicable in model year 2020 for model years 2021 through 2026. The estimated CAFE and CO_2 standards for model year 2020 are 43.7 mpg and 204 grams of CO_2 per mile for passenger cars and 31.3 mpg and 284 grams of CO_2 per mile for light trucks, projecting an overall industry average of 37 mpg, as compared to 46.7 mpg under the standards issued in 2012. In September 2019, the USEPA published the final rule in the Federal Register (Federal Register, Vol. 84, No. 188, Friday, September 27, 2019, Rules and Regulations, 51310-51363). The USEPA also published the final rule for the One National Program on Federal Preemption of State Fuel Economy Standards that finalizes critical parts of the SAFE Vehicles Rule and makes clear that federal law preempts state and local tailpipe GHG emissions standards as well as zero emission vehicle (ZEV) mandates. In November 2019, California and 23 other states, environmental groups, and the cities of Los Angeles and New York, filed a petition with the U.S. Court of Appeals for the District of Columbia Circuit, for the EPA to reconsider the published rule. On March 31, 2020, USEPA and NHTSA issued the SAFE Vehicles Rule, setting fuel economy and carbon dioxide standards that increase 1.5 percent in stringency each year from model years 2021 through 2026 (see 85 Federal Register 24174). On February 8, 2021, the United States Court of Appeals for the District of Columbia Circuit issued an order granting the Biden Administration's motion to stay litigation over Part 1 of SAFE Rule. Consistent with President Biden's executive order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, USEPA and NHTSA are now evaluating whether and how to replace the SAFE Rule.

1.6.2 State

California has promulgated a series of executive orders, laws, and regulations aimed at reducing both the level of air pollutants and GHGs in the atmosphere and emissions of pollutants from commercial and private activities within the state. The major components of California's initiatives are reviewed below.

California Clean Air Act

The California Clean Air Act, signed into law in 1988, requires all areas of the State to achieve and maintain the CAAQS by the earliest practical date. The CAAQS are established to protect the health of the most sensitive groups and apply to the same criteria air pollutants as the federal CAA and also includes State-identified criteria air pollutants, which are sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride (CARB 2020a). Table 2, provided above, shows the CAAQS currently in effect for each of the federally identified criteria air pollutants as well as state recognized pollutants, such as sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride.

California Greenhouse Gas Reduction Targets

Through executive order, California governors have established long-term GHG reduction goals for the state.

Executive Order S-3-05

On June 1, 2005, Governor Schwarzenegger announced Executive Order S-3-05, which established the following GHG emission reduction targets:

- By 2010, California shall reduce GHG emissions to 2000 levels;
- By 2020, California shall reduce GHG emissions to 1990 levels; and
- By 2050, California shall reduce GHG emissions to 80 percent below 1990 levels.

Executive Order B-30-15

On April 29, 2015, Governor Brown issued Executive Order B-30-15, in which, the Governor:

- Established a new interim statewide reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030;
- Ordered all state agencies with jurisdiction over sources of GHG emissions to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 reduction targets; and
- Directed CARB to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of carbon dioxide equivalent.

California Health and Safety Code, Division 25.5 – California Global Warming Solutions Act of 2006 (AB 32)

Following the issuance of Executive Order S-3-05, in 2006, the California State Legislature adopted the California Global Warming Solutions Act of 2006 (passed as Assembly Bill [AB] 32 and codified in the California Health and Safety Code [HSC], Division 25.5), which focuses on reducing GHG emissions in California to 1990 levels by 2020. HSC Division 25.5 defines GHGs as CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 and represents the first enforceable statewide program to limit emissions of these GHGs from all major industries with penalties for noncompliance. The law further requires that reduction measures be technologically feasible and cost effective.

Under HSC Division 25.5, CARB has the primary responsibility for reducing GHG emissions. CARB is required to adopt rules and regulations directing state actions that would achieve GHG emissions reductions equivalent to 1990 statewide levels by 2020.

Senate Bill 32

In 2016, Senate Bill (SB) 32 and its companion bill AB 197, augmented AB 32 and amended HSC Division 25.5, establishing a new climate pollution reduction target of 40 percent below 1990 levels by 2030 and including provisions to ensure the benefits of state climate policies reach into disadvantaged communities.

2008 and 2014 Climate Change Scoping Plans

A specific requirement of AB 32 was the preparation of a Climate Change Scoping Plan for achieving the maximum technologically feasible and cost-effective GHG emission reduction by 2020. CARB developed and approved the initial Scoping Plan in 2008, outlining the regulations, market-based approaches, voluntary measures, policies, and other emission reduction programs that would be needed to meet the 2020 statewide GHG emission limit and initiate the transformations needed to achieve the state's long-range climate objectives (CARB 2008).

The First Update to the Scoping Plan was approved by CARB in May 2014 and built upon the initial Scoping Plan with new strategies and recommendations. In 2014, CARB revised the target using the GWP values from the IPCC AR4 and determined that the 1990 GHG emissions inventory and 2020 GHG emissions limit is 431 million metric tons of carbon dioxide equivalents ($MMTCO_2e$). CARB also updated the state's 2020 emissions estimate to account for the effect of the 2007–2009 economic recession, new estimates for future fuel and energy demand, and the reductions required by regulation that were adopted for motor vehicles and renewable energy (CARB 2014).

2017 Climate Change Scoping Plan Update

In response to SB 32 and the 2030 GHG reduction target, CARB approved the 2017 Climate Change Scoping Plan Update (2017 Scoping Plan Update) in December 2017 (CARB 2017a). The 2017 Scoping Plan Update outlines the proposed framework of action for achieving the 2030 GHG target of 40 percent reduction in GHG emissions relative to 1990 levels (CARB 2017a). The 2017 Scoping Plan Update identifies key sectors of the state's implementation strategy, which includes improvements in low-carbon energy, industry, transportation sustainability, natural and working lands, waste management, and water. Through a combination of data synthesis and modeling, CARB determined that the target statewide 2030 emissions limit is 260 $MMTCO_2e$, and that further commitments will need to be made to achieve an additional reduction of 50 $MMTCO_2e$ beyond current policies and programs. The cornerstone of the 2017 Scoping Plan Update is an expansion of the Cap-and-Trade Program (discussed further below) to meet the aggressive 2030 GHG emissions goal and ensure achievement of the 2030 limit set forth by E.O. B-30-15.

The 2017 Scoping Plan Update's strategy for meeting the state's 2030 GHG target incorporates the full range of legislative actions and state-developed plans that have relevance to the year 2030, including the following, described elsewhere in this section:

- Extending the low-carbon fuel standard (LCFS) beyond 2020 and increasing the carbon intensity reduction requirement to 18 percent by 2030;
- SB 350, which increases the Renewables Portfolio Standard (RPS) to 50 percent by 2030 and requires the CEC to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by 2030. These targets may be achieved through energy efficiency savings and demand reductions from a variety of programs, including but not limited to appliance and building energy efficiency standards and a comprehensive program to achieve greater energy efficiency standards in existing buildings;
- The 2016 Mobile Source Strategy is estimated to reduce emissions from mobile sources including an 80 percent reduction in smog-forming emissions and a 45 percent reduction in diesel particulate matter from 2016 levels in the Air Basin, a 45 percent reduction in statewide GHG emissions (from both on-road and off-road mobile sources) and a 50 percent reduction in statewide consumption of petroleum-based fuels;
- The Sustainable Freight Action Plan to improve freight efficiency and transition to zero emission freight handling technologies (described in more detail below);
- SB 1383, which requires a 50 percent reduction in anthropogenic black carbon and a 40 percent reduction in hydrofluorocarbon and methane emissions below 2013 levels by 2030; and

- AB 398, which extends the state Cap-and-Trade Program through 2030.

In the 2017 Scoping Plan Update, CARB recommends statewide targets of no more than six MT CO_2e per capita by 2030 and no more than two metric tons CO_2e per capita by 2050. CARB acknowledges that because the statewide per capita targets are based on the statewide GHG emissions inventory that includes all emissions sectors in the state (including large industrial sources covered under the state's cap and trade program), they are not applicable for use at the local level. Rather, it is appropriate for local jurisdictions to derive evidence-based local per-capita goals based on local emissions sectors and growth projections.

To demonstrate how a local jurisdiction can achieve their long-term GHG goals at the community plan level, CARB recommends developing a geographically specific GHG reduction plan (i.e., climate action plan) consistent with the requirements of CEQA Guidelines section 15183.5(b). A so-called "CEQA-qualified" GHG reduction plan, once adopted, can provide local governments with a streamlining tool for project-level environmental review of GHG emissions, provided there are adequate performance metrics for determining project consistency with the plan. Absent conformity with such a plan, CARB recommends "that projects incorporate design features and GHG reduction measures, to the degree feasible, to minimize GHG emissions. Achieving no net additional increase in GHG emissions, resulting in no contribution to GHG impacts, is an appropriate overall objective for new development (CARB 2017a)."

On-Road and Off-Road Vehicle and Equipment Rules

Heavy-Duty Vehicles and Equipment

In 2004, CARB adopted an Airborne Toxic Control Measure to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel PM and other TACs. The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than 5 minutes at any given time.

In 2008 CARB approved the Truck and Bus Regulation to reduce NO_X, PM10, and PM2.5 emissions from existing diesel vehicles operating in California. The requirements were amended in December 2010 and apply to nearly all diesel fueled trucks and busses with a gross vehicle weight rating greater than 14,000 pounds. For the largest trucks in the fleet (i.e., those with a gross vehicle weight rating greater than 26,000 pounds), there are two methods to comply with the requirements. The first method is for the fleet owner to retrofit or replace engines, starting with the oldest engine model year, to meet 2010 engine standards, or better. This is phased over eight years, starting in 2015 and would be fully implemented by 2023, meaning that all trucks operating in the State subject to this option would need to meet or exceed the 2010 engine emission standards for NO_X and PM by 2023. The second option, if chosen, requires fleet owners, starting in 2012, to retrofit a portion of their fleet with diesel particulate filters achieving at least 85 percent removal efficiency, so that by January 1, 2016, their entire fleet is equipped with diesel particulate filters. However, diesel particulate filters do not typically lower NO_X emissions. Thus, fleet owners choosing the second method must still comply with the 2010 engine emission standards for their trucks and busses by 2020. Beginning January 1, 2020, this requirement is enforced by the California Department of Motor Vehicles (DMV). Senate Bill 1 (SB1), the Road Repair and Accountability Act of 2017, was signed into law on April 28, 2017. SB1 authorizes the DMV to check that vehicles are compliant with or exempt from CARB's Truck and Bus Regulation. Effective January 1, 2020, if a vehicle is not compliant with the rule, DMV will no longer register that vehicle.

In addition to limiting exhaust from idling trucks, CARB promulgated emission standards for off-road diesel construction equipment of greater than 25 horsepower such as bulldozers, loaders, backhoes and forklifts, as well as many other self-propelled off-road diesel vehicles. The regulation adopted by CARB on July 26, 2007, aims to reduce emissions by installation of diesel soot filters and encouraging the retirement, replacement, or repower of older, dirtier engines with newer emission-controlled models. Implementation is staggered based on fleet size (which is the total of all off-road horsepower under common ownership or control), with the largest fleets to begin compliance by January 1, 2014. Each fleet must demonstrate compliance through one of two methods. The first option is to calculate and maintain fleet average emissions targets, which encourages the retirement or repowering of older equipment and rewards the introduction of newer cleaner units into the fleet. The second option is to meet the Best Available Control Technology (BACT) requirements by turning over or installing Verified Diesel Emission Control Strategies (e.g., engine retrofits) on a certain percentage of its total fleet horsepower. The compliance schedule requires that BACT turn overs or retrofits be fully implemented by 2023 in all equipment in large and medium fleets and across 100 percent of small fleets by 2028.

Light-Duty Vehicles

In 2002, Governor Davis signed AB 1493 (Pavley), which required CARB to set GHG emission standards for passenger vehicles, light duty trucks, and other vehicles whose primary use is non-commercial personal transportation manufactured in and after 2009. Because the Pavley standards (named for the bill's author, state Senator Fran Pavley) would impose stricter standards than those under the CAA, California applied to the USEPA for a waiver under the CAA. In 2009, the USEPA granted the waiver. The waiver has been extended consistently since 2009; however, in 2018 the USEPA and NHTSA indicated their intent to revoke California's waiver, and prohibit future state emissions standards enacted under the CAA. In response to the Federal SAFE Vehicles Rules and the One National Program on Federal Preemption of State Fuel Economy Standards, in November 2019 California and 23 other states, environmental groups, and the cities of Los Angeles and New York, filed a petition with the U.S. Court of Appeals for the District of Columbia Circuit, for the EPA to reconsider the published rule. As noted above, consistent with President Biden's executive order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, USEPA and NHTSA are now evaluating whether and how to replace the SAFE Rule.

Low Carbon Fuel Standard

In January 2007, Governor Schwarzenegger enacted Executive Order S-01-07, which mandates that the state: (1) establish a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and (2) adopt a Low Carbon Fuel Standard (LCFS) for transportation fuels in California. The overall goal of the LCFS is to lower the carbon intensity of California transportation fuel. The 2017 Scoping Plan Update calls for the LCFS to reduce fuel carbon intensity by at least 18 percent by 2030. In September 2018, CARB extended the LCFS program to 2030, making significant changes to the design and implementation of the Program including a doubling of the carbon intensity reduction to 20 percent by 2030.

Energy Sector

Title 24 Building Energy Efficiency Standards

CCR Title 24 establishes California's Building Energy Efficiency Standards; Part 11 is referred to as the California Green Building Standards (CALGreen) Code. The purpose of the CALGreen Code is to "improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a positive environmental impact and encouraging sustainable construction practices in the following categories: (1) planning and design; (2) energy efficiency; (3) water efficiency and conservation; (4) material conservation and resource efficiency; and (5) environmental air quality (CBSC 2010)." In 2016, the CALGreen Code was updated to include new mandatory measures for residential and nonresidential buildings, and the new measures took effect on January 1, 2017. The CALGreen Code was most recently updated in 2018 with new measures taking effect on January 1, 2020 (CBSC 2019).

1.6.3 Regional

South Coast Air Quality Management District

SCAQMD has jurisdiction over air quality planning for all of County of Orange, Los Angeles County except for the Antelope Valley, the non-desert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The Air Basin is a subregion within SCAQMD jurisdiction. While air quality in the Air Basin has improved, the Air Basin requires continued diligence to meet the air quality standards.

SCAQMD adopted a "Policy on Global Warming and Stratospheric Ozone Depletion" on April 6, 1990. The policy commits SCAQMD to consider global impacts in rulemaking and in drafting revisions to the Air Quality Management Plan. In March 1992, the SCAQMD Governing Board reaffirmed this policy and adopted amendments to the policy to include the following directives:

- Phase out the use and corresponding emissions of chlorofluorocarbons, methyl chloroform (1,1,1-trichloroethane or TCA), carbon tetrachloride, and halons by December 1995;
- Phase out the large quantity use and corresponding emissions of hydrochlorofluorocarbons by the year 2000;
- Develop recycling regulations for hydrochlorofluorocarbons (e.g., SCAQMD Rules 1411 and 1415);
- Develop an emissions inventory and control strategy for methyl bromide; and
- Support the adoption of a California GHG emission reduction goal.

In 2008, SCAQMD released draft guidance regarding interim CEQA GHG significance thresholds (SCAQMD 2008a). Within its October 2008 document, SCAQMD proposed the use of a percent emission reduction target to determine significance for commercial/residential projects that emit greater than 3,000 metric tons of carbon dioxide equivalents ($MTCO_2e$) per year. On December 5, 2008, the SCAQMD Governing Board adopted the staff proposal for an interim GHG significance threshold for stationary source/industrial projects where SCAQMD is the lead agency. However, SCAQMD did not adopt a GHG significance threshold for land use development projects (e.g., mixed-use/commercial projects) and formed a GHG Significance Threshold Working Group to further evaluate potential GHG significance thresholds. This Working Group has been inactive since 2011 and SCAQMD has not formally adopted any GHG significance threshold guidance for land use development projects.

Air Quality Management Plan

SCAQMD has adopted a series of AQMPs to meet the CAAQS and NAAQS, the 2012 and the 2016 AQMPs. While the 2016 AQMP is the most recent and was adopted by SCAQMD and CARB, it has not received full USEPA approval for inclusion in the SIP. Therefore, until such time as the 2016 AQMP is completely approved by the USEPA, the 2012 AQMP remains the applicable AQMP; however, this analysis considers both the 2012 and 2016 AQMPs as appropriate.

The 2012 AQMP includes a comprehensive strategy aimed at controlling pollution from all sources, including stationary sources, and on-road and off-road mobile sources. It highlights the significant amount of emission reductions needed and the urgent need to identify additional strategies, especially in the area of mobile sources, to meet all federal criteria air pollutant standards within the timeframes allowed under the CAA (SCAQMD 2013).

The key undertaking of the 2012 AQMP is to bring the Air Basin into attainment with the NAAQS for the 24-hour PM2.5 standard. It also intensifies the scope and pace of continued air quality improvement efforts toward meeting the 2024 8-hour ozone standard deadline with new measures designed to reduce reliance on the CAA section 182(e)(5) long-term measures for NO_X and VOC reductions. SCAQMD expects exposure reductions to be achieved through implementation of new and advanced control technologies as well as improvement of existing technologies.

The SCAQMD Governing Board adopted the 2016 AQMP on March 3, 2017 (SCAQMD 2017a). CARB approved the 2016 AQMP on March 23, 2017. Key elements of the 2016 AQMP include implementing fair-share emissions reductions strategies at the federal, state, and local levels; establishing partnerships, funding, and incentives to accelerate deployment of ZE and near-zero-emissions (NZE) technologies; and taking credit from co-benefits from greenhouse gas, energy, transportation and other planning efforts (SCAQMD 2017a). The strategies included in the 2016 AQMP are intended to demonstrate attainment of the NAAQS for the national non-attainment pollutants ozone and PM2.5 (SCAQMD 2018). The strategies that are particularly relevant to the project include the following:

MOB-08 – Accelerated Retirement of Older On-Road Heavy-Duty Vehicles: This measure seeks to replace up to 2,000 heavy-duty vehicles per year with newer or new vehicles that at a minimum, meet the 2010 on-road heavy-duty NO_X exhaust emissions standard of 0.2 grams per brake horsepower-hour (g/bhp-hr).

MOB-10 – Extension of the SOON Provision for Construction/Industrial Equipment: This measure continues the Surplus Off-Road Option for NO_X (SOON) provision of the Statewide In-Use Off-Road Fleet Vehicle Regulation through the 2031 timeframe.

Air Quality Guidance Documents

SCAQMD's CEQA guidelines are voluntary initiatives recommended for consideration by local planning agencies. The *CEQA Air Quality Handbook* (Handbook) published by SCAQMD provides local governments with guidance for analyzing and mitigating project-specific air quality impacts (SCAQMD 1993). SCAQMD is currently updating some of the information and methods in the Handbook, such as the screening tables for determining the air quality significance of a project and the on-road mobile source emission factors. While this process is underway, SCAQMD recommends using other approved models to calculate emissions from land use projects, such as CalEEMod (SCAQMD 2020a).

The SCAQMD *Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning* considers impacts to air quality sensitive receptors from TAC-emitting facilities (SCAQMD 2005). SCAQMD's siting distance recommendations are the same as those provided by CARB (e.g., a 500-foot siting distance for air quality sensitive receptors proposed in proximity to freeways and high-traffic roads).

The SCAQMD Final Localized Significance Threshold Methodology and Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM2.5 Significance Thresholds provides guidance when evaluating the localized effects of emissions in the CEQA evaluation (SCAQMD 2008b; SCAQMD 2006). These guidance documents were promulgated by the SCAQMD Governing Board as a tool to assist lead agencies to analyzed localized impacts associated with project-specific level proposed projects. The guidance documents establish mass emission rate "look up tables" as significance thresholds for projects that are five acres or less. For projects that are larger than five acres, such as the proposed project, it is recommended that project-specific air quality dispersion modeling is completed to determine localized air quality.

Toxic Air Contaminants

At the local level, air pollution control or management districts may adopt and enforce CARB control measures. Under SCAQMD Regulation XIV (Toxics and Other Non-Criteria Pollutants), and in particular Rule 1401 (New Source Review), all sources that possess the potential to emit TACs are required to obtain permits from SCAQMD. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new source review standards and air toxics control measures. SCAQMD limits emissions and public exposure to TACs through a number of programs. SCAQMD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

In 2000, The Air Toxics Control Plan (revised in 2004) examined the overall direction of SCAQMD's air toxics control program. It includes development and implementation of strategic initiatives to monitor and control air toxics emissions. Control strategies that are deemed viable and are within SCAQMD's jurisdiction will each be brought to the SCAQMD Board for further consideration through the normal public review process. Strategies that are to be implemented by other agencies will be developed in a cooperative effort, and the progress will be reported back to the Board periodically.

In 2015, SCAQMD completed the Multiple Air Toxics Exposure Study IV (MATES IV) (SCAQMD 2015a), which is a monitoring and evaluation study conducted in the Air Basin. MATES IV is a follow up to the 2008 MATES III study and consists of several elements including a monitoring program, an updated emissions inventory of toxic air contaminants, and a modeling effort to characterize risk across the Air Basin (SCAQMD 2008c). MATES IV focuses on the carcinogenic risk from exposure to air toxics. However, it does not estimate mortality or other health effects from particulate exposures. SCAQMD is currently in the process of updating the MATES studies series with MATES V; however, the analysis has not yet been completed.

Rules and Regulations

The SCAQMD has adopted many rules and regulations to regulate sources of air pollutant emission sin the Air Basin. With respect to GHG emissions, the proposed project may be subject to the following SCAQMD rules and regulations. While the focus of these rules and regulations are on criteria pollutants and toxic air contaminants, they would nonetheless control GHG emissions as co-benefits:

Regulation IV – Prohibitions: This regulation sets forth the restrictions for visible emissions, odor nuisance, fugitive dust, various air emissions, fuel contaminants, start-up/shutdown exemptions and breakdown events. The following is a list of rules which apply to the proposed project:

Rule 401 – Visible Emissions: This rule states that a person shall not discharge into the atmosphere from any single source of emission whatsoever any air contaminant for a period or periods aggregating more than three minutes in any one hour which is as dark or darker in shade as that designated No. 1 on the Ringelmann Chart or of such opacity as to obscure an observer's view.

Rule 402 – Nuisance: This rule states that a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

Rule 403 – Fugitive Dust: This rule requires projects to prevent, reduce or mitigate fugitive dust emissions from a site. Rule 403 restricts visible fugitive dust to the project property line, restricts the net PM10 emissions to less than 50 micrograms per cubic meter ($\mu g/m^3$) and restricts the tracking out of bulk materials onto public roads. Additionally, projects must utilize one or more of the best available control measures (identified in the tables within the rule). Control measures may include adding freeboard to haul vehicles, covering loose material on haul vehicles, watering, using chemical stabilizers and/or ceasing all activities. Finally, a contingency plan may be required if so determined by USEPA. As a large site, the proposed project would also be required to comply with subsection (e) of Rule 403 which includes additional requirements for large operations.

Regulation XI – Source Specific Standards: Regulation XI sets emissions standards for specific sources. The following is a list of rules which may apply to the proposed project:

Rule 1113 – Architectural Coatings: This rule requires manufacturers, distributors, and end users of architectural and industrial maintenance coatings to reduce VOC emissions from the use of these coatings, primarily by placing limits on the VOC content of various coating categories.

Rule 1186 – PM10 Emissions from Paved and Unpaved Roads, and Livestock Operations: This rule applies to owners and operators of paved and unpaved roads and livestock operations. The rule is intended to reduce PM10 emissions by requiring the cleanup of material deposited onto paved roads, use of certified street sweeping equipment, and treatment of high-use unpaved roads (see also Rule 403).

Regulation XIV – Toxics and Other Non-Criteria Pollutants: Regulation XIV sets requirements for new permit units, relocations, or modifications to existing permit units which emit toxic air contaminants or other non-criteria pollutants. The following is a list of rules which may apply to the proposed project:

Rule 1403 – Asbestos Emissions from Demolition/Renovation Activities: This rule requires owners and operators of any demolition or renovation activity and the associated disturbance of asbestos-containing materials, any asbestos storage facility, or any active waste disposal site to implement work practice requirements to limit asbestos emissions from building demolition and renovation activities, including the removal and associated disturbance of asbestos-containing materials.

Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines: This rule applies to stationary compression ignition engine greater than 50 brake horsepower and sets limits on emissions and operating hours. In general, new stationary emergency standby diesel-fueled engines greater than 50 brake horsepower are not permitted to operate more than 50 hours per year for maintenance and testing.

Southern California Association of Governments

The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization for the region in which the County of Orange and City of Irvine are located. In May 2020, SCAG adopted the *2020-2045 Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS), also referred to as *ConnectSoCal*, which is an update to the previous 2016-2040 RTP/SCS (SCAG 2020).

The 2020-2045 RTP/SCS provides a vision for transportation throughout the region for the next several decades by considering the role of transportation in the broader context of economic, environmental, and quality-of-life goals for the future, identifying regional transportation strategies to address mobility needs. The 2020-2045 RTP/SCS describe how the region can attain the GHG emission-reduction targets set by CARB by achieving an 8 percent reduction in per capita transportation GHG emissions by 2020 and a 19 percent reduction in per capita transportation GHG emissions by 2035 compared to the 2005 level on a per capita basis. Compliance with and implementation of the 2020-2045 RTP/SCS policies and strategies would have co-benefits of reducing per capita criteria air pollutant emissions (e.g. nitrogen dioxide, carbon monoxide, etc.) associated with reduced per capita vehicle miles traveled (VMT) (SCAG 2020).

1.6.4 Local

Local jurisdictions, such as the County of Orange (County) and the City of Irvine (City), have the authority and responsibility to reduce air pollution and GHG emissions through their land use decision-making authority.

Orange County General Plan

The County is responsible for the assessment and mitigation of pollutant emissions resulting from its land use decisions. The County's General Plan Resource Element sets forth the goals, objectives, and policies which guide the County in its implementation of its air quality improvement programs and strategies. A number of these goals, objectives, and policies are relevant to the proposed project, and relate to minimizing particulate emissions from construction activities, managing traffic congestion during peak hours, and increasing energy efficiency in private developments.

The Resource Element establishes the following air quality goal pertaining to the proposed project: Promote optimum sustainable environmental quality standards for air resources.

The Resource Element establishes the following goal pertaining to the proposed project's energy use: Goal 3: Maximize the conservation of energy resources in all future land use and transportation planning decisions.

City of Irvine General Plan

The City is responsible for the assessment and mitigation of pollutant emissions resulting from its land use decisions. The City's General Plan Energy Element sets forth the objectives and policies which guide the City in its implementation of its energy improvement programs and strategies. Reduction of energy use results in a reduction in GHG emissions and therefore is relevant to the GHG analysis. The Energy Element establishes the following objectives pertaining to the proposed project energy use: Goal I-1: Maximize energy efficiency through land use and transportation planning.

1.7 Environmental Setting

1.7.1 Regional Air Quality

The Air Basin's meteorological conditions, in combination with regional topography, are conducive to the formation and retention of ozone. Pollutant concentrations in the Air Basin vary with location, season, and time of day. Concentrations of ozone, for example, tend to be lower along the coast, higher in the near inland valleys, and lower in the far inland areas of the Air Basin and adjacent desert (SCAQMD 2017a). The worst air pollution conditions throughout the Air Basin typically occur from June through September.

California Health and Safety Code section 39607(e) requires CARB to establish and periodically review area designation criteria. As shown in **Table 3***,* the Air Basin is designated under federal or State ambient air quality standards as nonattainment for ozone, PM10, and fine particulate matter PM2.5. It is noteworthy to mention that air quality in the Air Basin has improved substantially over the years, primarily due to the impacts of air quality control programs at the federal, State and local levels. The ozone and PM levels have fallen significantly compared to the worst years and are expected to continue to trend downward in the future despite increases in the economy and population in the Air Basin.

With respect to the State-identified criteria air pollutants (sulfates, hydrogen sulfide, visibility reducing particles, and vinyl chloride) present in Table 3, the proposed project would either not use these pollutants in the day to day operations or during construction and therefore would not have emissions of those pollutants (hydrogen sulfide, vinyl chloride, and lead), or such emissions would be accounted for as part of the pollutants estimated in this analysis (visibility reducing particles are associated with particulate matter emissions, and sulfates are associated with SO_2). Vinyl chloride is used in the process of making PVC plastic and vinyl products and is primarily emitted from industrial processes (CARB 2020l). Vinyl chloride would not be emitted directly during operations or during construction; therefore, there would be no project emissions of vinyl chloride. In addition, CARB determined there is not sufficient scientific evidence available to support the identification of a threshold exposure level for vinyl chloride, therefore, CARB does not monitor or make status designations for this pollutant (CARB 2020p).

TABLE 3
SOUTH COAST AIR BASIN ATTAINMENT STATUS (ORANGE COUNTY)

Pollutant	National Standards (NAAQS)	California Standards (CAAQS)
Ozone (1-hour standard)	N/A [a]	Non-attainment – Extreme
Ozone (8-hour standard)	Non-attainment – Extreme	Non-attainment
CO	Attainment – Maintenance	Attainment
NO_2	Attainment – Maintenance	Attainment
SO_2	Attainment	Attainment
PM10	Attainment – Maintenance	Non-attainment
PM2.5	Non-attainment – Serious	Non-attainment
Lead (Pb)	Attainment (Partial) [b]	Attainment
Visibility Reducing Particles	N/A	Unclassified
Sulfates	N/A	Attainment
Hydrogen Sulfide	N/A	Unclassified
Vinyl Chloride [c]	N/A	N/A

N/A = not applicable

a The NAAQS for 1-hour ozone was revoked on June 15, 2005, for all areas except Early Action Compact areas.

b Partial Non-attainment designation – Los Angeles County portion of the Air Basin only for near-source monitors. Orange County is designated as attainment.

c In 1990, the California Air Resources Board identified vinyl chloride as a toxic air contaminant and determined that it does not have an identifiable threshold. Therefore, the California Air Resources Board does not monitor or make status designations for this pollutant.

SOURCE: USEPA 2020a; CARB 2020q.

As detailed in the AQMP, the major sources of air pollution in the Air Basin are divided into four major source classifications: point and area stationary sources, and on-road and off-road mobile sources. Point and area sources are the two major subcategories of stationary sources (SCAQMD 2017a). Point sources are permitted facilities that contain one or more emission sources at an identified location (e.g., power plants, refineries, emergency generator exhaust stacks). Area sources consist of many small emission sources (e.g., residential water heaters, architectural coatings, consumer products, restaurant charbroilers and permitted sources such as large boilers), which are distributed across the region. Mobile sources consist of two main subcategories: On-road sources (such as cars and trucks) and off-road sources (such as heavy construction equipment). The main source associated with the proposed project is mobile source use during construction activities.

1.7.2 Local Air Quality

Existing Ambient Air Quality

SCAQMD maintains monitoring stations within district boundaries that monitor air quality and compliance with associated ambient standards. The project area is located in the Inland County of Orange general forecast area and specifically within the Saddleback Valley source receptor area. Currently, the nearest monitoring station to the project area is the Mission Viejo Station (26081 Via Pera Mission Viejo, CA 92691 – SCAQMD Station Number 3812). This station monitors ambient concentrations of CO, ozone, PM10 and PM2.5. The nearest monitoring station that monitors for NO_2 is the Anaheim station (SRA 17, Central County of Orange Station Number 3176). There are no stations within the Inland County of Orange general forecast area that monitor for SO_2. Historical data of ambient ozone, NO_2, CO, PM10 and PM2.5 concentrations from these monitoring stations for the most recent three years of available data (2017–2019) are shown in **Table 4**.

TABLE 4
AMBIENT AIR QUALITY IN THE PROJECT VICINITY

Pollutant/Standard [a]	2017	2018	2019
Ozone, (1-hour) – Mission Viejo			
Maximum Concentration (ppm)	0.103	0.121	0.106
Days > CAAQS (0.09 ppm)	3	2	3
Ozone, (8-hour) – Mission Viejo			
Maximum Concentration (ppm)	0.083	0.088	0.087
4th High 8-hour Concentration (ppm)	0.082	0.074	0.082
Days > CAAQS (0.070 ppm)	25	9	11
Days > NAAQS (0.070 ppm)	25	9	11
Nitrogen Dioxide, NO_2 (1-hour) - Anaheim			
Maximum Concentration (ppm)	0.081	0.066	0.059
Days > CAAQS (0.18 ppm)	0	0	0
98th Percentile Concentration (ppm)	0.064	0.055	0.049
Days > NAAQS (0.100 ppm)	0	0	0
Nitrogen Dioxide, NO_2 (Annual)			
Annual Arithmetic Mean (0.030 ppm)	0.014	0.014	0.013

Pollutant/Standard [a]	2017	2018	2019
Carbon Monoxide, CO (1-hour) – Mission Viejo			
Maximum Concentration (ppm)	1.4	1.2	1.0
Days > CAAQS (20 ppm)	0	0	0
Days > NAAQS (35 ppm)	0	0	0
Carbon Monoxide, CO (8-hour)			
Maximum Concentration (ppm)	0.9	0.09	0.8
Days > CAAQS (9.0 ppm)	0	0	0
Days > NAAQS (9 ppm)	0	0	0
Respirable Particulate Matter, PM10 (24-hour) – Mission Viejo			
Maximum Concentration (μg/m^3)	58	55	45
Samples > CAAQS (50 μg/m^3)	1	1	0
Samples > NAAQS (150 μg/m^3)	0	0	0
Respirable Particulate Matter, PM10 (Annual)			
Annual Arithmetic Mean (20 μg/m^3)	18.4	19.0	16.6
Fine Particulate Matter, PM2.5 (24-hour) – Mission Viejo			
Maximum Concentration (μg/m^3)	19.5	20.80	20.80
98th Percentile Concentration (μg/m^3)	15.0	18.50	14.70
Samples > NAAQS (35 μg/m^3)	0	0	0
Fine Particulate Matter, PM2.5 (Annual)			
Annual Arithmetic Mean (12 μg/m^3)	8.11	8.31	7.11

[a] ppm = parts per million; μg/m^3 = micrograms per cubic meter

SOURCE: SCAQMD 2020b.

Existing Area Health Risk

Between July 2012 and June 2013, the SCAQMD conducted the Multiple Air Toxics Exposure Study IV (MATES IV), which focuses on the carcinogenic risk from exposure to air toxics. The MATES IV Final Report was issued in May 2015. The study, based on actual monitored data throughout the Air Basin, consisted of several elements, which included a monitoring program, an updated emissions inventory of TACs, and a modeling effort to characterize carcinogenic risk across the Air Basin from exposure to TACs. As part of the MATES IV study, the SCAQMD has prepared a series of maps that show regional trends in estimated outdoor inhalation cancer risk from toxic emissions, as part of an ongoing effort to provide insight into relative risks. The maps represent the estimated number of potential cancers per million people associated with a lifetime of breathing air toxics (24 hours per day outdoors for 70 years). The background potential cancer risk per million people in the proposed project area using the updated Office of Environmental Health Hazard Assessment (OEHHA) methodology is estimated at 587 in one million (compared to an overall Air Basin-wide risk of 1,023 in one million for the average of 10 fixed monitoring sites) (SCAQMD 2015b). Generally, the risk from air toxics is lower near the coastline and increases inland, with higher risks concentrated near large diesel sources (e.g., freeways, airports, and ports).

Existing Site Emissions

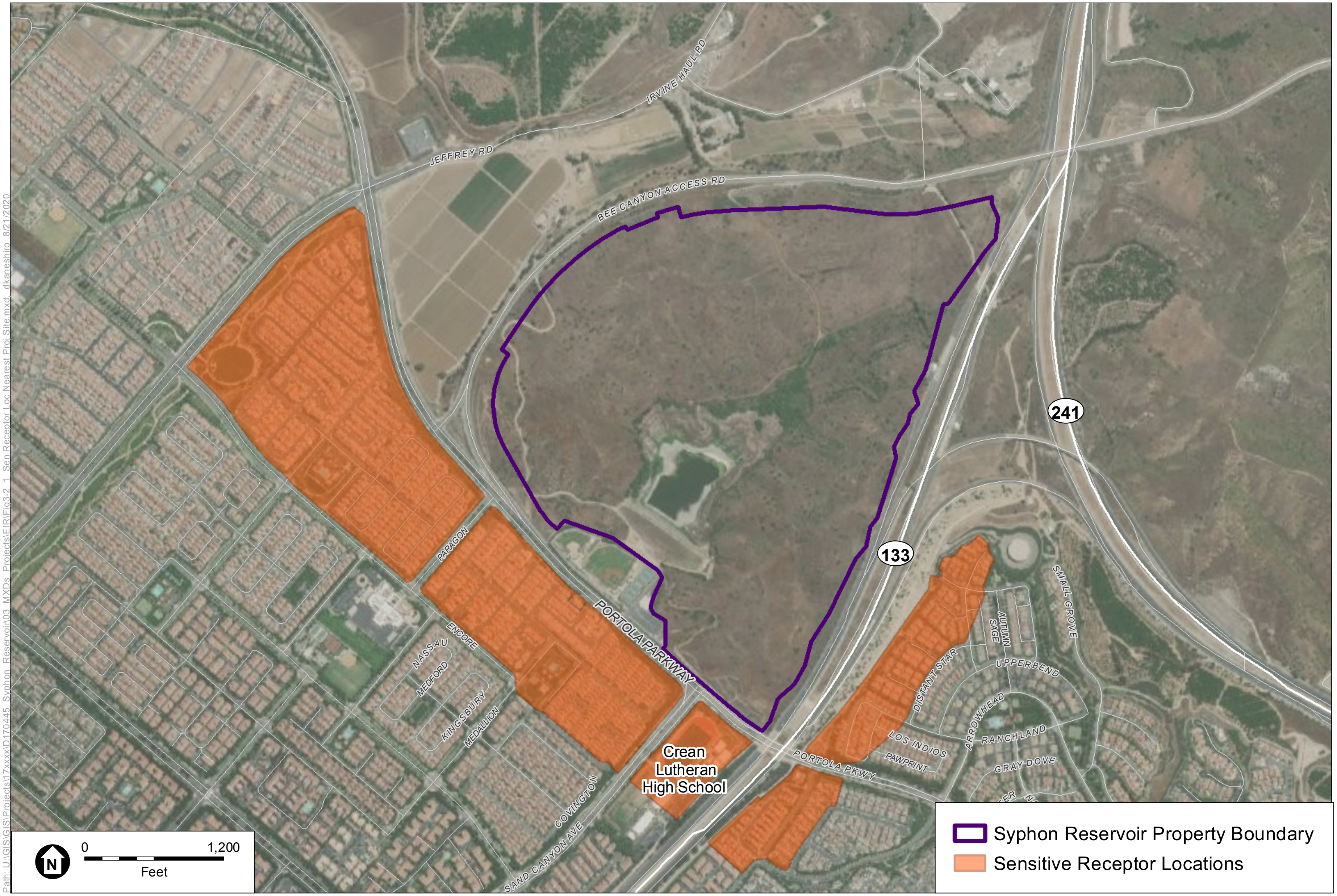
The existing Syphon Reservoir activities result in negligible mobile source emissions from maintenance trips and current recreational activities. The number of maintenance and recreational trips are nominal and are not anticipated to change with the improvements to the reservoir. Therefore, existing emissions were not modeled, and the proposed project's air quality emissions would all be considered new emissions.

Sensitive Receptors and Locations

Certain population groups, such as children, elderly, and acutely and chronically ill persons (especially those with cardio-respiratory diseases), are considered more sensitive to the potential effects of air pollution than others. As a result, certain land uses that are occupied by these population groups, such as residences, hospitals and schools, are considered to be air quality-sensitive land uses. The proposed project site is bordered to the north and west by predominantly open space, agricultural (including a residence), and commercial/industrial uses. The proposed project site is bordered to the south by Portola Parkway with residential and school land uses directly south. The proposed project is bordered to the east by SR-133 followed by residential land uses. The nearest land uses are the residential neighborhoods approximately 180 feet southwest of the intersection of Portola Parkway and Sand Canyon Ave, which is the proposed project site entrance. The Crean Lutheran High School is located approximately 140 feet southeast of the project site at the intersection of Portola Parkway and San Canyon Road.[3] Residences to the east of SR-133 are approximately 1,000 feet from onsite construction activities. Sensitive receptor locations are shown **Figure 1**.

All other air quality-sensitive uses are located at greater distances from the proposed project site and would experience lower air pollutant impacts from potential sources of pollutants from the proposed project site due to atmospheric dispersion effects.

3 While the Crean Lutheran High School Athletic Complex is located adjacent to the project site area, the athletic complex itself is not considered a sensitive receptor as it would only be occupied for a limited amount of time, similar to that of a local gym, park, or other commercial establishment. The majority of student time would be spent at the main school site and therefore that would be the closest school associated sensitive receptor.



SOURCE: ESA, 2019; ESRI, 2019.

Syphon Reservoir Improvement Project

Figure 1
Sensitive Receptor Locations Nearest to the Project Site

ESA

1.7.3 Greenhouse Gases

Global Emissions Inventory

Global GHG estimates are based on country inventories developed as part of programs of the United Nations Framework Convention on Climate Change (UNFCCC). Worldwide man-made emissions of GHGs were approximately 49 billion metric tons CO_2e in 2010, including ongoing emissions from industrial and agricultural sources and emissions from land use changes (e.g., deforestation). Emissions of CO_2, primarily from fossil fuel use and industrial processes, account for 76 percent of total GHG (CO_2e) emissions. Methane emissions account for 16 percent and N_2O emissions for 6.2 percent. For comparison, worldwide emissions of GHGs in 1970 were 27 billion metric tons of CO_2e per year (IPCC 2014).

United States Emissions Inventory

In 2018, the United States emitted about 6,677 million metric tons (MMT) of CO_2e, with 75.4 percent of those emissions coming from fossil fuel combustion. Of the major sectors nationwide, transportation accounts for the highest amount of GHG emissions (approximately 28 percent), followed by electricity (27 percent), industry (22 percent), agriculture (10 percent), commercial and residential buildings (12 percent) (. Between 1990 and 2018, total US GHG emissions rose by 3.7 percent, but emissions have generally decreased since peaking in 2005. GHG emissions in 2018 are approximately 10 percent below 2005 levels. Since 1990, U.S. emissions of GHGs have increased at an average annual rate of 0.2 percent; however, GHG emissions have been decreasing at an average annual rate of 0.7 percent since 2005 (USEPA 2020b).

California Greenhouse Gas Emissions Inventory

CARB compiles GHG inventories for the state. Based on the 2017 GHG inventory data (i.e., the latest year for which data are available from CARB), California emitted 424 $MMTCO_2e$ including emissions resulting from imported electrical power (CARB 2019). CARB's 2017 statewide inventory indicated that California's net GHG emissions in 2017 were 7 $MMTCO_2e$ below 1990 levels, which is the 2020 GHG reduction target codified in AB 32. The overall trends in the inventory demonstrate that the carbon intensity of California's economy is declining and has decreased by 41 percent from 2001 peak emissions while increasing the gross domestic product (GDP) by 52 percent (CARB 2019).[4] The GDP grew 3.6 percent in 2017 while emissions per GDP declined by 4.5 percent compared to 2016. **Table 5** identifies and quantifies statewide anthropogenic GHG emissions and sinks (e.g., carbon sequestration due to forest growth) in 1990 and 2017. As shown in the table, the transportation sector is the largest contributor to statewide GHG emissions at approximately 40 percent (CARB 2019).

4 Carbon intensity of California's economy is the amount of carbon pollution per million dollars of gross domestic product.

TABLE 5
STATE OF CALIFORNIA GREENHOUSE GAS EMISSIONS

Category	Total 1990 Emissions Using IPCC SAR ($MMTCO_2e$)	Percent of Total 1990 Emissions	Total 2017 Emissions Using IPCC AR4 ($MMTCO_2e$)	Percent of Total 2017 Emissions
Transportation	150.7	35%	169.9	40%
Electric Power	110.6	26%	62.4	15%
Commercial Use	14.4	3%	15.1	4%
Residential	29.7	7%	26.0	6%
Industrial	103.0	24%	89.4	21%
Recycling and Waste[a]	–	–	8.9	2%
High GWP/Non-Specified[b]	1.3	<1%	20.0	5%
Agriculture/Forestry	23.6	6%	32.4	8%
Forestry Sinks	-6.7	-2%	—[c]	—
Net Total (IPCC SAR)	**426.6**	**100%**[e]	—	—
Net Total (IPCC AR4)[d]	**431**	**100%**[e]	**424.1**	**100%**[e]

NOTES:
[a] Included in other categories for the 1990 emissions inventory.
[b] High GWP gases are not specifically called out in the 1990 emissions inventory.
[c] Revised methodology under development (not reported for 2012).
[d] CARB revised the state's 1990 level GHG emissions using GWPs from the IPCC AR4.
[e] Total of individual percentages may not add up to 100% due to rounding
SOURCES: CARB 2017b; CARB 2019.

Existing Site Emissions

The existing Syphon Reservoir activities result in minimal mobile source emissions from maintenance trips. The number of maintenance are not anticipated to change with the proposed improvements to the reservoir, therefore existing emissions were not modeled and the proposed project's GHG emissions would be considered net new emissions. The existing operations on the site result in annual electrical consumption of 217,273 kilowatt hours (kWh) annually. Because the current facility at the site would be removed, the electricity would no longer be consumed. Emissions associated with the existing electrical consumption onsite were not quantified, instead net new electrical consumption was analyzed.

SECTION 2
Thresholds of Significance

The significance thresholds below are derived from the Environmental Checklist questions in Appendix G of the State CEQA Guidelines. Accordingly, a significant impact associated with air quality would occur based on the following thresholds described below:

AIR-1: Conflict with or obstruct implementation of the applicable air quality plan;

AIR-2: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;

AIR-3: Expose sensitive receptors to substantial pollutant concentrations; or

AIR-4: Result in other emissions (such as those leading to odors) affecting a substantial number of people.

A significant impact associated with GHG emissions would occur based on the following thresholds described below:

GHG-1: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or

GHG-2: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs.

In addition to the Appendix G significant impacts listed above, cumulative impacts with respect to air quality and GHGs are also addressed as part of the analysis.

Pursuant to the CEQA Guidelines (Section 15064.7), a lead agency may consider using, when available, significance thresholds established by the applicable air quality management district or air pollution control district when making determinations of significance. For purposes of this analysis, the potential air quality impacts of the proposed project are assessed in accordance with the most recent thresholds adopted by the SCAQMD in connection with its CEQA Air Quality Handbook, Air Quality Analysis Guidance Handbook, and subsequent SCAQMD guidance, as discussed below.[5]

[5] While the SCAQMD CEQA Air Quality Handbook contains significance thresholds for lead, project construction and operation would not include sources of lead emissions and would not exceed the significance thresholds for lead. Unleaded fuel and unleaded paints have virtually eliminated lead emissions from projects. As a result, lead emissions are not further evaluated.

2.1 Regional Criteria Air Pollutant Emissions Thresholds

SCAQMD has established numerical significance thresholds for regional emissions during construction and operation. The numerical significance thresholds are based on the recognition that the Air Basin is a distinct geographic area with a critical air pollution problem for which ambient air quality standards have been promulgated to protect public health (SCAQMD 1993).

Given that construction impacts are temporary, SCAQMD has established significance thresholds specific to construction activity. Based on the thresholds of significance in the SCAQMD CEQA Air Quality Analysis Handbook, the proposed project would potentially cause or contribute to an exceedance of an ambient air quality standard if the following would occur (SCAQMD 2020c).

Regional construction emissions from both direct and indirect sources would exceed any of the following SCAQMD prescribed daily emissions thresholds (SCAQMD 2020c):

- 75 pounds a day for VOC,
- 100 pounds per day for NO_X,
- 550 pounds per day for CO,
- 150 pounds per day for SO_X,
- 150 pounds per day for PM10, and
- 55 pounds per day for PM2.5

SCAQMD has also established numeric significance thresholds for operations. SCAQMD has established significance thresholds in part based on CAA section 182(e), which identifies 10 tons per year of VOC and NO_X as a significance level for stationary source emissions in extreme non-attainment areas for ozone. The numeric significance thresholds for other pollutants are also based on federal major source thresholds, which vary depending on regional attainment status. For example, the Air Basin is in attainment for carbon monoxide, which yields a corresponding major source threshold of 100 tons per year, or 550 pounds per day (USEPA 2017f). These "major source" significance thresholds were developed under the Federal Title V Operating Permit Program (SCAQMD 2020d). SCAQMD converted these significance levels to pounds per day. The attainment status designation is based on the healthfulness of air quality and the corresponding significance thresholds are intended to be health protective (CARB 2020q).

A similar approach is applied to PM2.5, where the daily limit of 55 pounds per day is based on the USEPA proposed rule to implement a PM2.5 NAAQS, with a significant emission rate of 10 tons per year (SCAQMD 2006).

The proposed project would potentially cause or contribute to an exceedance of an ambient air quality standard if regional operational emissions exceed any of the following SCAQMD prescribed daily emissions thresholds (SCAQMD 2019):

- 55 pounds a day for VOC,

- 55 pounds per day for NO_X,
- 550 pounds per day for CO,
- 150 pounds per day for SO_X,
- 150 pounds per day for PM10, and
- 55 pounds per day for PM2.5.

SCAQMD has set its CEQA significance threshold for NO_X and VOC at 10 tons per year (expressed as 55 pounds per day). because the federal CAA defines a major stationary source for extreme ozone nonattainment areas such as SCAQMD as one emitting 10 tons/year (42 U.S.C. §§ 75lla(e), 7511a(f); CAA §§ 182(e), 182(f)). Under the federal CAA, such sources are subject to enhanced control requirements (42 U.S.C. §§ 7502(c)(5), 7503; CAA §§ 172(c)(5), 173), so SCAQMD determined that 55 lb/day was an appropriate threshold for making a CEQA significance finding and requiring feasible mitigation. As, SCAQMD has stated:

> *"… a project source that emits 10 tons/year of NO_X or VOC is small enough that its regional impact on ambient ozone levels may not be detected in the regional air quality models that are currently used to determine ozone levels. Thus, in this case it would not be feasible to directly correlate project emissions of VOC or NO_X with specific health impacts from ozone."(SCAQMD 2015c.)*

Therefore, lead agencies that use SCAQMD thresholds of significance may determine that projects have a significant air quality impact and correspondingly are required to implement all feasible mitigation measures, yet are not able to correlate the project impact to quantifiable health effects.

2.2 Localized Significance Thresholds

SCAQMD published its Final Localized Significance Threshold Methodology in June 2003, (revised July 2008) and Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM2.5 Significance Thresholds in October 2006, recommending that all air quality analyses include a localized assessment of both construction and operational impacts on the air quality of nearby air quality sensitive receptors (SCAQMD 2008). LSTs represent the maximum emissions from a project site that are not expected to result in an exceedance of a NAAQS or CAAQS. LSTs are based on the ambient concentrations of that pollutant within the Source Receptor Area (SRA) where a project is located and the distance to the nearest air quality sensitive receptor. LSTs are only applicable to the following criteria air pollutants: NO_X, CO, PM10, and PM2.5. The proposed project site is located in the central portion of SRA 19 (Saddleback Valley) (SCAQMD 2020e).

The Basin is in attainment for NO_2 and CO, meaning their ambient concentrations are below their respective air quality standards. When evaluating localized impacts for NO_2 and CO, the local ambient concentrations and the proposed project related concentrations are summed and then compared to the NAAQS and CAAQS. If the sum of the ambient concentrations and proposed project concentrations are greater than the air quality standard, this would result in a significant impact.

The Basin is in nonattainment for PM10 and PM2.5, meaning their ambient concentrations are above their respective air quality standards. If ambient levels already exceed a NAAQS or CAAQS, then project impacts may be considered significant if they increase ambient concentrations in excess of the allowable increase established by SCAQMD. This would apply to PM10 and PM2.5, both of which are nonattainment pollutants in the Basin. For these latter two pollutants, the significance criteria are the pollutant concentration thresholds presented in SCAQMD Rules 403 and 1301. The Rule 403 threshold of 10.4 $\mu g/m^3$ applies to construction emissions (and may apply to operational emissions at aggregate handling facilities). The Rule 1301 threshold of 2.5 $\mu g/m^3$ applies to non-aggregate handling operational activities.

SCAQMD recommends that sites larger than 5 acres perform air dispersion modeling to determine localized air quality (SCAQMD 2008b). While the proposed project site is greater than 5 acres, the individual phases of construction are localized to smaller portions of the site on any given day (i.e. construction at the toe of the dam would not be occurring at the same time as the access road near the intersection of Sand Canyon Avenue and Portola Parkway). Based on the daily areas of disturbance, the onsite areas are analyzed as either one-acre sites or five-acre sites and screening level LSTs are used to determine significance. Operational emissions would be centralized around the proposed Treatment Facility, which is conservatively assumed to be 328 feet (100 meters) from the nearest sensitive receptor. **Table 6** shows the threshold levels used for a one-acre site located within 164 feet (50 meters) of the nearest sensitive receptor and for a five-acre site located within 164 feet of the proposed project.

TABLE 6
LOCALIZED SCREENING LEVELS

Source	NO_X	CO	PM10	PM2.5
Construction - 1-acre site at 164 feet (50 meters)	52	883	11	4
Construction - 5-acre site at 328 feet (100 meters)	112	2,763	49	16
Operational – 1-acre site at 328 feet (100 meters)	60	1,234	6	2

SOURCE: SCAQMD 2008b.

2.3 Toxic Air Contaminants

Based on the criteria set forth by SCAQMD, the proposed project would expose air quality sensitive receptors to substantial concentrations of TACs if the proposed project emits carcinogenic materials or TACs that exceed the maximum incremental cancer risk of 10 in one million or a non-cancer hazard index of 1.0. Similarly, the proposed project would result in a potentially significant impact if cancer burden corresponds to an increase in more than 0.5 excess cancer cases in areas where the proposed project-related increase in individual cancer risk exceeds 1 in one million (SCAQMD 2019).

2.4 Health Impacts

In Sierra Club v. County of Fresno (S219783) (Sierra Club) the Supreme Court held that CEQA requires lead agencies to either (i) make a “reasonable effort” to substantively connect the estimated amount of a given air pollutant a project will produce and the health effects associated with that pollutant, or (ii) explain why such an analysis is infeasible (6 Cal.5th at 1165-66). However, the Court also clarified that that CEQA "does not mandate" that EIRs include "an in-depth risk assessment" that provides "a detailed comprehensive analysis … to evaluate and predict the dispersion of hazardous substances in the environment and the potential for exposure of human populations and to assess and quantify both the individual and population wide health risks associated with those levels of exposure (Sierra Club v. County of Fresno. 6 Cal.5th 502, 517-522 (2018))."

USEPA and CARB have established AAQS at levels above which concentrations could be harmful to human health and welfare, with an adequate margin of safety. Further, California air districts, like SCAQMD, have established emission-based thresholds that provide project-level estimates of criteria air pollutant quantities that air basins can accommodate without affecting the attainment dates for the AAQS, and therefore, providing thresholds of significance for regional and localized air quality impacts from both construction and operation of projects. SCAQMD thresholds take into account that the Air Basin is a distinct geographic area that has critical air pollution problems for which AAQS have been established to protect human health and welfare (SCAQMD 2008a).

Typically, the health effect of a particular criteria pollutant is analyzed by air districts on a regional scale based on how close the area is to attaining the NAAQS. As shown by the attainment plan emissions data, it takes a large amount of additional precursor emissions to demonstrate a modeled increase in ambient levels over an entire region. Because air districts' attainment plans and supporting air model tools are regional in nature, they are not typically used to evaluate the impacts to ambient concentrations of criteria air pollutants, or to correlate those impacts to the potential resultant impacts to public health effects, from an individual project. The complex nature of criteria air pollutant dispersion and the complex atmospheric chemistry that occurs (especially in the case of ozone and fine particulate matter) limits the usefulness of applying the available models to predict health effects at a project-level. Therefore, correlating a project's criteria air pollutant emissions to specific health effects, particularly with respect to ozone, is speculative.

Generally, models that correlate criteria air pollutant concentrations with specific health effects focus on regulatory decision-making that will apply throughout an entire air basin or region. These models focus on the region-wide health effects of pollutants so that regulators can assess the costs and benefits of adopting a proposed regulation that applies to an entire category of air pollutant sources, rather than the health effects related to emissions from a specific proposed project or source. Because of the scale of these analyses, any one project is likely to have only very small incremental effects which may be difficult to differentiate from the effects of air pollutant concentrations in an entire air basin. In addition, such modeling efforts are costly, and the value of a project-specific analysis may be modest in relation to that cost. Furthermore, the results, while costly to produce, may not be particularly useful. For regional pollutants, it is difficult to trace a particular project's criteria air pollutant emissions to a specific health effect. Moreover, the modeled results may be misleading because the margin of error in such modeling is large enough that, even if the modeled results report a given health effect, the model is sufficiently imprecise that the actual effect may differ from the reported results; that is, the modeled results suggest precision, when in fact available models cannot be that precise on a project level.

Writing as amicus curiae in Sierra Club, the SJVAPCD explained that "[r]unning the photochemical grid model used for predicting ozone attainment with emissions solely from one project would thus not be likely to yield valid information given the relative scale involved" (SJVAPCD 2015). Ozone is not directly emitted into the air, but is instead formed as ozone precursors undergo complex chemical reactions through sunlight exposure (SJVAPCD 2015). Given the complex nature of this process, and the fact that ozone can be transported by wind over long distances, "a specific tonnage amount of NOx or ROGs emitted in a particular area does not equate to a particular concentration of ozone in that area" (SJVAPCD 2015). For this reason, the photochemical analysis for ozone is done on a regional scale, and it is inappropriate to analyze ozone impacts at a local or project-level basis because a localized analysis would at most be speculative, and at worst be misleading.

Speculative analysis is not required by CEQA. The SJVAPCD stated that even a project with criteria pollutant emissions above its CEQA thresholds does not necessarily cause localized human health effects as, even with relatively high levels of emissions, the SJVAPCD cannot determine "whether and to what extent emissions from an individual project directly impact human health in a particular area" (SJVAPCD 2015). The SCAQMD also, as amicus curiae in Sierra Club, made similar points, reiterating that "an agency should not be required to perform analyses that do not produce reliable or meaningful results" (SCAQMD 2015c). With regard to particulate matter, the SCAQMD noted that while the CARB has created a methodology to predict expected mortality from large amount of PM2.5, the primary author of the methodology has reported that it "may yield unreliable results due to various uncertainties" and CARB staff has been directed by its Governing Board to reassess and improve it, which factor "also counsels against setting any hard-and-fast rule" about conducting this type of analysis (SCAQMD 2015c). SCAQMD agrees that it is very difficult to quantify health effects, opining that the only possible means of successfully doing so is for a project so large that emissions would essentially equate to levels comparable to all combined regional emission increases (SCAQMD 2015c). Because the proposed project would not emit that magnitude of daily emissions, the usage of photochemical modeling to determine specific health effects of this individual project is not warranted.

The mass emissions thresholds developed by the SCAQMD and used by CEQA lead agencies throughout the SCAQMD to determine potential significance of project-related regional changes in the environment are not directly indicative of exceedances of applicable ambient air standards. Meteorology, the presence of sunlight, and other complex chemical factors all combine to determine the ultimate concentration and location of ozone or PM. The effects on ground-level ambient concentrations of pollutants that may be breathed by people are also influenced by the spatial and temporal patterns of the emission sources. In other words, the effect on ozone and PM concentrations from a given mass of pollutants emitted in one location may vary from the effect if that same mass of pollutants was emitted in an entirely different location in the Air Basin. The same effect may be observed when the daily and seasonal variation of emissions is taken into account. Regional-scale photochemical modeling, typically performed only for NAAQS attainment demonstration and rule promulgation, account for these changes in the spatial, temporal, and chemical nature of regional emissions.

As an example of the relationship between modeled regional mass emissions and modeled air basin pollutant concentrations, the most recent EPA-approved SCAQMD basin-wide emissions inventory shows VOC emissions at 162.4 tons per day and NOx emissions at 293.1 tons per day for the baseline year of 2012 (SCAQMD 2017a). SCAQMD's AQMP shows that reducing the baseline 2008 NO_X and VOC emissions by 432 tons per day and 187 tons per day respectively, would only reduce ozone levels at the monitor stations with the greatest ozone concentrations by 9 parts per billion (ppb) (SCAQMD 2013). Additionally, SCAQMD modeling that accounts for increases in emissions due to new or modified sources within the SCAQMD between 2010 and 2030 show an increase of 6,620 pounds per day of NOx and 89,947 pounds per day of VOC. The results of this analysis show that this level of daily pollutant increase would only increase ozone concentrations in the Air Basin by 2.6 ppb and less than 1 ppb of NO_2 (SCAQMD 2011).

Currently, the health impact of a particular criteria air pollutant is analyzed by air districts on a regional scale based on how close the area is to attaining the NAAQS. Such an analysis has generally not been performed at the project level. The SCAQMD states that an exceedance of the significance thresholds does not necessarily cause localized human health effects as, even with relatively high levels of emissions. However, the Air Basin is a distinct geographic area that has critical air pollution problems for which AAQS have been established to protect human health and welfare. Therefore, analyzing a project against these thresholds conservatively assesses whether these emissions directly contribute to regional or local exceedances of AAQS and assesses their potential to be harmful to human health. Thus, in order to determine the potential for adverse health effects, project emissions are compared to the SCAQMD's regional emissions thresholds of significance.

2.5 General Conformity Determination

A conformity determination is required for each criteria pollutant or precursor where the total of direct emissions of the criteria pollutant or precursor in a federal non-attainment or maintenance area would equal or exceed specified annual emission rates, referred to as "de minimis" thresholds." These de minimis thresholds are provided in 40 CFR 93.153(b)(1) and (2). For ozone precursor emissions, the de minimis thresholds depend on the severity of the non-attainment classification. In an extreme ozone non-attainment area, the de minimis thresholds are 10 tons per year for both NO_X and VOC. In a federal serious non-attainment area, the de minimis threshold is 70 tons per year for PM2.5. In a federal attainment-maintenance area, the de minimis threshold is 100 tons per year for CO, and PM10. Effective June 13, 2012, the USEPA designated the South Coast Air Basin as extreme non-attainment for the 1997 ozone standard. In 2012, the USEPA designated the Air Basin as extreme non-attainment for the 2008 ozone standard. The Air Basin is also attainment-maintenance for the federal CO and PM10 standards. and serious non-attainment for the federal PM2.5 standards. Thus, based on the present attainment status of the Air Basin, a federal action would conform to the SIP if its annual emissions remain below 10 tons of VOC or NO_X, 100 tons of CO or PM10, and 70 tons of PM2.5.

2.6 Greenhouse Gas Emissions Thresholds

CEQA Guidelines section 15064.4 gives lead agencies the discretion to determine whether to assess the significance of GHG emissions quantitatively or qualitatively. Section 15064.4 recommends considering certain factors, among others, when determining the significance of a project's GHG emissions, including the extent to which the proposed project may increase or reduce GHG emissions as compared to the existing environment; whether the proposed project exceeds an applicable significance threshold; and extent to which the proposed project complies with regulations or requirements adopted to implement a reduction or mitigation of GHGs. None of the amendments establishes a threshold of significance; rather, so long as any threshold selected is supported by substantial evidence (see section 15064.7(c)), lead agencies are granted discretion to establish significance thresholds for their respective jurisdictions, including by looking to thresholds developed by other public agencies, such as air districts, or suggested by experts, such as the California Air Pollution Control Officers Association (CAPCOA).

The California Natural Resources Agency's *Final Statement of Reasons for Regulatory Action* from December 2009 similarly provides that project-level quantification of emissions should be conducted where it would assist in determining the significance of emissions, even where no numeric threshold applies. In such cases, CNRA's guidance provides that qualitative thresholds can be utilized to determine the ultimate significance of project-level impacts based on a project's consistency with plans, which can include applicable regional transportation plans. Even when using a qualitative threshold, quantification can inform "the qualitative factors" and indicate "whether emissions reductions are possible, and, if so, from which sources (CNRA 2009)."

Neither CARB nor the County of Orange has adopted quantitative significance thresholds for assessing project-level impacts related to GHG emissions. As a method for determining significance under CEQA, SCAQMD developed a draft tiered flowchart in 2008 for determining significance thresholds for GHGs for industrial projects where SCAQMD is acting as the lead agency. In December 2008, SCAQMD adopted a 10,000 $MTCO_2e$/year threshold for industrial facilities, but only with respect to for projects in which SCAQMD is the lead agency. SCAQMD has not adopted a threshold of significance for residential or commercial projects. Additionally, SCAQMD formed a GHG Significance Threshold Working Group to evaluate potential GHG significance thresholds and had proposed, but not adopted, a 3,000 $MTCO_2e$/year screening level for land use development projects. However, the aforementioned Working Group has been inactive since 2011 and no screening levels drafted by the Working Group have been formally adopted for land use development projects. Nonetheless, while the proposed project is an infrastructure project and does not fit neatly into a category (industrial, commercial, or residential/), in the absence of a formally adopted threshold applicable to this proposed project, the more stringent of the two quantitative thresholds discussed above (i.e., 3,000 $MTCO_2e$/year) is used to evaluate the significance for this proposed project.

2.7 Greenhouse Gas Reduction Plans, Policies and Regulations

A significant impact would occur if the proposed project would conflict with applicable regulations, plans and policies that were adopted to reduce GHG emissions that contribute to global climate change. For the proposed project, as an infrastructure project, this analysis considers the proposed project's potential to conflict with the following applicable plans, policies and regulations to reduce GHG emissions:

- The 2017 Climate Change Scoping Plan Update, CARB's plan for achieving a 40 percent reduction on GHG emissions from 1990 levels by 2030, statewide, as mandated by SB 32; and
- The SCAG 2020-2045 RTP/SCS, the regional plan for achieving sustainable land use patterns that reduce passenger vehicle GHG emissions, as mandated by SB 375.

SECTION 3
Impact Analysis

3.1 Methodology

The evaluation of potential impacts to regional and local air quality that may result from the construction and long-term operations of the proposed project is discussed below.

3.1.1 Construction Impacts

Regional Construction Emissions

Project construction activities that would have the potential to create regional air quality impacts including vehicle trips generated by construction workers, vendor trucks, and haul trucks traveling to and from the proposed project site and building activities such as the application of paint and other surface coatings. The proposed project's daily regional criteria pollutant emissions during construction have been estimated by assuming a conservative scenario for construction activities (i.e., assuming all construction occurs at the earliest feasible date) and applying the mobile source and fugitive dust emissions factors.

The emissions have been estimated using the CalEEMod software, an emissions inventory software program recommended by the SCAQMD for off-road construction equipment emissions.[6] On-road mobile source emissions were estimated using the 2017 CARB on-road vehicle emissions factor model (EMFAC) and incorporating the adjustment factors for the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part I: One National Program (SAFE Rule Part I).

Project construction is estimated to start in 2022 and continue for approximately 41 months, ending in 2026. Construction phasing would include vegetation clearing, mobilization and creation of access road/intersection improvements, excavation of sediments and the existing dam, construction of the dam, spillway and reservoir, construction of the treatment facilities, creation of wetlands/riparian habitat, installation of recreational components (non-paved hiking trails), and demobilization. The proposed project would import approximately 100,000 cubic yards of soil with a maximum of 66 haul trucks accessing the site per day. The remaining soil needed for the new dam construction would come from soils excavated onsite. No soil removal is estimated. An

---

6 CalEEMod was developed in collaboration with the air districts of California and is recommended by SCAQMD for evaluating GHG emissions for projects under CEQA. Regional data (e.g., emission factors, trip lengths, meteorology, source inventory, etc.) were provided by the various California air districts to account for local requirements and conditions. According to the California Air Pollution Control Officers Association, the model is an established, accurate and comprehensive tool for quantifying air quality and GHG impacts from land use projects throughout California.

estimated 420,000 cubic yards of vegetation would be removed from the project site with a maximum of 78 haul trucks per day. One daily fuel delivery per day is estimated during construction activities. Worker and vendor deliveries vary by phase with a maximum of 114 worker vehicles and 29 vendor trucks accessing the site daily.[7]

The input values used in this analysis were adjusted to be proposed project-specific based on provided equipment types and the construction schedule. Haul truck trips and concrete truck trips estimates were based on information obtained from IRWD. Haul and concrete truck trip VMT were based on a 28-mile one-way trip. Worker trip and vendor truck trip estimates were based on default calculation methodologies in CalEEMod (worker trips equal 14.7 miles and vendor trips equal 6.9 miles).

Additional geotechnical work may or may not occur and the intensity of any geotechnical work is unknown. There are three potential geotechnical tests that could occur: borings, test pits, or trenches. Because the intensity of any work that will occur is unknown, the analysis determines the maximum intensity of geotechnical work that can occur concurrently and independent from the reservoir work. The *Irvine Ranch Water District Syphon Reservoir Geotechnical Investigations Project Initial Study/Mitigated Negative Declaration* was used to determine the equipment and workers that would be used to conduct the additional geotechnical investigations.

Emissions from proposed project construction activities were estimated based on the construction phase in which the activity would be occurring. The maximum daily emissions estimate the worst-case day and do not represent the emissions that would occur for every day of proposed project construction. The maximum daily emissions are compared to SCAQMD daily regional thresholds of significance. A detailed discussion of the proposed project's construction phasing and equipment list is available in Appendix A of this technical report. Emissions calculations and modeling output are included in Appendices B, D and E of this technical report.

Localized Construction Emissions

Proposed project construction activities that would have the potential to create local air quality impacts including fugitive dust from grading, demolition, and building activities such as the application of paint and other surface coatings. The localized effects from the on-site portion of the proposed project's construction emissions were evaluated at the nearby sensitive receptor locations that would be potentially impacted by proposed project construction in accordance with the SCAQMD's *Final Localized Significance Threshold Methodology* (June 2003, revised July 2008). The localized significance thresholds only address NO_X, CO, PM10, and PM2.5 emissions. The SCAQMD has established screening criteria that can be used to determine the maximum allowable daily emissions that would satisfy the localized significance thresholds and therefore not cause or contribute to an exceedance of the applicable ambient air quality standards without the need for proposed project-specific dispersion modeling. The localized analysis for the proposed project is based on this SCAQMD screening criteria. The maximum daily onsite emissions from construction

7 It is unknown how many additional geotechnical tests would be required for completion of the project. The 114 maximum workers is based on the maximum geotechnical work that can occur with non-geotechnical work. Geotechnical activities would require between 9 to 12 workers per activity.

of the proposed project were compared to these screening criteria. Emissions calculations and modeling output are included in Appendices B, D, and E of this technical report.

Health Impact Assessment

Health impacts associated with the proposed project are assessed based on the estimated project's regional emissions, as discussed above for regional construction and operational emissions, in comparison to the SCAQMD regional emissions thresholds of significance.

Greenhouse Gas Emissions

The evaluation of potential impacts to GHG emissions that may result from the construction of the proposed project is consistent with CEQA Guidelines section 15064.4(a) and recent related guidance from OPR. This analysis considered GHG emissions resulting from construction activities associated with the proposed project as detailed under Regional Construction Emissions above. Because potential impacts resulting from GHG emissions would be long-term rather than acute, GHG emissions were calculated on an annual basis. In accordance with SCAQMD guidance, GHG emissions from construction have been amortized (i.e., averaged annually) over the lifetime of the proposed project. SCAQMD defines the lifetime of a project as 30 years. Therefore, the proposed project's total construction GHG emissions are divided by 30 to determine an annual construction emissions estimate comparable to operational emissions.

GHG quantification methods rely on guidance from State and regional agencies with scientific expertise in quantifying GHG emissions, including CARB and SCAQMD. Along with the air quality emissions, GHG emissions were estimated using CalEEMod Version 2016.3.2 for off-road construction equipment and Safe Rule 1 adjusted EMFAC2017 emissions for on-road vehicles as detailed above. Emissions calculations and modeling output are included in Appendices C through E of this technical report.

3.1.2 Operational Impacts

Regional Operational Emissions

The proposed project's operational activities would have minimal changes from the existing scenario. There are no new permanent maintenance or recreational trips associated with the reservoir improvements, and no natural gas emissions, water use or solid waste generation anticipated. Maintenance of the wetland/riparian area would be required for approximately 5 years after construction is complete to ensure success of the vegetated areas, and would result in infrequent trips to the project site. Operational vehicle trips during the first five years of maintenance would equal 12 to 24 round trips for 30 to 40 days per year. However, these trips would not result in substantial daily or annual emissions.

The main operational emissions associated with air quality impacts would occur from consumer product use associated with onsite maintenance activities. While electrical consumption will increase, electrical consumption does not result in direct air quality impacts and therefore are not addressed in the regional or localized air quality emissions analysis. Assumptions, calculations and modeling output are included in Appendices A, B, D and E of this technical report.

Localized Operational Emissions

The localized effects from the on-site portion of the maximum daily emissions from proposed project operation were evaluated at the nearby sensitive receptor locations that would be potentially impacted by operation of the proposed project according to the SCAQMD's Final Localized Significance Threshold Methodology (June 2003, revised July 2008). The localized impacts from operation of the proposed project were assessed similar to the construction emissions, as discussed previously. For further explanation, please see Appendices B, D and E of this report.

Carbon Monoxide Hotspots

The greatest quantities of CO are produced from motor vehicle combustion and are usually concentrated at or near ground level because they do not readily disperse into the atmosphere, particularly under cool, stable (i.e., low or no wind) atmospheric conditions. Localized areas where ambient concentrations exceed State and/or federal standards are termed "CO hotspots." As the operation of the proposed project would not result in any new mobile source emissions, the project would not result in CO hotspots. Therefore, CO hotspots are not discussed further in this analysis.

Greenhouse Gas Emissions

Existing operations at the proposed project site generate GHG emissions from electrical consumption. The proposed project would not result in new or increased use of motor vehicles, water or natural gas consumption, or wastewater or solid waste generation. The proposed project would result in the consumption of 1,300,000 kWh annually. The existing operations consist of approximately 217,273 kWh annually, therefore the annual increase in electrical consumption is approximately 1,082,727 kWh. The increase in electrical consumption was used to quantify annual operational GHG emissions. Emissions from annual electrical consumption are added to the amortized construction emissions and compared to the SCAQMD's quantitative screening level. For further explanation, please see Appendix C of this report.

3.1.3 Toxic Air Contaminant Impacts (Construction and Operation)

The proposed project would emit TACs during construction, exposure to which may result in an increase in carcinogenic and non-carcinogenic health risks on the residents and other air quality sensitive receptors in the vicinity. A Health Risk Assessment (HRA) was prepared to evaluate the risk of potential negative health outcomes (cancer, or other acute or chronic conditions) related to TACs exposure from airborne emissions during proposed project construction activities. Incremental increase in lifetime cancer risk is assessed over longer exposure time periods (i.e., 30-year for residential receptors).

The HRA followed the procedure and methods provided in the *Guidance Manual for Preparation of Health Risk Assessments* issued by OEHHA in 2015. as well as the methods the SCAQMD's *Risk Assessment Procedures for Rule 1401, 1401.1, and 212, version 8.1*, used in conjunction with the associated *SCAQMD Permit Application Package "N (OEHHA 2015; SCAQMD 2017b; SCAQMD 2017c)."* The procedure involved emission quantification, modeling of environmental transport, evaluation of environmental fate, identification of exposure routes, identification of exposed populations, and estimation of short-term (e.g., 1-hour maximum), 8-hour average, and long-term (annual) exposure levels. The revised 2015 OEHHA Guidance takes into account the sensitivity of children to TAC emissions, breathing rates, and time spent at home since children have higher breathing rate compared to adults and would likely spend more time at home resulting in longer exposure durations.

For construction, the potential TAC emission sources of DPM are diesel-fueled heavy-duty equipment, and on-road travel and idling emissions from diesel-fueled haul and vendor trucks. Since DPM has cancer and non-cancer health effects, the impacts of being exposed to these emissions during construction were evaluated on a short term and annual basis.

Air dispersion model runs were conducted to simulate annual air concentrations at air quality sensitive receptors for the duration of construction of the proposed project. Annual air concentrations were adjusted for OEHHA's Cancer Potency Factor (CPF) to evaluate the incremental increase in lifetime cancer risk and Recommended Exposure Level (REL) to evaluate chronic health effects. The maximum incremental increase in lifetime cancer risk is compared to the SCAQMD threshold of 10 in one million and the maximum hazard index is compared to the SCAQMD threshold for Chronic Hazard Indices (1.0). The SCAMD's thresholds for incremental increases in lifetime cancer risk and Hazard Indices apply to all regions of the Basin, regardless of the existing risks posed by exposure to ambient levels of airborne TACs.

The process of assessing health risks and impacts includes a degree of uncertainty. The level of uncertainty depends on the availability of data and the extent to which assumptions must be relied upon in cases where the data are incomplete or unknown. All HRAs rely upon scientific studies to reduce the level of uncertainty; however, it is not possible to eliminate uncertainty from the analysis. Where assumptions are used to substitute for incomplete or unknown data, it is standard practice in performing HRAs to err on the side of health protection to avoid underestimating or underreporting the risk to the public. In general, sources of uncertainty that may lead to an overestimation or an underestimation of the risk include extrapolation of toxicity data in animals to humans and uncertainty in the exposure estimates. In addition to uncertainty, there exists "a natural range or variability in measured parameters defining the exposure scenario," and that "the greatest quantitative impact is variation among the human population in such properties as height, weight, food consumption, breathing rates, and susceptibility to chemical toxicants."[8] As mentioned previously, it is typical to err on the side of health protection by assessing risk on the most sensitive populations, such as children and the elderly, by modeling potential impacts based on high-end breathing rates, by incorporating age sensitivity factors, and by not taking into account exposure reduction measures, such as mechanical air filtration building systems.

Cancer Risk Calculation

The incremental increase in lifetime cancer risk values for TAC emissions consider exposure via the inhalation pathway. The potential exposure through other pathways (e.g., ingestion) requires

8 Office of Environmental Health Risk Assessment, 2015. Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, February 2015.

substance and site-specific data, and the specific parameters for DPM are not known for these pathways.[9] The OEHHA Guidance recommends the incorporation of several factors to quantify the carcinogenic compound dose via the inhalation pathway. Once determined, the dose is multiplied by the compound-specific inhalation cancer potency factor to derive the incremental increase in lifetime cancer risk estimate. The dose takes into account the concentration at an air quality sensitive receptor. The cancer potency factor is compound specific. In performing health risk calculations, carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, will have some associated risk.

Incremental health risks associated with exposure to carcinogenic compounds is defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. Under a deterministic approach (i.e., point estimate methodology), the incremental increase in lifetime cancer risk probability is determined by multiplying the chemical's annual concentration by its unit risk factor (URF). For example, the URF for DPM recommended by the Scientific Review Panel[10] is 3.0×10^{-4} per microgram per cubic meter ($\mu g/m^3$). This value corresponds to a CPF of 1.1 per milligram/kilogram (body weight) per day (mg/kg(bw)-day). The URF for DPM means that for receptors with an annual average concentration of 1 $\mu g/m^3$ in the ambient air, the probability of contracting cancer over a lifetime of exposure is 300 in one million. This approach for calculating the incremental increase in lifetime cancer risk is intended to result in conservative (i.e., health protective) estimates of health impacts and is used for assessing risks to air quality sensitive receptors. The estimation of health risks is calculated as follows:

Equation 1: $Dose_{RESIDENT}$ (mg/kg/day) = $C_{AIR} \times DBR \times A \times EF \times CF$

where:

- C_{air}= concentration in air ($\mu g/m^3$)
- DBR= daily breathing rate normalized to body weight (L/kg body weight-day)
- A= inhalation absorption factor (1 for DPM, unitless)
- EF= exposure frequency (unitless) (days/365 days)
- CF= 10^{-6}, correction factor, micrograms to milligrams conversion, liters to cubic meters conversion

Equation 2: $Risk_{INH-RESIDENT}$ (in one million) = $Dose_{AIR} \times CPF \times ASF \times ED/AT \times FAH \times CCF$

where:

- $Dose_{AIR}$= daily inhalation dose (mg/kg-day)
- CPF= cancer potency factor $(mg/kg\text{-}day)^{-1}$
- ASF= age sensitivity factor (unitless)

9 California Air Resources Board, 1998. Report to the Air Resources Board on the Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant, April 22, 1998.

10 The Scientific Review Panel is charged with evaluating the risk assessments of substances proposed for identification as TACs by CARB, OEHHA, and the Department of Pesticide Regulation (DPR), and the review of guidelines prepared by OEHHA.

- ED= exposure duration (years)
- AT= averaging time for lifetime cancer risk (years)
- FAH= fraction of time spent at home (unitless)
- CCF= 10^6, cancer conversion factor to represent risk in chances per million

Details of the exposure parameters used under this methodology as well as risk calculations and modeling output are included in Appendix F.

The estimated excess incremental increase in lifetime cancer risks for residential receptors (including the early-in-life exposure) were adjusted using the ASFs recommended in Cal/EPA OEHHA Technical Support Document and 2015 OEHHA guidance. This approach accounts for an “anticipated special sensitivity to carcinogens” of infants and children. The incremental increase in lifetime cancer risk estimates were weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from 2 to 15 years of age. No weighting factor (i.e., an ASF equal to one, which is equivalent to no adjustment) is applied to ages 16 to 30 years. As a conservative risk estimate, the receptors at the Crean Lutheran High School located across Portola Parkway from the project site were analyzed as residential receptors.

Non-Cancer Health Impacts

Non-cancer effects of chronic (i.e., long- term) TAC exposures were evaluated using the Hazard Index (HI) approach consistent with the OEHHA guidance. The chronic HI was calculated by dividing the modeled annual average concentration by the Reference Exposure Level (REL). The REL is the concentration at or below which no adverse health effects are anticipated. The REL for were obtained from OEHHA and the REL for DPM is 5 for annual chronic impacts. DPM does not have an 8-hour or acute REL therefore only chronic annual impacts are discussed. SCAQMD guidance identifies a significant impact if a project would result in an incremental chronic and acute HI that is greater than 1.0. Details of the risk calculations and modeling output are included in Appendix F.

3.1.4 General Conformity Determination (Construction and Operation)

Under section 176(c)(1) of the federal CAA, federal agencies that “engage in, support in any way or provide financial assistance for, license or permit, or approve any activity” must demonstrate that such actions do not interfere with state and local plans to bring an area into attainment with the NAAQS (42 USC 7506(c)). Orange County is designated extreme non-attainment for the federal 8-hour ozone NAAQS; serious non-attainment for PM2.5; and attainment for the federal CO, NO_2, SO_2, and PM10 standards. The program by which a federal agency determines that its action would not obstruct or conflict with air quality attainment plans is called "General Conformity.” The implementing regulations for General Conformity are found in 40 CFR 93(B) (75 FR 17254 (April 5, 2010, amended July 6, 2010).

Under the General Conformity regulations, both the direct and indirect emissions associated with a federal action must be evaluated. Direct emissions are defined as:

> *Those emissions of a criteria pollutant or its precursors that are caused or initiated by the federal action and originate in a nonattainment or maintenance area and occur at the same time and place as the action and are reasonably foreseeable (40 CFR 93.152 (as revised April 5, 2010, effective July 6, 2010; 75 FR 17273).*

Indirect emissions are defined as:

> *Those emissions of a criteria pollutant or its precursors:*
>
> 1. *That are caused or initiated by the federal action and originate in the same nonattainment or maintenance area, but occur at a different time or place as the action;*
> 2. *That are reasonably foreseeable;*
> 3. *That the agency can practically control; and*
> 4. *For which the agency has continuing program responsibility (40 CFR 93.152 (as revised April 5, 2010, effective July 6, 2010; 75 FR 17273).*

For purposes of this definition, even if a federal licensing, rulemaking, or other approving action is a required initial step for a subsequent activity that causes emissions, such initial steps do not mean that a federal agency can practically control any resulting emissions ((40 CFR 93.152 (as revised April 5, 2010, effective July 6, 2010; 75 FR 17273))).

When describing the 2010 revisions to the definition of indirect emissions, USEPA offered the following explanation:

> *EPA is revising the definition for indirect emissions to clarify that only indirect emissions originating in a nonattainment or maintenance area need to be analyzed for conformity with the applicable SIP. In addition, EPA is revising the definition of "indirect emissions" to clarify what is meant by "the agency can practically control" and "for which the agency has continuing program responsibility."*

This clarification represents USEPA's long standing position that Congress did not intend for conformity to apply to "cases where although licensing or approving action is a required initial step for a subsequent activity that causes emissions, the agency has no control over that subsequent activity, either because there is no continuing program responsibility or ability to practically control (40 CFR 93.152 (as revised April 5, 2010, effective July 6, 2010; 75 FR 17273))."

The General Conformity regulations incorporate a stepwise process, beginning with an applicability analysis. According to USEPA guidance, before any approval is given for a federal action to go forward, the regulating federal agency must apply the applicability requirements found at 40 CFR 93.153(b) to the federal action to evaluate whether, on a pollutant-by-pollutant basis, a determination of General Conformity is required. The guidance states that the applicability analysis can be (but is not required to be) completed concurrently with the NEPA analysis. If the regulating federal agency determines that the General Conformity regulations do not apply to the federal action, no further analysis or documentation is required. If the General Conformity regulations do apply to the federal action, the regulating federal agency must next conduct a conformity evaluation in accordance with the criteria and procedures in the implementing regulations, publish a draft determination of General Conformity for public review, and then publish the final determination of General Conformity.

The General Conformity regulations require that a General Conformity determination analyze the following emissions scenarios: (1) the attainment year specified in the SIP, or if the SIP does not specify an attainment year, the latest attainment year possible under the Act; or (2) the last year for which emissions are projected in the maintenance plan; (3) the year during which the total of direct and indirect emissions from the action is expected to be the greatest on an annual basis; and (4) any year for which the applicable SIP specifies an emissions budget (40 CFR 93.159(d), as amended, effective July 6, 2010).

Each year of construction (2022 through 2026) are analyzed against the *de minimis* thresholds. Annual emissions for the construction activities are quantified for both the unmitigated and mitigated scenarios. Operational emissions are discussed qualitatively as there is a minimal operational component.

3.2 Air Quality Impacts

Threshold AIR-1 Conflict with or obstruct implementation of the applicable air quality plan.

Impact AIR-1: Implementation of the proposed project would not conflict with or obstruct implementation of the applicable air quality plan. (Less than Significant with Mitigation).

The proposed project is located within the Air Basin, which is under the jurisdiction of the SCAQMD. As such, SCAQMD's 2016 AQMP is the applicable air quality plan for the proposed project. Projects that are consistent with the regional population, housing, and employment forecasts identified by SCAG are considered to be consistent with the AQMP growth projections, since the forecast assumptions by SCAG forms the basis of the land use and transportation control portions of the AQMP. Additionally, because SCAG's regional growth forecasts are based upon, among other things, land uses designated in general plans, a project that is consistent with the land use designated in a general plan would also be consistent with the SCAG's regional forecast projections, and thus also with the AQMP growth projections.

The proposed project would result in an increase in short-term employment compared to existing conditions. Also, construction employees are typically employees of the construction firm and are not hired specifically for any one construction job. Being relatively small in number and temporary in nature, construction jobs under the project would not conflict with the long-term employment projections upon which the AQMP is based. Control strategies in the AQMP with applicability to short-term emissions from construction activities include strategies denoted in the 2016 AQMP as MOB-08 and MOB-10 and are intended to reduce emissions from on-road and off-road heavy-duty vehicles and equipment by accelerating replacement of older, emissions-prone engines with newer engines meeting more stringent emission standards. Construction contractors would be required to comply with the CARB Air Toxic Control Measure that limits heavy duty diesel motor vehicle idling to no more than five minutes at any given location with certain limited exceptions defined in the regulation for equipment in which idling is integral to the function of the equipment or activity (such as concrete trucks and concrete pouring). In addition, contractors would be required to comply with required and applicable BACT and the CARB In-Use Off-Road Diesel Vehicle Regulation to use lower emitting equipment in accordance with the phased-in compliance schedule for equipment fleet operators. The proposed project would not conflict with implementation of these strategies. The proposed project is also required to comply with SCAQMD regulations for controlling fugitive dust pursuant to SCAQMD Rule 403. Compliance with these requirements is consistent with and meets or exceeds the AQMP requirements for control strategies intended to reduce emissions from construction equipment and activities.

Nonetheless, as discussed further below in the analysis for Impact AIR-2, even though the proposed project would be consistent with applicable strategies in the AQMP, local and state regulations, and other voluntary measures designed to reduce non-attainment pollutants, regional emissions during construction of the proposed project would exceed the significance threshold for NO_X. Therefore, impacts related to consistency with air quality plans during construction of the proposed project would be potentially significant.

As detailed in Impact AIR-2 below, construction-related daily emissions would be reduced to below the SCAQMD threshold of significance of significance for NO_X with the implementation of Mitigation Measure AIR-1. Implementation of mitigation would increase the emissions of CO, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. For all other criteria pollutants, emission levels would remain below the applicable thresholds of significance. As the proposed project's maximum regional emissions from construction would not exceed the regional thresholds of significance with implementation of mitigation measures, the proposed project would be consistent with the AQMP, and impacts would be reduced to a less than significant level.

Mitigation:

AIR-1: IRWD shall require the construction contractor to implement construction equipment features for equipment operating at the project site during certain construction phases. Construction features will include the following: The proposed project shall utilize off-road diesel-powered construction equipment that meet or exceed CARB and USEPA Tier 4 off-road emissions standards for standard construction equipment rated at 50 horsepower (hp) or greater during project construction. Such equipment will be outfitted with BACT devices including a CARB certified Level 3 Diesel Particulate Filter or equivalent. At a minimum, this measure shall apply during implementation of the following construction sub-phases: upstream

Significance Determination: Less than Significant Impact with Mitigation.

Threshold AIR-2	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard.

Impact AIR-2: Implementation of the proposed project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard. (Less than Significant with Mitigation)

The proposed project would contribute to local and regional air pollutant emissions during construction (short-term or temporary) and operation (long-term).

Construction

Regional Emissions Analysis

Construction of the proposed project has the potential to generate temporary regional criteria pollutant emissions through the use of heavy-duty construction equipment, such as excavators and forklifts, through vehicle trips generated by workers and haul trucks traveling to and from the proposed project site, and through building activities such as the application of paint and other surface coatings. In addition, fugitive dust emissions would result from demolition and various soil-handling activities. Mobile source emissions, primarily NO_X, would result from the use of construction equipment such as dozers and loaders. Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of construction activity, and prevailing weather conditions.

The maximum daily construction emissions for the proposed project were estimated for each construction phase. Some individual construction phases could potentially overlap; therefore, the estimated maximum daily emissions include these potential overlaps by combining the relevant construction phase emissions. The maximum daily emissions are predicted values for a representative worst-case day, and do not represent the actual emissions that would occur for every day of construction, which would likely be lower on many days. As stated above, in order to provide a conservative emissions analysis, for modeling purposes, construction emissions were modeled beginning in 2022. Detailed emissions calculations are provided in Appendix B of this report.

The results of the criteria pollutant calculations are presented in **Table 7** and include dust control measures required to be implemented by SCAQMD Rule 403 (Control of Fugitive Dust), including subsection (e) – Additional Requirements for Large Operations, and fugitive VOC control measures required to be implemented by architectural coating emission factors based on SCAQMD Rule 1113 (Architectural Coatings). As shown in Table 7, construction-related daily emissions would exceed the SCAQMD threshold of significance for NO_X. For all other criteria pollutants, emission levels would be below the applicable thresholds of significance. As the proposed project's maximum regional emissions from construction would exceed the regional threshold of significance for NO_X, regional construction emissions impacts would be potentially significant.

TABLE 7
ESTIMATED MAXIMUM UNMITIGATED REGIONAL CONSTRUCTION EMISSIONS (POUNDS PER DAY) [a]

Source	VOC	NO_X	CO	SO_2	PM10[b]	PM2.5[b]
Preconstruction Activities	7	91	42	<1	14	8
Access Routes/Intersection Improvements	4	47	36	<1	5	2
Excavation of Sediment/Existing Dam	13	133	94	<1	16	10
Construction of Dam/Spillway/Reservoir	13	165	95	<1	19	11
Construction of Treatment Facility	5	26	21	<1	3	1
Wetlands/Riparian Installation	2	16	14	<1	2	1
Installation of Recreational Facilities	4	43	34	<1	3	2
Demobilization	3	22	20	<1	1	1
Max Geotechnical	20	177	198	<1	50	18
Overlapping Subphases						
Set-up & Geotechnical[c]	12	137	94	<1	27	13
Excavation & Geotechnical	19	180	145	<1	29	15
Construction & Geotechnical	18	211	147	<1	32	16
Maximum Reservoir Phase Overlap & Geotechnical	21	236	173	<1	35	17
Dam Excavation & Construction of Dam (Install Inlet/Outlet)	16	182	122	<1	21	12
Construction of Dam (Install Chimney) & Construction of Dam (Spillway)	15	189	121	<1	21	12
Construction of Dam (Spillway) & Construction of Treatment Facilities & Wetlands Installation	9	66	61	<1	7	3
Construction of Treatment Facilities & Wetlands Installation & Recreation Facilities Installation	11	84	70	<1	8	4
Maximum Daily Emissions	**21**	**236**	**198**	**1**	**50**	**18**
SCAQMD Thresholds of Significance	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Thresholds?	No	**Yes**	No	No	No	No

[a] Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided in Appendix B of this report.

[b] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403, including subsection (e) – Additional Requirements for Large Operations.

[c] Set-up includes preconstruction activities and access routes/intersection improvement. Excavation includes excavation of sediment and excavation of dam. Construction includes Construction of Dam/Spillway/Reservoir, construction of facility, wetlands/riparian installation, recreational facilities installation, and demobilization.

SOURCE: ESA 2020.

The results of the mitigated criteria pollutant calculations are presented in **Table 8** and include dust control measures required to be implemented by SCAQMD Rule 403 (Control of Fugitive Dust), including subsection (e) – Additional Requirements for Large Operations and fugitive VOC control measures required to be implemented by architectural coating emission factors based on SCAQMD Rule 1113 (Architectural Coatings). As shown in Table 8, construction-related daily emissions would be reduced to below the SCAQMD threshold of significance for NOx with the implementation of Mitigation Measure AIR-1. Implementation of Mitigation Measure AIR-1 would slightly increase the emissions of CO due to the emissions control technology used, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. For all other criteria pollutants, emission levels would remain below the applicable thresholds of significance. As the proposed project's maximum regional emissions from construction would not exceed the regional thresholds of significance with implementation of mitigation measures, the proposed project's regional construction emissions impacts would be less than significant.

General Conformity Determination

Annual emissions for unmitigated and mitigated emissions were compared to the General Conformity *de minimis* levels for NAAQS non-attainment areas (see **Table 9**). In the unmitigated scenario, annual construction emissions of NO_X, would exceed the 10 tons per year General Conformity threshold. With implementation of Mitigation Measure AIR-1, annual construction emissions of VOC, CO, NO_X, PM10, and PM2.5 would be below applicable General Conformity *de minimis* levels and thus would not conflict with implementation of the SIP. Additionally, short-term direct construction emissions associated with the project would not conflict with or obstruct implementation of applicable long-term air quality management plans. Therefore, no further conformity analysis is required for any of the pollutants because their emissions would be less than the conformity *de minimis* levels, and no significant adverse effect from the project would occur.

TABLE 8
ESTIMATED MAXIMUM MITIGATED REGIONAL CONSTRUCTION EMISSIONS (POUNDS PER DAY) [a]

Source	VOC	NO_X	CO	SO_2	PM10[b]	PM2.5[b]
Preconstruction Activities	3	45	51	<1	12	6
Access Routes/Intersection Improvements	1	9	47	<1	4	1
Excavation of Sediment/Existing Dam	5	33	112	<1	11	6
Construction of Dam/Spillway/Reservoir	4	51	106	<1	14	6
Construction of Treatment Facility	4	18	22	<1	2	1
Wetlands/Riparian Installation	2	14	16	<1	2	1
Installation of Recreational Facilities	1	5	45	<1	1	<1
Demobilization	2	13	25	<1	1	1
Max Geotechnical	10	97	139	<1	48	16
Overlapping Subphases						
Set-up & Geotechnical[c]	5	70	115	<1	25	10
Excavation & Geotechnical	8	59	176	<1	24	10
Construction & Geotechnical	8	76	170	<1	27	11
Maximum Reservoir Phase Overlap & Geotechnical	9	98	208	1	29	12
Dam Excavation & Construction of Dam (Install Inlet/Outlet)	7	72	144	<1	17	8
Construction of Dam (Install Chimney) & Construction of Dam (Spillway)	5	62	134	<1	16	7
Construction of Dam (Spillway) & Construction of Treatment Facilities & Wetlands Installation	7	43	66	<1	6	2
Construction of Treatment Facilities & Wetlands Installation & Recreation Facilities Installation	7	38	83	<1	6	2
Maximum Daily Emissions	**10**	**98**	**208**	**1**	**48**	**16**
SCAQMD Thresholds of Significance	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Thresholds?	No	**No**	No	No	No	No

[a] Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided in Appendix B of this report.

[b] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403, including subsection (e) – Additional Requirements for Large Operations.

[c] Set-up includes preconstruction activities and access routes/intersection improvement. Excavation includes excavation of sediment and excavation of dam. Construction includes Construction of Dam/Spillway/Reservoir, construction of facility, wetlands/riparian installation, recreational facilities installation, and demobilization.

SOURCE: ESA 2020.

TABLE 9
GENERAL CONFORMITY[A]

Year	VOC	NO_X	CO	PM10[b]	PM2.5[b]
Unmitigated Emissions (tons/year)					
2022	<1	4	3	1	<1
2023	1	15	10	2	1
2024	1	19	11	2	1
2025	1	9	6	1	<1
2026	<1	1	1	<1	<1
Annual Emissions	1	19	11	2	1
***De minimis* Levels**	10	**10**	100	100	70
Exceeds *de minimis*?	No	**Yes**	No	No	No
Mitigated Emissions (tons/year)[c]					
2022	<1	1	3	<1	<1
2023	1	5	13	1	1
2024	<1	7	12	2	1
2025	<1	3	7	1	<1
2026	<1	1	1	<1	<1
Annual Emissions	1	7	13	2	1
***De Minimis* Levels**	10	10	100	100	70
Exceeds *de minimis*?	No	No	No	No	No

a Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided in Appendix B of this report.
b Emissions include fugitive dust control measures consistent with SCAQMD Rule 403, including subsection (e) – Additional Requirements for Large Operations.
c Incorporates Mitigation Measure AIR-1.

SOURCE: ESA 2020.

Operations

Regional Emissions Analysis

As discussed previously, operational activities would result in area source emissions and an increase in electrical consumption. No new permanent vehicle trips would occur as maintenance and recreational activities are anticipated to remain the same as the existing conditions. Operational vehicle trips during the first five years of maintenance would equal 12 to 24 round trips for 30 to 40 days per year. However, these trips would not result in substantial daily or annual emissions. Operational regional criteria pollutant emissions were calculated for the proposed project's buildout year of 2026 and emissions were assumed not to exceed 1 pound per day for all criteria pollutants during operational activities. Detailed emissions calculations are provided in Appendix B of this report. The proposed project's operational-related daily emissions would not exceed the SCAQMD thresholds of significance for any criteria pollutants. As the proposed project's maximum regional emissions from operational activities would be below the regional thresholds of significance, regional operation-related emissions impacts would be less than significant.

General Conformity Analysis

Daily operational emissions are less than one pound per day for all criteria pollutants. Therefore, annual emissions would be less than 0.2 tons per year, well below any of the de minimis thresholds, thus in conformance with the SIPs. Additionally, operational emissions associated with the proposed project would not conflict with or obstruct implementation of applicable long-term air quality management plans. Therefore, no further conformity analysis is required for any of the pollutants because their emissions would be less than the conformity thresholds and no significant adverse effect from the project would occur.

Health Impact Assessment

NOx and VOC emissions from projects are directly related to the increase in ozone in the local area/region which aggravate respiratory diseases, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to emergency rooms and may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. As shown in Table 7, unmitigated project-related construction emissions would potentially exceed regional thresholds for NO_X. Accordingly, elevated levels of criteria air pollutants as a result of a project's emissions could cause adverse health effects associated with this pollutant. All other criteria pollutants would be below the thresholds of significance. Implementation of Mitigation Measure AIR-1 would reduce both localized (discussed in detail in Impact 3 below) and regional project generated construction emissions (with the exception of CO, which increases slightly with Mitigation Measure AIR-1 but still remains below the threshold of significance), and therefore would reduce the potential to result in regional health effects associated with ozone precursors (VOC and NO_X). As shown in Table 8, mitigated project construction emissions would not exceed the thresholds of significance. As a result, construction of the proposed project would not have the potential to result in additional quantifiable health impacts, and impacts would be reduced to a less than significant level with implementation of Mitigation Measure AIR-1.

As discussed under operational emissions above, unmitigated project-related operational emissions would not exceed regional thresholds for any criteria pollutant. Accordingly, levels of criteria air pollutants as a result of a project's emissions are not anticipated to cause adverse health effects. Impacts would be less than significant.

Mitigation:

Implement Mitigation Measure AIR-1.

Significance Determination: Less than Significant Impact with Mitigation.

Threshold AIR-3 Expose sensitive receptors to substantial pollutant concentrations.

Impact AIR-3: Implementation of the proposed project would not expose sensitive receptors to substantial pollutant concentrations. (Less than Significant with Mitigation)

Localized Construction

The maximum daily localized emissions for each of the construction phases and the localized significance thresholds are presented in **Table 10**. The same phasing, equipment assumptions, and compliance with SCAQMD Rule 403 and Rule 1113 were used as for the regional emissions calculations discussed above. As shown in Table 10, maximum localized construction emissions for sensitive receptors would exceed the localized threshold of significance for NO_X, therefore, with respect to localized construction emissions, impacts to sensitive receptors would be potentially significant. All other criteria pollutants of local concern (CO, PM10, and PM2.5) would not exceed the localized thresholds of significance. Detailed emissions calculations are provided in Appendix B of this report.

The results of the mitigated localized emissions calculations are presented in **Table 11**. And include dust control measures required to be implemented by SCAQMD Rule 403 (Control of Fugitive Dust), including subsection € – Additional Requirements for Large Operations and fugitive VOC control measures required to be implemented by architectural coating emission factors based on SCAQMD Rule 1113 (Architectural Coatings). As shown in Table 11, construction-related daily emissions would be reduced to below the SCAQMD threshold of significance of significance for NO_X with the implementation of Mitigation Measure AIR-1. Implementation of Mitigation Measure AIR-1 would slightly increase CO emissions due to the emissions control technology used, but would not result in CO emissions exceeding the SCAQMD’s threshold of significance. For all other criteria pollutants, emissions levels would remain below the applicable thresholds of significance. As the proposed project’s maximum localized emissions from construction would not exceed the localized thresholds of significance, localized construction emissions impacts would be less than significant with the incorporation of Mitigation Measure AIR-1.

TABLE 10
ESTIMATED MAXIMUM UNMITIGATED LOCALIZED CONSTRUCTION EMISSIONS (POUNDS PER DAY) [a]

Source	NO_X	CO	PM10[b]	PM2.5[b]
1 acre area – 164 feet (50 meters) from sensitive receptors				
Mobilization, site prep/Staging Areas	44	41	2	2
Access Routes/Intersection Improvements	42	33	5	2
Construction of Facility	9	11	0	0
Installation of Recreational Facilities	42	33	3	2
Demobilization	21	19	1	1
Spillway & Facilities & Wetlands	41	44	3	2
Facilities & Wetlands & Recreational	65	57	5	3
Maximum Localized (On-Site) Emissions	65	57	5	3
SCAQMD Thresholds of Significance	52	883	11	4
Exceed Thresholds?	**Yes**	No	No	No
5 acre area – 328 feet (100 meters) from sensitive receptors				
Preconstruction Activities	55	26	11	7
Excavation of Sediment/Existing Dam	**132**	91	15	10
Construction of Dam/Spillway/Reservoir	**128**	78	15	10
Wetlands/Riparian Installation	14	13	1	1
Dam Excavation & Inlet/Outlet	**144**	102	16	10
Chimney & Spillway Construction	**145**	98	15	10
Max Geotechnical	176	186	37	11
Maximum Localized (On-Site) Emissions	**176**	**186**	37	11
SCAQMD Thresholds of Significance	112	2,763	49	16
Exceed Thresholds?	**Yes**	No	No	No

[a] Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided in Appendix B of this report.

[B] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403.

SOURCE: ESA 2020.

TABLE 11
ESTIMATED MAXIMUM MITIGATED LOCALIZED CONSTRUCTION EMISSIONS (POUNDS PER DAY) [a]

Source	NO_X	CO	PM10[b]	PM2.5[b]
1 acre area – 164 feet (50 meters) from sensitive receptors				
Mobilization, site prep/Staging Areas	20	50	1	1
Access Routes/Intersection Improvements	4	44	3	<1
Construction of Facility	2	12	<1	<1
Installation of Recreational Facilities	4	44	1	<1
Demobilization	13	24	<1	<1
Spillway & Facilities & Wetlands	18	50	2	1
Facilities & Wetlands & Recreational	19	70	3	1
Maximum Localized (On-Site) Emissions	20	70	3	1
SCAQMD Thresholds of Significance	52	883	11	4
Exceed Thresholds?	**No**	**No**	1	1
5 acre area – 328 feet (100 meters) from sensitive receptors				
Preconstruction Activities	8	35	9	5
Excavation of Sediment/Existing Dam	32	109	11	6
Construction of Dam/Spillway/Reservoir	14	88	10	5
Wetlands/Riparian Installation	13	14	1	<1
Dam Excavation & Inlet/Outlet	34	124	12	6
Chimney & Spillway Construction	17	111	10	5
Max Geotechnical	96	234	37	11
Maximum Localized (On-Site) Emissions	96	234	37	11
SCAQMD Thresholds of Significance	112	2,763	49	16
Exceed Thresholds?	**No**	**No**	**No**	**No**

[a] Totals may not add up exactly due to rounding in the modeling calculations. Detailed emissions calculations are provided in Appendix B of this report.
[b] Emissions include fugitive dust control measures consistent with SCAQMD Rule 403.

SOURCE: ESA 2020.

Localized Operations

The localized operational air quality analysis was conducted using the methodology prescribed in the SCAQMD Localized Significance Threshold Methodology (June 2003, revised July 2008). The screening criteria provided in the Localized Significance Threshold Methodology were used to determine the localized operational thresholds of significance for the proposed project. The maximum daily localized emissions would not exceed 1 pound per day and therefore would not exceed localized significance thresholds. Detailed emissions calculations are provided in Appendix B of this report. As the proposed project's maximum localized operational emissions would not exceed the localized thresholds of significance for NO_X, CO, PM10, or PM2.5, operational emissions impacts to sensitive receptors would be less than significant.

Toxic Air Contaminants

Carcinogenic Health Risk

Excess lifetime cancer risk is estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to carcinogens. As the individual incremental increase in lifetime cancer risk is assessed over long exposure time periods (i.e., 30-year for residential receptors), the potential effects of proposed project-related carcinogenic TAC emissions must include the combination of exposure to construction-related activities and exposure to operation-related activities. For cancer risk, SCAQMD guidance identifies a significant impact if a project would result in an incremental cancer risk that is greater than 10 in one million for any receptor.

The TAC emissions of the proposed project would be generated from mobile sources including diesel-powered heavy-duty trucks and construction equipment. These sources generate DPM from combustion of diesel fuels. The analysis uses exhaust PM10 emissions associated with each construction phase as a surrogate for DPM emissions. The potential emission sources of DPM would be diesel-fueled heavy-duty equipment, on-road travel and idling emissions from diesel-fueled haul trucks. For operational activities the proposed project would not result in new TAC sources and therefore would not contribute to the cumulative health risk of the local sensitive receptors.

The maximum health risk impacts to exposed sensitive receptors was determined through placing receptor locations around the proposed project site and haul truck routs. The estimated incremental cancer risks for the proposed project's construction activities over a maximum 30-year exposure in line with OEHHA guidance starting with the first year of construction as analyzed. Cancer risk for the maximum impacted sensitive receptor is 11.16 per million which would exceed the SCAQMD's threshold of 10 per million. As the cancer risk would exceed the SCAQMD's significance thresholds, the lifetime cancer risk that would result from construction and operation of the proposed project would result in significant impacts without mitigation.

Implementation of Mitigation Measure AIR-1, would reduce DPM emissions from the proposed project's construction activities. The estimated incremental cancer risk for the proposed project's construction activities with implementation of Mitigation Measure AIR-1 would be between 1.43 per million and 3.44 per million depending on the level at which the mitigation is implemented. This range is below the significance threshold of 10 per million. Therefore, with mitigation impacts would be less than significant.

Non-carcinogenic Health Risk

As previously discussed, an HRA was prepared to evaluate the risk of potential non-carcinogenic negative health outcomes related to TACs exposure from airborne emissions during the construction of the proposed project. For construction, the potential TAC emission sources were heavy-duty equipment and haul/vendor trucks used during the improvements to the reservoir. Non-cancer effects of chronic (i.e., long- term) exposure were evaluated using the HI approach consistent with the OEHHA and SCAQMD guidance.

A chronic HI equal to or greater than 1.0 represents a significant chronic health hazard. A chronic health effect could include irritation to eyes, throat, lungs or neurological damage. Construction of the proposed project would result in non-carcinogenic health risk of 0.02 under the unmitigated scenario and between 0.004 and 0.02 with implementation of mitigation. Both unmitigated and mitigated non-carcinogenic health risk would be below the significance threshold of a chronic HI of 1.0 for the maximum impacted receptor. Therefore, this this impact would be less than significant.

Mitigation:

Implement Mitigation Measure AIR-1.

Significance Determination: Less than Significant Impact with Mitigation.

Threshold AIR-4	Result in other emissions (such as those leading to odors) affecting a substantial number of people.

Impact AIR-4: Implementation of the proposed project would not result in other emissions (such as those leading to odors adversely affecting a substantial number of people). (Less than Significant)

Construction

Potential activities that may emit odors during the proposed project's construction include the use of architectural coatings and solvents, as well as the combustion of diesel fuel in on-and off-road equipment. SCAQMD Rule 1113 would limit the amount of VOCs in architectural coatings and solvents. In addition, the proposed project would comply with the applicable provisions of the CARB Air Toxics Control Measure regarding idling limitations for diesel trucks. Through mandatory compliance with SCAQMD Rules, no construction activities or materials are expected to create objectionable odors affecting a substantial number of people. Furthermore, as shown in Table 7, construction emissions would not exceed the SCAQMD regional significance thresholds for attainment, maintenance, or unclassifiable criteria air pollutants (i.e., CO and SO_2). Therefore, the proposed project's construction activities would result in less than significant impacts with respect to other emissions, including those leading to odors.

Operations

According to the SCAQMD *CEQA Air Quality Handbook*, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. The proposed project would not include any uses identified by the SCAQMD as being associated with substantial odors. As a result, the proposed project is not expected to discharge contaminants into the air in quantities that would cause a nuisance, injury, or annoyance to the public or property pursuant to SCAQMD Rule 402. Furthermore, as discussed under Impact AIR-2 above, operational emissions would not exceed the SCAQMD regional significance thresholds for attainment, maintenance, or unclassifiable criteria air pollutants (i.e., CO and SO_2). Therefore, operation of the proposed project would result in less than significant impacts with respect to other emissions, including those leading to odors.

Mitigation: None required.

Significance Determination: Less Than Significant Impact.

3.3 Greenhouse Gas Impacts

Threshold GHG-1	Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

Impact GHG-1: Implementation of the proposed project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. (Less than Significant)

According to SCAQMD methodology, because GHG emissions are a cumulative impact, project significance is determined by the combined amortized construction and operational emissions. The proposed project's total estimated GHG emissions during construction are identified in **Table 12**. As shown, estimated GHG emissions would be approximately 9,567 $MTCO_2e$ over the entire lifetime of the project. This would equal approximately 319 $MTCO_2e$ per year after amortization over 30 years per SCAQMD methodology.

Operational GHG emissions result from area sources and the increased electrical use as a result of daily activities once the proposed improved reservoir is operational. **Table 13** shows the total annual GHG emissions associated with the combined construction and operation of the proposed project. As shown in Table 13, operational emissions result in 161 $MTCO_2e$ annually, which is attributed almost exclusively to increased electrical use.

TABLE 12
AMORTIZED ANNUAL CONSTRUCTION GHG EMISSIONS

Source	$MTCO_2e$
Vegetation Clearing	483
Access Routes/Intersection Improvements	434
Mobilization, site prep/Staging Areas	208
Upstream Excavation and Foundation Treatment	1,127
Dam Excavation and Foundation Treatment	689
Install Inlet/Outlet	308
Install Embankment to Bottom of Blanket Drain	643
Install Blanket Drain	546
Install Chimney/Remaining Embankment	3,856
Spillway Construction	152
Construction of Filtration/Chlor/Dechlor Facility	566
Wetlands/Riparian Installation	161
Installation of Recreation Facilities	288
Demobilization	97
Maximum Geotechnical (23 tests)	20
Total Project Construction Emissions	**9,567**
Amortized Project Construction Emissions	**319**

SOURCE: ESA 2020.

TABLE 13
ANNUAL OPERATIONAL GHG EMISSIONS

Source	$MTCO_2e$
Area	<1
Energy	157
Mobile Source	4
Waste	0
Water	0
Subtotal Operational Emissions	**161**
Amortized Project Construction Emissions	319
Total Project Emissions	**480**
District-wide energy savings	535
Total Net Emissions	(55)
Screening Level	3,000
Exceed Screening Level?	No

SOURCE: ESA 2020.

Furthermore, the objectives of the proposed project include reducing the need to purchase supplemental imported untreated water from MWD by storing recycled water that is already produced. Conveying imported untreated water from the State Water Project (SWP) and the Colorado River to Orange County requires a tremendous amount of energy for pumping. Replacing imported water with locally generated recycled water reduces the overall energy associated with imported water since there would be less energy needed for conveyance. Approximately 1,890 kWh per acre foot is required for water supply and conveyance in the IRWD service area due to importing water from outside of the region from the SWP and the Colorado River (IRWD 2019). Without the proposed project, approximately 4,500 AF of untreated water would be imported through MWD, resulting in approximately 8,505,000 kWh/year of electricity consumption. Under the proposed project, the provision of approximately 4,500 AF of locally-produced recycled water would result in approximately 4,806,000 kWh/year of electricity consumption, which is an approximate savings of 3,699,000 kWh annually.

The combined annual construction and operational emissions from the proposed project result in approximately 480 $MTCO_2e$. The district-wide savings in approximately 3,699,000 kWh annually results in a reduction in district emissions of approximately 535 MT CO_2e annually and results in a district wide reduction in GHG emissions of approximately 55 $MTCO_2e$ annually.[11] As the proposed project's annual GHG emissions would not exceed the threshold of significance, emissions impacts with respect to the generation of GHGs would be less than significant.

Mitigation: None required.

Significance Determination: Less Than Significant Impact.

Threshold GHG-2 Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs.

Impact GHG-2: Implementation of the proposed project would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs. (Less than Significant)

Consistency with the Climate Change Scoping Plan

The CARB Climate Change Scoping Plan was designed to reduce GHG emissions from new land use projects. The proposed project would be subject to the Scoping Plan requirements. The majority of the Scoping Plan measures target measures that reduce energy and transportation emissions from residential and commercial/industrial development and therefore the majority of the Scoping Plan measures are not applicable to the proposed project. Out of the Recommended Actions contained in CARB's Scoping Plan, the actions that are most applicable to the proposed program would be reducing diesel-fueled commercial motor vehicle idling, and reducing energy associated with water

[11] 1,082,727 kWh of net increase in electrical use results in 157 $MTCO_2e$ annually. 3,699,000 kWh of electric use results in approximately 535 $MTCO_2e$ annually. Project emissions (480 $MTCO_2e$) minus the district emissions (535 $MTCO_2e$) equals a 55 $MTCO_2e$ annual reduction in district emissions from the implementation of the project.

use. The proposed project would be designed to comply with the California regulations to limit idling of onsite vehicles to 5 minutes or less per location.

The objectives of the proposed project include reducing the need to purchase imported water from MWD by storing and using additional recycled water stored by the proposed project and maximize the use of recycled water produced by IRWD for the benefit of IRWD customers. Once operational, the proposed project would increase the amount of recycled water available within IRWD and therefore would reduce the emissions associated with the transport of non-potable water from other sources. Replacing purchased imported water with locally generated recycled water for use by local customers reduces the overall energy-related GHG emissions associated with the purchase of imported water since there would be less GHG emissions from water supply and conveyance. Approximately 1,890 kWh per acre foot is required for water supply and conveyance in the IRWD service area due to importing water from outside of the region from the SWP and the Colorado River (IRWD 2019). Without the proposed project approximately 4,500 AF of untreated water would be imported through MWD, resulting in approximately 8,505,000 kWh/year of electricity consumption district-wide. Treatment and transport of approximately 4,500 AF of locally-produced recycled water would result in approximately 4,806,000 kWh/year of district-wide electricity consumption, which is an approximate savings of 3,699,000 kWh annually. By providing IRWD customers with recycled water stored under the proposed project, electricity used for water supply and conveyance from imported water would be offset by the recycled water, thus reducing district-wide GHG emissions. The 2017 Climate Change Scoping Plan recognizes the nexus between water and energy consumption. The water-energy nexus provides opportunities for reducing energy demand and reducing emissions of GHGs. The 2017 Climate Change Scoping Plan, states that "recycled water has the potential to reduce GHGs if it replaces, and not merely serves as an alternative to, an existing, higher-carbon water supply" (CARB 2017a). Thus, the proposed project would be consistent with the Scoping Plan's strategy to reduce water-related GHG emissions.

As the proposed project would not increase traffic within the region, and would reduce the overall energy-related GHG emissions associated with the use of imported water, the proposed project would not conflict with the Scoping Plan. That combined with the reduction in vehicle idling, the proposed project would be consistent with the Scoping Plan measures applicable to the project. Therefore, the proposed project would result in less than significant impacts.

Consistency with SB 375

The key goal of the Sustainable Communities Standard is to achieve GHG emission reduction targets through integrated land use and transportation strategies. The focus of these reductions is on transportation and land use strategies that influence vehicle travel. The proposed project would not significantly or permanently increase vehicle traffic within the County or the region. While the proposed project would result in an increase in short-term employment compared to existing conditions, the project would not result in long-term employment growth in excess of regional projections by SCAG. Therefore, the proposed project would not conflict with the implementation of SB 375 nor the 2020-2045 RTP/SCS and impacts would be less than significant.

Consistency with Applicable Regulations

The Heavy-Duty Vehicle and Light-Duty vehicle rules have been established to reduce CO2 emissions from the combustion of fossil fuels. The proposed project would not involve the manufacture of vehicles or production of vehicle fuels. However, vehicles that are purchased and used within the project site would comply with any vehicle and fuel standards that the CARB adopts or has adopted. Therefore, the construction and operation of the proposed project would not conflict with these regulations.

CARB's ATCM limits heavy-duty diesel motor vehicle idling to reduce DPM and other TACs and applies to all the haul trucks, heavy duty vendor trucks, and construction equipment that would be used on the project site. CARB also implemented the Truck and Bus Regulation to further reduce NOx, PM10 and PM2.5 from on-road diesel operating vehicles. CARB has also promulgated emissions standards for off-road diesel construction equipment greater than 24 horsepower to reduce criteria pollutant emissions. The proposed project would operate both on- and off-road trucks and construction equipment. These vehicles would comply with all of the CARB regulations and onsite trucks and equipment would be monitored to ensure that idling would occur for only five minutes at any given time. Therefore, the proposed project would be consistent with the applicable regulations for heavy-duty, light-duty and off-road vehicles and equipment and impacts would be less than significant.

Mitigation: None required.

Significance Determination: Less Than Significant Impact.

3.4 Cumulative Air Quality Impacts

The following cumulative impact analysis is based on the recommendations provided by SCAQMD in the Potential Control Strategies to Address Cumulative Impacts from Air Pollution White Paper. SCAQMD's guidance for assessing a project's cumulative impacts recommends the use of two alternative methodologies: (1) that project-specific air quality impacts be used to determine the project's potential cumulative impacts to regional air quality; or (2) that a project's consistency with the AQMPs are used to determine its potential cumulative impacts.

Under SCAQMD's guidance, "[p]rojects that exceed the project-specific significance thresholds are considered by SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant." Therefore, consistent with this guidance, the potential for the Proposed Project to results in cumulative impacts from regional emissions is assessed based on SCAQMD thresholds.

Consistency with AQMP

As described above under Impact AIR-1, construction of the proposed project would not be consistent with the AQMP as the proposed project would generate emissions of nonattainment pollutants or precursors (i.e., NO_X) that exceed the applicable significance thresholds. Based on

SCAQMD guidance, the exceedance of these thresholds indicates that the proposed project would have a considerable contribution to a significant impact. Construction-related daily emissions would be reduced to below the SCAQMD threshold of significance for NO_X with the implementation of Mitigation Measure AIR-1. Implementation of this mitigation measure would slightly increase the emissions of CO due to the emissions control technology used, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. For all other criteria pollutants, emission levels would remain below the applicable thresholds of significance. As the proposed project's maximum regional emissions from construction would not exceed the regional thresholds of significance, the proposed project would be consistent with the AQMP and cumulative impacts would be less than significant.

Operation of the proposed project would be consistent with the AQMP as the proposed project would not generate emissions of nonattainment pollutants or precursors (i.e., VOC, $NO_{X,}$ CO, SOx, PM10, and PM2.5) that exceed the applicable significance thresholds. Therefore, the proposed project would result in a less than significant cumulative operational impact.

Project-Specific Impacts

Construction

As described above under Impact AIR-2 and Impact AIR-3, regional and localized emissions during construction of the proposed project would exceed the SCAQMD significance threshold for NO_X. Thus, based on SCAQMD methodology, the proposed project construction emissions would represent a considerable contribution to a cumulative impact, resulting in a potentially significant cumulative impact. The proposed project's construction-related daily emissions would be reduced to below the SCAQMD regional and local thresholds of significance for NO_X with the implementation of Mitigation Measure AIR-1. Implementation of Mitigation Measure AIR-1 would slightly increase the emissions of CO due to the emissions control technology used, but would not result in CO emissions exceeding the SCAQMD's threshold of significance. As the proposed project's maximum mitigated regional emissions from construction would not exceed the regional thresholds of significance, the proposed project would not represent a considerable contribution to a cumulative impact, resulting in a less than cumulative impact.

Operation

As discussed under Impact AIR-2 and Impact AIR-3, above, regional and localized operational emissions of VOC, NO_X, CO, PM10, and PM2.5 would not exceed the SCAQMD significance thresholds. Thus, based on SCAQMD methodology, the proposed project operational emissions would not represent a considerable contribution to a cumulative impact, resulting in a less than significant cumulative impact.

Mitigation

Implement Mitigation Measure AIR-1.

Significance Determination: Less than Significant Impact with Mitigation

3.5 Cumulative GHG Impacts

The GHG emissions of the proposed project alone would not cause a direct physical change in the environment. According to CAPCOA, "GHG impacts are exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective. (CAPCOA 2008)" It is global GHG emissions in their aggregate that contribute to climate change, not any single source of GHG emissions alone. The impact analysis of the project's GHG emissions and consistency with existing plans and policies related to GHG emissions provided above for the proposed project serves as a cumulative impact analysis. Therefore, as discussed above, the proposed project would be consistent with applicable plans, policies or regulations adopted for the purpose of reducing GHG emissions and the proposed project would not generate GHG emissions that would have a significant impact on the environment. As such, the proposed project would result in a less than cumulatively considerable impact related to applicable GHG emissions and GHG reduction plans and policies and cumulative impacts would be less than significant.

Mitigation Measures

None required

Significance Determination: Less than Significant Impact

SECTION 4
References

Anderegg, William R. L., J.W. Prall, J. Harold, S.H., Schneider, 2010. Expert Credibility in Climate Change, Proceedings of the National Academy of Sciences of the United States of America. 2010; 107:12107-12109.

Cal-Adapt. 2020. Exploring California's Climate Change Research. Available Online at: Cal-Adapt. Available: http://cal-adapt.org. Accessed October 2020.

California Air Pollution Officers Association (CAPCOA). 2008. CEQA & Climate change: Evaluating and Addressing Greenhous Gas Emissions from Projects Subject to the California Environmental Quality Act. January. Available online at: http://capcoa.org/wp-content/uploads/downloads/2010/05/CAPCOA-White-Paper.pdf. Accessed June 2020.

CAPCOA. 2017. California Emissions Estimator Model. Available online at: http://caleemod.com/. Accessed June 2020.

California Air Resources Board (CARB), 2004. Final Regulation Order, Amendments to the California Diesel Fuel Regulations, July 15, 2004.

CARB. 2008. Climate Change Scoping Plan. Available: December. Available online at: https://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm. Accessed June 2020.

CARB. 2014. First Update to the Climate Change Scoping Plan. May. Available online at: https://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm. Accessed June 2020.

CARB. 2016a. California Ambient Air Quality Standards. Updated May 4.

CARB. 2016b. Southern California Association of Governments' (SCAG) 2016 Sustainable Communities Strategy (SCS) ARB Acceptance of GHG Quantification Determination. June. Available online at: https://ww3.arb.ca.gov/cc/sb375/mpo/bcag/bcag_scs_executive_order_2016.pdf. Accessed June 2020.

CARB. 2017a. California's 2017 Climate Change Scoping Plan: The strategy for achieving California's 2030 greenhouse gas target. November. Available: www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.

CARB, 2017b. 1990 to 2004 Inventory Data and Documentation. Available online at: https://www.arb.ca.gov/cc/inventory/1990level/1990data.htm. Accessed June 2020.

CARB. 2019. California Greenhouse Gas 2000-2017 Emissions Trends and Indicators Report. Available online at: https://ww2.arb.ca.gov/ghg-inventory-data. Accessed June 2020.

CARB. 2020a. California Ambient Air Quality Standards. Available online at: https://ww2.arb.ca.gov/resources/california-ambient-air-quality-standards. Accessed June 2020.

CARB. 2020b. Ozone & Health, Health Effects of Ozone. Available online at: https://ww2.arb.ca.gov/resources/ozone-and-health. Accessed June 2020.

CARB. 2020c. Common Air Pollutants. Available online at: https://ww2.arb.ca.gov/resources/common-air-pollutants. Accessed June 2020.

CARB. 2020d. Nitrogen Dioxide & Health. Available online at: https://ww2.arb.ca.gov/resources/nitrogen-dioxide-and-health. Accessed June 2020.

CARB. 2020e. Carbon Monoxide & Health, https://ww2.arb.ca.gov/resources/carbon-monoxide-and-health. Accessed June 2020.

CARB. 2020f. Sulfur Dioxide & Health. Available online: https://ww2.arb.ca.gov/resources/sulfur-dioxide-and-health. Accessed June 2020.

CARB. 2020g. Inhalable Particulate Matter and Health (PM2.5 and PM10). Available online at: https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm. Accessed June 2020.

CARB. 2020h. Lead & Health. Available online at: https://ww2.arb.ca.gov/resources/lead-and-health. Accessed June 2020.

CARB. 2020i. Sulfates and Health. Available online at: https://ww2.arb.ca.gov/resources/sulfate-and-health. Accessed June 2020.

CARB. 2020j. Hydrogen Sulfide and Health. Available online at: https://ww2.arb.ca.gov/resources/hydrogen-sulfide-and-health. Accessed June 2020.

CARB. 2020k. Visibility-Reducing Particles & Health. Available online at: https://ww2.arb.ca.gov/resources/visibility-reducing-particles-and-health. Accessed June 2020.

CARB. 2020l. Vinyl Chloride and Health. Available online at: https://ww2.arb.ca.gov/resources/vinyl-chloride-and-health. Accessed June 2020.

CARB 2020m. CARB Identified Toxic Air Contaminants. Available online at: https://ww2.arb.ca.gov/resources/documents/carb-identified-toxic-air-contaminants . Accessed June 2020.

CARB. 2020n. Overview of the Air Toxics Hotspots Information and Assessment Act. Available online at: https://ww2.arb.ca.gov/overview-air-toxics-hot-spots-information-and-assessment-act. Accessed June 2020.

CARB 2020o. Overview Diesel Exhaust & Health. Available online at: https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health. Accessed June 2020.

CARB 2020p. CARB Identified Toxic Air Contaminants. Available online at: https://ww2.arb.ca.gov/resources/documents/carb-identified-toxic-air-contaminants. Accessed June 2020.

CARB. 2020q. Area Designations Maps/State and National. Available online at: http://www.arb.ca.gov/desig/adm/adm.htm. Accessed May 2020.

California Natural Resources Agency (CNRA). 2009. 2009 California Climate Adaptation Strategy.

CNRA. 2014. Safeguarding California: Reducing Climate Risk, an Update to the 2009 California Climate Adaptation Strategy. July.

CNRA 2018. *Safeguarding California Plan: 2018 Update*. Available online at: https://resources.ca.gov/Initiatives/Building-Climate-Resilience. Accessed June 2020.

California Building Standards Commission (CBSC). 2010. *California 2010 Green Building Standards Code (CALGreen).* Available online at: https://ladbs.org/docs/default-source/publications/misc-publications/2010-ca-green-building-standards-code.pdf?sfvrsn=11. Accessed June 2020.

CBSC. 2019. 2019 California Green Building Standards Code. Available online at: https://calgreenenergyservices.com/wp/wp-content/uploads/2019_california_green_code.pdf. Accessed June 2020.

California Energy Commission. 2006. Refining Estimates of Water-related Energy Use In California. December 2006.

Center for Climate and Energy Solutions (C2ES). No Date. Heat Waves and Climate Change. Available online at: https://www.c2es.org/content/heat-waves-and-climate-change. Accessed June 2020.

Intergovernmental Panel on Climate Change (IPCC). 2007. Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Available: https://www.ipcc.ch/assessment-report/ar4/. Accessed June 2020.

IPCC. 2014. *Climate Change 2014 Synthesis Report.* Available: http://ipcc.ch/report/ar5/syr/. Accessed June 2020.

Irvine Ranch Water District (IRWD). 2019. Embedded Energy Plan Final Report. December. Available online at: https://www.irwd.com/images/pdf/doing-business/energy-programs/1.%20Embedded%20Energy%20Plan%20-%20Final%20Report.pdf. Accessed June 2020.

IRWD. 2020. Syphon Reservoir Improvement Project – Project Construction Schedule Estimate. May 6.

Kenward, A, et al. (2013). Wildfires and Air Pollution: The Hidden Health Hazards of Climate Change. Climate Central. Available: http://assets.climatecentral.org/pdfs/WildfiresAndAirPollution.pdf.

National Oceanic and Atmospheric Association (NOAA). 2019. Assessing the US Climate in 2018. February 6. Available online at: https://www.ncei.noaa.gov/news/national-climate-201812. Accessed June 2020.

NOAA 2020. Assessing the U.S> Climate in 2019. January 8. Available online at: https://www.ncei.noaa.gov/news/national-climate-201912. Accessed June 2020.

National Research Council, 2010. *Advancing the Science of Climate Change*. Available: http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/Science-Report-Brief-final.pdf. Accessed June 2020.

Office of Environmental Health Hazard Assessment (OEHHA). 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. February. Available online at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed June 2020.

Governor's Office of Planning and Research (OPR). 2018. California's Fourth Climate Change Assessment: Statewide Summary Report. August 2018.

Sierra Club v. County of Fresno. 6 Cal.5th 502, 517-522 (2018). Available: https://www.leagle.com/decision/incaco20181224020. Accessed June 2020

South Coast Air Quality Management District (SCAQMD). 1993. *CEQA Air Quality Handbook*. November.

SCAQMD. 2005. Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning. May 06. Available online at: https://www.aqmd.gov/home/research/guidelines/planning-guidance/guidance-document. Accessed June 2020.

SCAQMD. 2006. Final – Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds. October. Available online at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/particulate-matter-(pm)-2.5-significance-thresholds-and-calculation-methodology/final_pm2_5methodology.pdf. Accessed June 2020.

SCAQMD. 2008a. Draft Guidance Document – Interim CEQA Greenhouse Gas (GHG) Significance Threshold, October 2008. Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgattachmente.pdf. Accessed June 2020.

SCAQMD. 2008b. Final Localized Significance Threshold Methodology. June 2003, Revised July 2008. Available online at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf. Accessed June 2020.

SCAQMD. 2008c. MATES III Report, 2008. Available online at: http://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iii/mates-iii-final-report. Accessed June 2020.

SCAQMD. 2011. Final Program Environmental Assessment for Re-Adoption of Proposed Rule 1315, (pg 1-11). Available online at: https://www.aqmd.gov/home/research/documents-reports/lead-agency-scaqmd-projects/aqmd-projects---year-2011/re-adoption-of-proposed-rule-1315. Accessed June 2020.

SCAQMD. 2013. Final 2012 Air Quality Management Plan. February 2013. Available online at: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/aqmp-archive. Accessed June 2020.

SCAQMD. 2015a. Final Report – Multiple Air Toxics Exposure Study in the South Coast Air Basin, ES-2, 2-11, 6-1. Available online at: https://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iv. Accessed June 2020.

SCAQMD. 2015b. Multiple Air Toxics Exposure Study, MATES IV Carcinogenic Risk Interactive Map. Available online at: https://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iv. Accessed June 2020.

SCAQMD 2015c. Amicus Brief in Support of Neither Party, Sierra Club v. County of Fresno, 2015.

SCAQMD. 2017. *Final 2016 Air Quality Management Plan*. March 2017. Available online at: https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/final2016aqmp.pdf?sfvrsn=15http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/aqmp-archive. Accessed June October 2020.

SCAQMD. 2017a. *Final 2016 Air Quality Management Plan*. March 2017. Available online at: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/aqmp-archive. Accessed June 2020.

SCAQMD. 2017b. Risk Assessment Procedures for Rule 1401, 1401.1, and 212, Version 8.1, September 1. Available online at:

SCAQMD. 2017c. Permit Application Package "N", September 1. Available online at:

SCAQMD. 2018. *NAAQS/CAAQS and Attainment Status for South Coast Air Basin*. September. Available online at: http://www.aqmd.gov/home/air-quality/clean-air-plans. Accessed June 2020.

SCAQMD. 2019. SCAQMD Air Quality Significance Thresholds. Revised April. Available oline at: www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf. Accessed June 2020.

SCAQMD. 2020a, Air Quality Modeling. Available online at: https://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-modeling. Accessed October 2020.

SCAQMD. 2020b. Historical Data by Year for years 2017, 2018, and 2019. Available online at: http://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year. Accessed May 2020.

SCAQMD. 2020c. Air Quality Analysis Handbook. Available online at: www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook. Accessed October 2020.

SCAQMD. 2020d. What is Title V?. Available online at: http://www.aqmd.gov/home/permits/title-v/what-is-title-v-. Accessed June 2020.

SCAQMD. 2020e. South Coast Air Quality Management District, Map of Monitoring Areas, http://www.aqmd.gov/docs/default-source/default-document-library/map-of-monitoring-areas.pdf. Accessed October, 2020.

Southern California Association of Governments (SCAG). 2020. *2020-2045 Regional Transportation Plan/Sustainable Communities Strategy*. May. Available online at: https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal-plan_0.pdf?1606001176. Accessed March 2021.

US Environmental Protection Agency (USEPA). 2004. Air Toxics Risk Assessment Reference Library, Volume 1 Technical Resource Manual. April.

USEPA. 2016a. Criteria Air Pollutants, NAAQS Table. Updated December 20. Available online at: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed June 2020.

USEPA. 2016b. Nitrogen Dioxide (NO_2) Pollution. Updated September 8. Available online at: https://www.epa.gov/no2-pollution/basic-information-about-no2#Effects. Accessed June 2020.

USEPA. 2016c. Carbon Monoxide (CO) Pollution in Outdoor Air. Updated September 8. Available online at: https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution. Accessed June 2020.

USEPA. 2017a. Technical Overview of Volatile Organic Compounds. Updated April 12. Available online at: https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds. Accessed June 2020.

USEPA. 2017b. Volatile Organic Compounds Impact on Indoor Air Quality. Updated November 6. Available online at: https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality. Accessed June 2020.

USEPA. 2017c. Lead Air Pollution. Updated November 29. Available online at: https://www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution. Accessed June 2020.

USEPA. 2017d. What are Hazardous Air Pollutants. Updated February 9. Available online at: https://www.epa.gov/haps/what-are-hazardous-air-pollutants. Accessed June 2020.

USEPA. 2017e. Climate Impacts on Human Health. Updated May 31. Available online at: https://archive.epa.gov/epa/climate-impacts/climate-impacts-human-health.html. Accessed June 2020.

USEPA. 2017f. Title V Operating Permits. March 15. Available online at: https://www.epa.gov/title-v-operating-permits/who-has-obtain-title-v-permit. Accessed June 2020

USEPA. 2018a. Pollutants and Sources. Updated September 26. Available online at: https://www3.epa.gov/airtoxics/pollsour.html. Accessed June 2020.

USEPA. 2018b. Particulate Matter (PM) Pollution. Updated November 14. Available online at: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics. Accessed June 2020.

USEPA. 2019a. Health Effects of Ozone Pollution. Updated July 30. Available online at: https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution. Accessed June 2020.

USEPA. 2019b. Sulfur Dioxide (SO_2) Pollution. Updated April 2. Available online at: https://www.epa.gov/so2-pollution/sulfur-dioxide-basics. Accessed June 2020.

USEPA. 2020a. The Green Book Non-Attainment Areas for Criteria Pollutants. Updated May 31. Available online at: https://www.epa.gov/green-book. Accessed October 2020.

USEPA. 2020b. Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2018. Available online at: https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018. Accessed June 2020.

Westerling, Anthony LeRoy. (2018). Wildfire Simulations for the Fourth California Climate Assessment: Projecting Changes in Extreme Wildfire Events with a Warming Climate. California's Fourth Climate Change Assessment, California Energy Commission. Publication number: CCCA4-CEC-2018-014.

Appendix C

Biological Resources Technical Report

ESA

SYPHON RESERVOIR IMPROVEMENT PROJECT

Biological Resources Technical Report

Prepared for
Irvine Ranch Water District

March 2021

SYPHON RESERVOIR IMPROVEMENT PROJECT

Biological Resources Technical Report

Prepared for
Irvine Ranch Water District

March 2021

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001
www.esassoc.com

ESA

Bend
Camarillo
Delray Beach
Destin
Irvine
Los Angeles
Miami
Oakland
Orlando
Pasadena
Petaluma
Portland
Sacramento
San Diego
San Francisco
Santa Monica
Sarasota
Seattle
Sunrise
Tampa

TABLE OF CONTENTS

Syphon Reservoir Improvement Project Biological Resources Technical Report

Page

Appendices

List of Figures

List of Tables

SYPHON RESERVOIR IMPROVEMENT PROJECT

Biological Resources Technical Report

1.0 Introduction

This report presents the findings of a biological resources assessment conducted by Environmental Science Associates (ESA) for the Syphon Reservoir Improvement Project (proposed project) within an approximately 265-acre study area ("study area") located in unincorporated Orange County, California. The Syphon Reservoir is an existing recycled water storage reservoir in Irvine Ranch Water District's (IRWD) service area. IRWD is limited in its ability to supply recycled water to its customers year-round with its existing recycled water storage capacity. The proposed project would increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam, while meeting or exceeding the current safety and design requirements. The proposed project would allow the storage of additional recycled water by expanding the reservoir's storage capacity from the current 500 acre-feet (AF) to approximately 5,000 AF, which would help IRWD become more self-sufficient and increase IRWD's water supply reliability by reducing its dependence on costly and less-reliable imported water.

This report documents the results of a literature review, biological surveys, and describes the environmental setting of the study area, including plant communities, habitats, and special-status biological resources that have been documented on-site or have the potential to occur on-site. In addition, the report includes an analysis of potential direct or indirect project-related impacts to special-status biological resources within the context of applicable environmental regulations and provides recommendations to mitigate these effects. The purpose of this study is to satisfy the requirements of the California Environmental Quality Act (CEQA), and to supplement subsequent regulatory processing pursuant to Section 1602 of the California Fish and Game Code (FGC) and potential coordination with State and federal agencies regarding Sections 404 and 401 of the Clean Water Act (CWA). Syphon Reservoir is located within the Orange County Central & Coastal Subregions Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and is recognized as an operating reservoir in the NCCP/HCP Reserve. Implementation of expanded seasonal storage for recycled water purposes was also anticipated and identified as a permitted use in the NCCP/HCP.

1.1 Project Location

The study area is located in central Orange County in southern California (**Figure 1**). Specifically, the study area is located northeast of Portola Parkway between Bee Canyon Access Road and State Route 133 (SR-133) (**Figure 2**). IRWD owns the majority of the property bounded by these thoroughfares. An athletic complex including tennis courts and parking area is also located between Portola Parkway and the base of the existing dam. Residential neighborhoods are located southwest of Portola Parkway. The land-form surrounding the reservoir is moderately hilly with ridgelines and terraced slopes. Elevations at the site range from approximately 320 feet above mean sea level (amsl) at Portola Parkway immediately below the existing reservoir to approximately 675 feet amsl in the northeast corner of the study area.

1.2 Project Purpose and Background

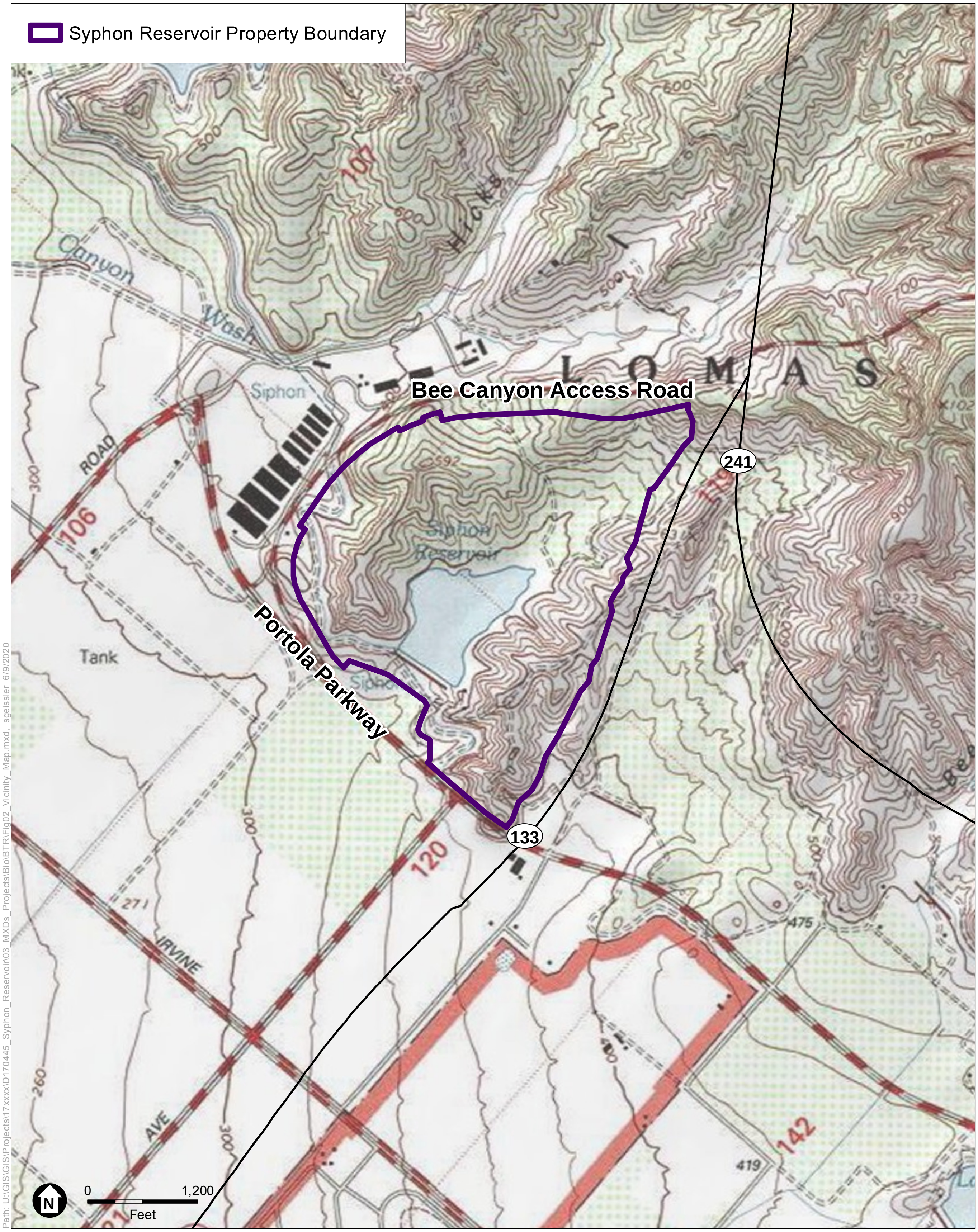
The purpose of the proposed project is to increase the recycled water storage capacity at Syphon Reservoir in order to meet the seasonal demand of recycled water customers and to enhance IRWD's water supply reliability. Water recycling is an essential component of IRWD's water supply portfolio, as any demand met with recycled water reduces the demand for high-quality drinking water. The expansion of Syphon Reservoir would assist in meeting projected demands within the service area by allowing the storage of additional recycled water produced at IRWD's Michelson Water Recycling Plant (WRP) during periods of low demand (winter months) for use during periods of high demand (summer months). Although IRWD's existing recycled water reservoirs provide some storage for recycled water, once the storage reservoirs are full to capacity in winter months, recycled water supplies are either diverted to Orange County Sanitation District (OCSD) or discharged to the ocean. During the dry summer season, when irrigation demands are highest, service area demand for recycled water depletes existing reservoir storage and exceeds the rate at which new recycled water is produced by the WRPs. IRWD must then purchase costly supplemental imported water from Metropolitan Water District of Southern California (MWD) to meet the seasonal demands of IRWD's recycled water customers. Based on projected demands and supplies, IRWD estimates that it will need 4,500 AF of additional recycled water storage capacity by the year 2030 to meet demand. The expansion of Syphon Reservoir's storage capacity from the current 500 AF to approximately 5,000 AF would help IRWD become more self-sufficient by reducing its dependence on costly and less-reliable imported water during summer months, and would increase the use of recycled water to maintain community landscaping, as well as agricultural, business, and industrial uses. IRWD produces up to 28 million gallons of recycled water every day at its WRPs. Every gallon of recycled water IRWD uses for these non-drinking water purposes saves a gallon of drinking water. The proposed project would prepare IRWD for the future by storing more drought-proof water, helping the region better withstand future water shortages. By expanding water recycling infrastructure, the proposed project would be consistent with California Water Code Section 13512, which states, "[i]t is the intention of the Legislature that the state undertake all possible steps to encourage development of water recycling facilities so that recycled water may be made available to help meet the growing water requirements of the state."

SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservoir Improvement Project

Figure 1
Regional Map

ESA



SOURCE: ESRI, 2016; El Toro USGS 7.5 minute Quadrangle

Syphon Reservoir Improvement Project

Figure 2
Vicinity Map

ESA

IRWD acquired Syphon Reservoir in 2010 from the Irvine Company (TIC). Multiple studies and activities have occurred within the study area to support use of the reservoir to store recycled water. In 2012, IRWD prepared the Syphon Reservoir Expansion Engineering Feasibility Study (GEI 2012), which provided baseline geotechnical information for the study area. This study was limited in the location and number of borings conducted due to requirements to remain within existing roadways on-site and to avoid vegetation disturbance. In 2013, IRWD implemented the Syphon Reservoir Interim Facilities Project, which included minor improvements to integrate the reservoir into IRWD's recycled water system. In 2016, IRWD conducted a dry lakebed geotechnical exploration to obtain information on the extent and character of sediments that have accumulated in the reservoir over time (GEI 2016). In 2019, IRWD implemented the Syphon Reservoir Geotechnical Investigations Project, which provided details about the geologic and geotechnical baseline conditions at Syphon Reservoir in order to inform the design of an enlarged reservoir (ESA 2019b). The existing reservoir has been operated for many years based on the supply and demand for recycled water. Generally, this means water levels tend to be high in the winter months when demand is lower and the reservoir level is typically lower in the spring and summer as demand increases. Despite considerable fluctuation of water levels in the reservoir, this fairly typical operation where average water levels are higher in the winter and early spring, has resulted in the establishment of a substantial fringe of freshwater marsh and woody riparian habitat around the perimeter of the reservoir. It is important to recognize that the presence of natural habitat areas within this artificial system is completely incidental to the purpose of the reservoir, and may be considered an unintended benefit to wildlife in the area.

In addition, part of the area surrounding the reservoir was previously used by the Transportation Corridor Agencies (TCA) to mitigate impacts to natural areas associated with construction of part of the Eastern Transportation Corridor Project (Dudek 2012). Between 1995 and 2000, approximately 102 acres of the study area were preserved and 112 acres were restored to native coastal sage scrub habitat as mitigation for the TCA Eastern Transportation Corridor Project's impacts to coastal California gnatcatcher. Restoration activities involved removal of orchard trees, native coastal sage scrub planting, temporary irrigation, and monitoring. The revegetation was successfully completed in accordance with regulatory requirements and supported mature coastal sage scrub suitable for California gnatcatcher (Dudek 2012). When IRWD acquired Syphon Reservoir from TIC, the Conveyance Agreement included a Grant Deed over 219 acres of the property with use restrictions to provide for the conservation of biological resources associated with that mitigation. The Grant Deed includes provisions to "install, maintain, repair and replace improvements to enhance the safety or capacity of the Reservoir Facilities," that are "subject to receipt of approvals from applicable governmental agencies." Coordination with the third-party beneficiaries of the Grant Deed (i.e., TCA and U.S. Fish and Wildlife Service [USFWS]) is required. Since 2018, IRWD has been engaged with USFWS and CDFW regarding appropriate options that will satisfy these agencies with regard to mitigation for upland habitat in consideration of the Grant Deed provisions as well as the relevant NCCP/HCP requirements.

1.3 Project Description

The proposed project primarily involves the expansion of three on-site facilities: Syphon Reservoir Dam, Syphon Reservoir, and Syphon Reservoir Treatment Facilities (**Figure 3A**).

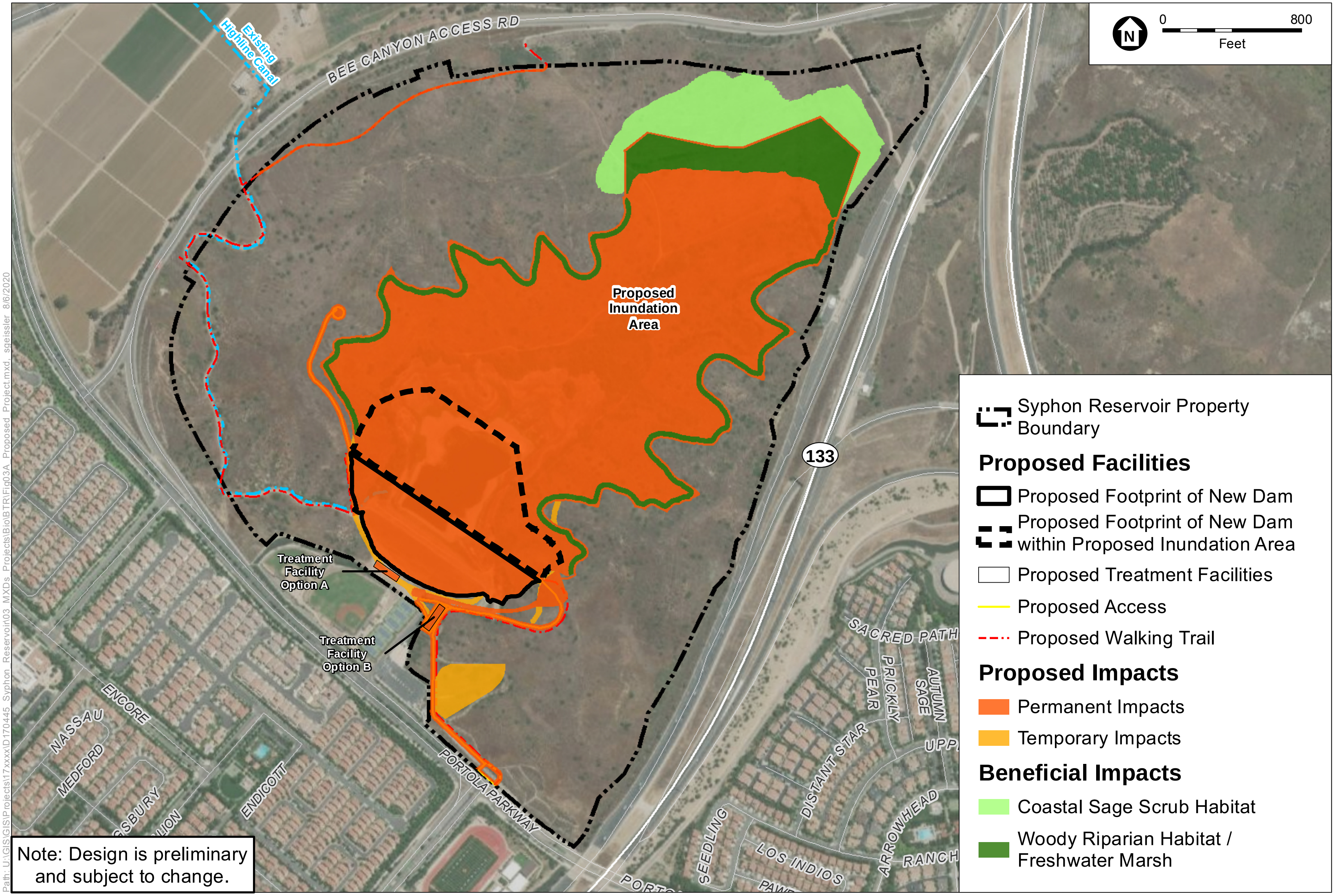
Other operational design features would include an internal seepage control system within the new engineered dam; a circulation/aeration system for the reservoir; new on-site access and maintenance roads; wetland and riparian mitigation areas; and potential recreational facilities. These proposed project facilities and components are described further below. It should be noted that sizes, dimensions, and locations of the various project components and configurations as further described herein, are based on feasibility-level evaluations and are subject to change with final design.

The delivery of recycled water to and from Syphon Reservoir would be accomplished with existing off-site facilities. Modifications to off-site facilities would be limited to the addition of pumps within the existing structures as further described below. The existing Highline Canal would be abandoned in place and no longer used to deliver water to Syphon Reservoir from IRWD's Rattlesnake Reservoir. Under normal operating conditions, all flow out of Syphon Reservoir would be conveyed back to the Eastwood Recycled Water Pump Station through the same 36-inch recycled water pipeline, for connection to IRWD's recycled water distribution system.

1.3.1 Dam Replacement

The proposed project would replace the existing engineered dam with a new engineered dam, increasing the existing 59-foot dam height to 136 feet and increasing the elevation of the dam crest from the existing 388 feet amsl to 466 feet amsl. The new dam would be an earthen fill embankment. The embankment slopes would provide adequate stability including for seismic loading conditions. The crest of the new dam would be approximately 20 feet wide and approximately 1,300 feet long. Figure 3A shows the preliminary footprint of the proposed dam, which would be constructed primarily from on-site materials, although the importation of some specialty materials is anticipated. On-site materials would be obtained from excavation of the existing earthen embankment dam and spillway, excavation below the new dam footprint and borrow excavations within the existing and proposed reservoir area. Slope protection for the new dam would consist of rip-rap on the upstream slope and vegetation on the downstream slope. The rip-rap on the upstream slope would provide erosion protection from wave action resulting from water in the reservoir. Similar to the existing dam, the vegetation on the downstream slope would consist of grass and would provide erosion protection from rainfall runoff.

The new proposed spillway would be designed to meet or exceed the current safety and design requirements established by the Department of Water Resources (DWR), Division of Safety of Dams (DSOD). The elevation of the spillway crest would be approximately 456 feet amsl, providing 10 feet of freeboard relative to the dam crest at 466 feet amsl and thus ensuring that overtopping of the dam would not occur. In addition, IRWD would operate the reservoir with additional freeboard below the spillway to ensure the water surface elevation remains safely below the spillway crest elevation at all times. Furthermore, IRWD's current and future operating procedures include monitoring the local weather forecasts, and in the event of a major storm event, IRWD will lower the reservoir's water surface by distributing the stored water throughout IRWD's recycled water system, or sending a controlled flow to the existing storm drain in advance of the predicted storm event.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 3A
Proposed Project

ESA

1.3.2 Reservoir Enlargement

The replacement dam would result in an increase in the reservoir's maximum water surface elevation from 376 feet amsl to 456 feet amsl and increase the reservoir's capacity from approximately 500 AF to 5,000 AF. As shown in Figure 3A, the proposed project would expand the reservoir's shoreline and inundate up to approximately 82 acres upstream of the dam that currently support upland and wetland vegetation communities, some of which are within the NCCP/HCP Reserve area and grant deed restricted lands. The existing reservoir ground surface would be excavated non-uniformly to obtain approximately 2.2 million cubic yards of material to construct the new engineered dam. A seepage control drainage system would be constructed on the downstream side of the dam to safely route seepage through the dam and prevent erosion in the embankment area.

1.3.3 Treatment Facilities

The existing strainer and disinfection facilities would be demolished, reconstructed and expanded at the toe of the new dam to provide filtration, chlorination and de-chlorination. The potential locations of the treatment facilities, which would be determined during detailed design, are depicted in Figure 3A (labeled as Treatment Facility Option A and Option B). Only one treatment facility in one of the optional locations will be constructed for the proposed project. The layout would consist of an enclosed masonry building. The footprint of the proposed treatment facilities would be determined during the detailed design, but is anticipated to be approximately 40 feet by 160 feet. The purpose of the treatment facilities would be to de-chlorinate the recycled water as it enters the reservoir, filter the recycled water as it leaves the reservoir to remove algae and leaves, and chlorinate the recycled water as it leaves the reservoir to provide a chlorine residual as the water is delivered through the District's recycled water distribution system.

1.3.4 Access and Maintenance Roads

The primary access point for construction traffic and future IRWD operation and maintenance is anticipated to be from the intersection at Portola Parkway and Sand Canyon Avenue. The current intersection consists of a "T" intersection, where Sand Canyon Avenue ends at the intersection with Portola Parkway. As part of the proposed project, the intersection and associated traffic lights would be modified to allow construction and future IRWD operations access through the intersection, into the District's property. Construction vehicles and IRWD vehicles would also leave the site through the same intersection.

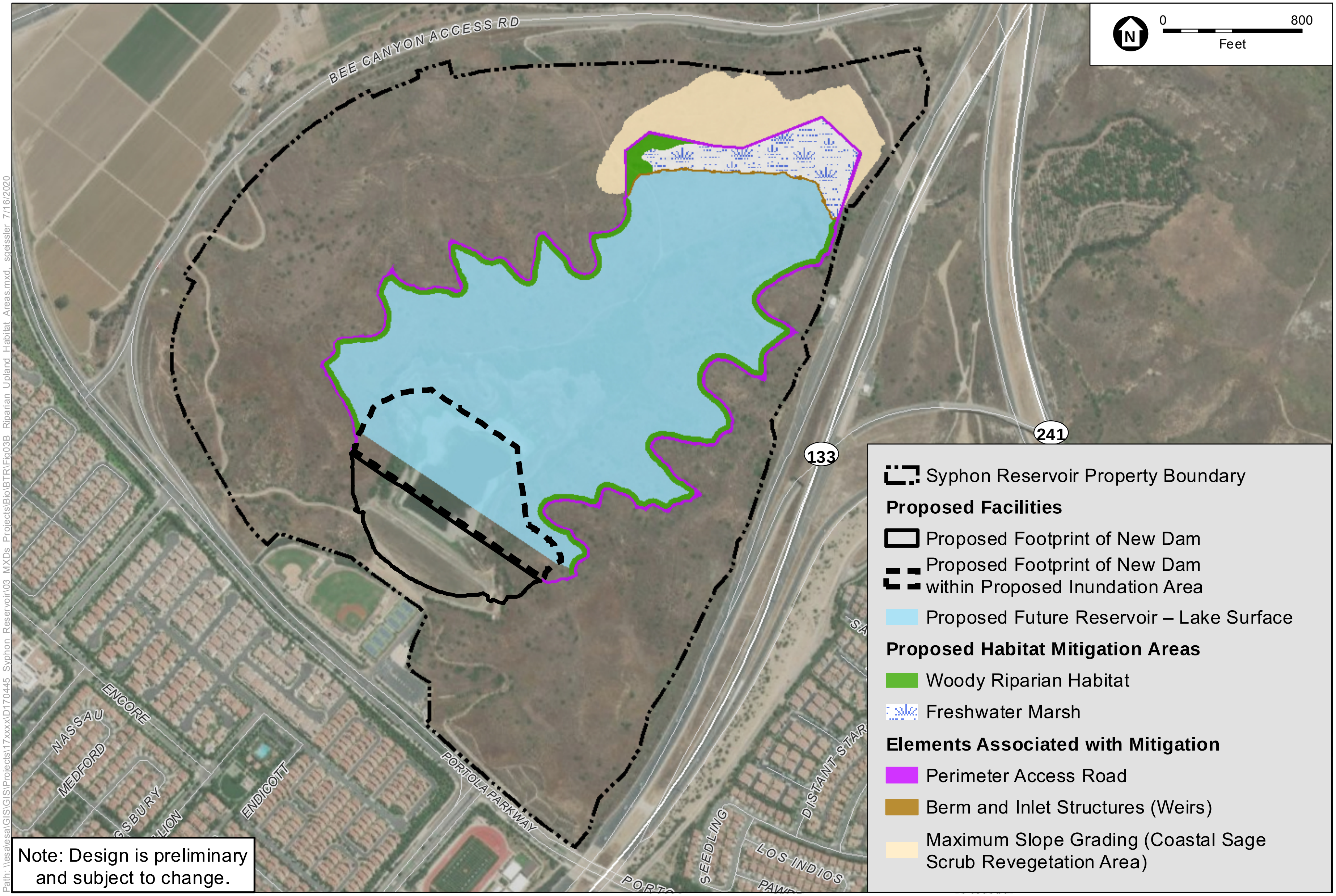
An unpaved road currently exists on the District's property in the vicinity of the intersection at Portola Parkway and Sand Canyon Avenue, which was previously used to access and maintain the existing Highline Canal. This portion of the Highline Canal in the area has since been abandoned. As part of the proposed project, this dirt road would be utilized and improved to allow two lanes (one in each direction) for ingress and egress for the construction and IRWD operation traffic. As part of the access road improvements, it is anticipated that excavation into the existing slope and construction of a retaining wall may be necessary to allow trucks to make the left turn onto the existing Highline Canal road after passing through the intersection. Figure 3A depicts the anticipated access road location.

1.3.5 On-Site Freshwater Wetland, Riparian, and Upland Habitat Replacement Areas

The displacement of the existing woody riparian and freshwater marsh communities resulting from expansion of the current facility would be offset on site at a 1:1 ratio, at minimum. At least 12.3 riparian/wetland habitat consisting of native woody riparian vegetation and freshwater marsh habitat is proposed to be established on-site to replace habitat displaced by construction. Both freshwater marsh and woody riparian vegetation are proposed to be placed within a large patch at the northeast end of the proposed reservoir. Also, much of the woody riparian replacement habitat would be situated within a strip that would extend around the proposed reservoir at the same elevation as the planned water surface elevation when the reservoir is full, as shown in **Figure 3B**. A shallow trough would be constructed around the reservoir perimeter (excluding the dam face), which would support native trees and shrubs (e.g., willows, mule fat, etc.) forming a belt of riparian vegetation around the upper edge of the artificial lake. The trough would be formed with fine clayey material to reduce permeability and help retain water when the reservoir is periodically drained.

In addition to reserving a strip around the edge of the expanded reservoir for woody riparian habitat, an approximately 6- to 8-acre wetland area would also be established within a flat area extending northeast of the expanded reservoir (Figure 3B). Like the perimeter trough for riparian habitat creation, this wetland area would be situated at an elevation just below the maximum water surface elevation of the reservoir. The underlying material in this area would consist of slowly permeable fine soil with very high clay content to retain water for extended periods when the reservoir is drained down. Freshwater marsh vegetation consisting primarily of tules (native cattail and bulrush species) would be planted or seeded in the area subject to periodic inundation. However, based on preliminary coordination with the wildlife agencies, additional woody riparian habitat and less freshwater marsh vegetation may be established in this flat area in order to increase habitat for State and federally endangered least Bell's vireo on-site.

Significant grading would be necessary that would cut into the existing hill northeast of the future lake edge in order to create sufficient space for wetland and riparian habitat restoration in this area. This additional grading would occur in an area that is dominated by ruderal (weedy) vegetation and non-native grassland that provides relatively low wildlife habitat value. Once grading is completed, the graded slope would be seeded, planted and maintained to establish native coastal sage scrub habitat where none currently exists.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 3B
Riparian and Upland Habitat Areas

ESA

1.3.6 Recreational Facilities

During project design, IRWD would consider passive recreational facilities compatible with the proposed project site. Recreational facilities could include a walking trail along existing access roads at the proposed project site. As shown on Figure 3A, this proposed walking trail could be located in the south and west portions of the proposed project site, beginning at the new permanent access road at Portola Parkway and Sand Canyon Avenue and traveling along that route, across the dam crest, and following the alignment of the existing Highline Canal, which would be abandoned with implementation of the proposed project. Final design would determine the appropriateness and location of the proposed walking trail on existing access roads and any other optional recreational facilities. Passive recreational uses on the proposed project site are allowed under the NCCP/HCP, which is referenced in the grant deed with respect to open space and habitat uses. A Recreation and Resources Management Plan (RRMP) would need to be prepared to demonstrate consistency with the NCCP/HCP allowed uses. Coordination with regulatory agencies, including USFWS and California Department of Fish and Wildlife (CDFW), would be required for on-site recreational components.

1.3.7 Additional Geotechnical Investigations

IRWD previously completed a comprehensive geotechnical investigation of the site from which the resulting data would be used during final design to develop the detailed construction documents. During the design phase, additional geotechnical investigations may need to be performed. If additional investigations are deemed necessary, the investigations may include the performance of exploratory test pits, soil borings, packer testing, and/or non-intrusive geologic investigations and observations. The additional geotechnical investigations, if needed, would remain within the proposed limits of disturbance defined by the project and would be mitigated as part of the overall project.

1.4 Project Construction

Construction of the proposed project is estimated to require a total of 41 months. The preconstruction activities would begin in the fall of 2022 and would involve approximately 5 months of access road improvements. Preconstruction would be followed by approximately 36 months for construction of the new dam, reservoir, and associated facilities, depending on weather conditions and other variables. Construction is currently anticipated to begin in the spring of 2023. Most construction activities would be limited to 7:00 a.m. to 7:00 p.m. Monday through Friday and 9:00 am to 6:00 p.m. on Saturday. If construction work is conducted outside of these hours, IRWD would secure a variance/waiver from the appropriate entity. Construction of the proposed project would include activities implemented in phases as outlined below, which may involve overlap.

1.4.1 Preconstruction Activities and Intersection Modification

Before active construction activities are initiated on-site, all water within the reservoir would be drained and vegetation cleared outside of the bird nesting season. In addition, the proposed access road would be constructed starting at the intersection of Portola Parkway and Sand Canyon Avenue. As part of the proposed project, the intersection of Portola Parkway and Sand Canyon Avenue and associated traffic lights would be modified to allow access for construction vehicles and future IRWD operation and maintenance vehicles through the intersection, into the District's property.

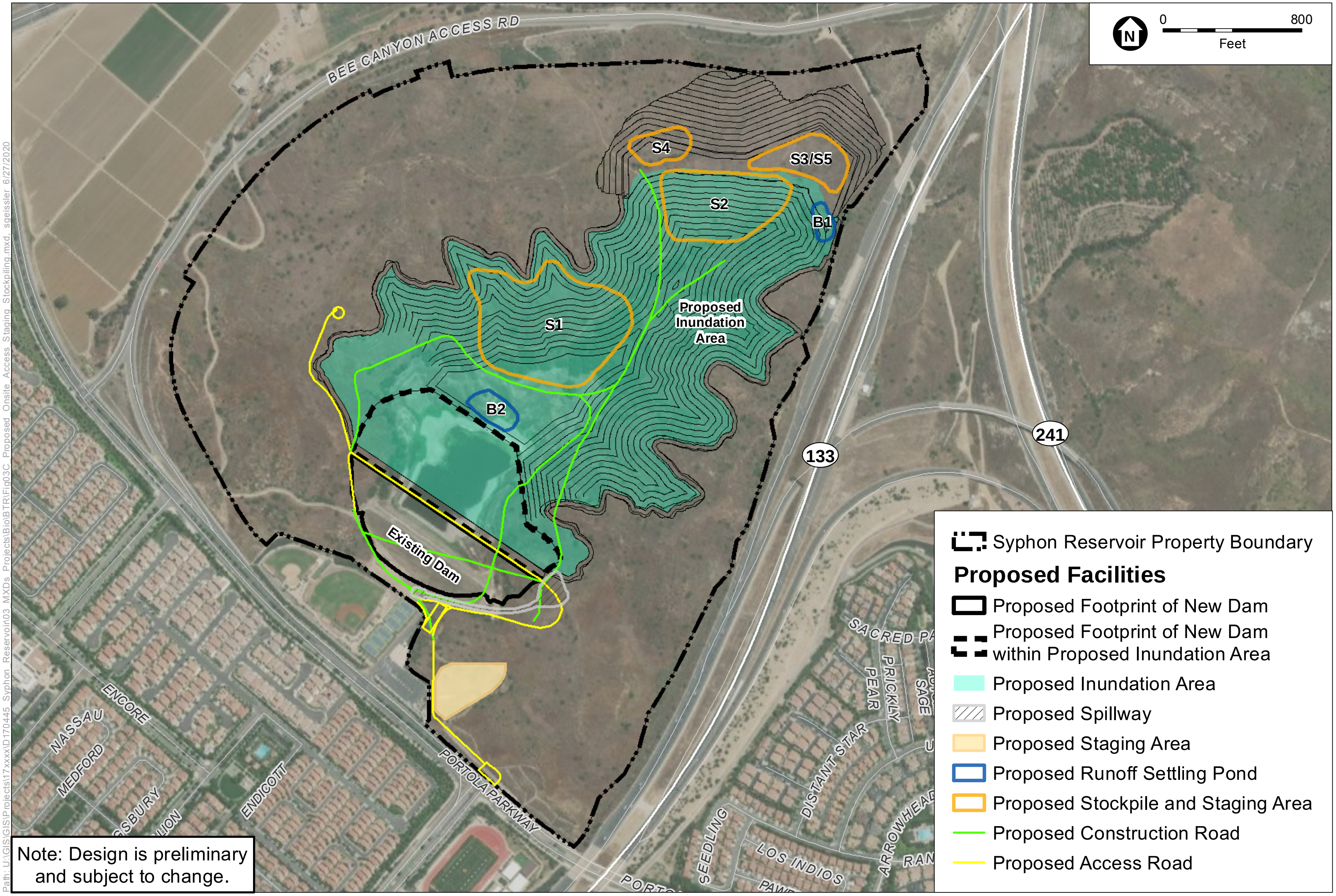
A dirt or paved road would be graded from the new intersection at Portola Parkway and Sand Canyon Avenue for ingress and egress for the construction and IRWD operations and maintenance traffic. As part of the access road improvements, it is anticipated that excavation into the existing slope and construction of a retaining wall may be necessary to allow trucks to make the left turn onto the existing Highline Canal road after passing through the intersection. Construction of the new access road would be completed within approximately 5 months and would require approximately 10 construction workers.

1.4.2 Construction Mobilization, Site Preparation and Staging Areas

Construction mobilization would involve initial mobilization of contractors, construction office trailers and equipment to the site, as well as initial site preparation. Stockpile and staging areas, runoff settling basins, as well as temporary construction access roads would be cleared and developed. The preliminary locations of these construction-related features are shown in **Figure 3C** and are subject to change during final project design. Initial construction areas proposed for work also would be cleared. Ingress and egress areas would be delineated, fenced, or marked so that, to the extent possible, the surrounding habitat and riparian areas would not be impacted.

The proposed stockpile/staging areas would hold reusable excavation materials, sediments, and topsoil, as well as material imported from off-site sources such as rock and gravel, and would be located primarily within the proposed reservoir inundation area to avoid disturbance to surrounding conservation lands in the NCCP/HCP. The proposed stockpile/staging areas could also be used for excavating borrow materials once stockpiles are removed. Some stockpile/staging areas could be outside the reservoir expansion area and could hold materials to be used beyond the inundation area. These stockpile/staging locations would primarily be sited in areas that would later be used for upland restoration.

The construction access roads shown in Figure 3A would be arterial roads used for the duration of the proposed project construction period, and have been designed to be located primarily within the limits of disturbance for the reservoir enlargement and the new dam. As the site is developed, and borrow excavation areas are developed, utilized, and exhausted, the location of the roads may change and additional roads would be constructed. In addition, some of the construction access roads may transition to permanent maintenance and access roads.



SOURCE: ESA, 2020; ESRI, 2020.

Syphon Reservoir Improvement Project

Figure 3C
Proposed Onsite Access, Staging, and Stockpiling

ESA

The runoff settling basins would be constructed on-site to capture sediment and runoff during construction, including nuisance flow, flows from the storm drain conduit below SR-133, and flows from dewatering operations. The basins also could be used as a water source for dust control and soil moisture conditioning.

A temporary office (trailer) would be established near the toe of the dam (see Figure 3C), which would be used by the contractor for the duration of construction. This location could also provide some level of site security since all vehicles entering and leaving the site would pass this point. Additional mobilization of equipment to distinct areas on-site may occur on an ongoing basis, for each construction phase described below, based on the particular activity occurring on-site.

1.4.3 Excavation of Material/Existing Dam and Dewatering

Approximately 2.3 million cubic yards of material would be excavated from within the proposed project site for use in construction of the proposed project components. These materials include topsoil, lake bottom sediments, alluvium, colluvium, slopewash, formational materials, as well as the existing dam. The majority of materials would be obtained from borrow excavations made within the enlarged reservoir inundation area; these reservoir area excavations also would contribute significantly to the capacity of the expanded reservoir.

During excavation activities, saturated materials and shallow groundwater would be encountered. Groundwater depth at the downstream toe of the existing dam is approximately three feet below ground surface. Groundwater relief trenches for dewatering would be installed in materials and into the alluvium as needed during excavation. The area downstream of the toe of the dam would also be dewatered.

The borrow excavation could be accomplished with large excavators and articulated trucks. This equipment is well suited to the wet and soft nature of materials in the excavated zones and stockpile areas. The processing of all excavated material would be done in the stockpile areas. Processing and drying of saturated materials would be accomplished using various methods, including use of discs and tractors to expose the material to sun and wind, and mixing drier and wetter borrow materials together. Wet materials transported to stockpile areas could be spread with a dozer, such as a low ground pressure bulldozer. The excavation phase of the proposed project would be completed within approximately 7 to 9 months.

1.4.4 Construction of New Dam, Spillway and Reservoir

The proposed new engineered dam would be an earthen fill embankment constructed primarily from on-site materials. The majority of materials for the embankment fill would be obtained from borrow excavations made in the reservoir area, as described above. Approximately 2.2 million cubic yards of compacted material would be reused on-site for construction of the new engineered dam. Approximately 0.1 million (100,000) cubic yards of material would be imported from off-site sources, including the rock, gravel and other materials required for the construction of portions of the dam, including riprap. A portion of the topsoil obtained during borrow excavation could be used on the downstream slope of the new dam to support the proposed vegetation for downstream slope protection. However, topsoil would not be suitable for embankment fill. Lake bottom sediments would also not likely be suitable for embankment fill.

Once all sediment has been appropriately excavated, stockpiled, and processed, the new proposed embankment dam would be installed. Depending on weather conditions, approximately 12 months of work would be required to construct the embankment above elevation 340 feet amsl, up to the dam crest. Construction of the proposed embankment may be done with scrapers, or a large excavator and articulated trucks. The embankment would be spread with bulldozers and compacted with sheepsfoot and vibratory rollers, depending on the materials. Support equipment would include graders and water wagons.

The proposed new spillway would be constructed and lined with reinforced concrete to prevent erosion. The spillway would be constructed once the construction of the dam embankment is near completion (overlap may occur). Construction of the proposed dam, spillway and expanded reservoir would be completed within approximately 14 months, depending on weather conditions.

1.4.5 Construction of Treatment Facilities

The existing filtration and disinfection facilities would be demolished during construction of the new embankment dam, rebuilt and enlarged in one of the optional locations as part of the proposed project (i.e., either Treatment Facility Option A or Option B). Construction of the proposed new treatment facilities would occur once construction of the new dam embankment is largely complete and would require site preparation and grading, followed by installation of buried and exposed piping, mechanical, electrical/control, and structural facilities. Construction of the proposed new treatment facilities would last approximately 12 months, depending on weather conditions, and would require a crew of up to 16 construction workers. Construction equipment would include a front-end loader, backhoe, bobtail dump truck, transit mix concrete truck, vibratory walk-behind compactor and water truckIf water is encountered during excavation or trenching, it would be dewatered and discharged to the nearby existing Portola Parkway storm drain under a permit from the Regional Water Quality Control Board (RWQCB). Trench width would vary depending upon the size (diameter) of the pipeline but would generally be between 2 to 6 feet. Excavated soils would be placed back within the trench and spread over the site in other disturbed areas.

1.4.6 Construction of Wetland, Riparian, and Upland Areas

A minimum of approximately 12.3 acres of riparian/wetland on-site habitat consisting of at least 6.4 acres of native woody riparian vegetation, or more, with up to 5.9 acres of freshwater marsh habitat, would be established at the eastern end and around the perimeter of the reservoir. These areas would be graded and contoured at the same time excavation and grading occurs as described under Section 1.4.3. A shallow trough would be constructed around the reservoir perimeter and would be formed with fine clayey material to reduce permeability and help retain water when the reservoir is periodically drained. After installation of the trough, irrigation would be installed through a series of pipelines that are around the perimeter of the reservoir, which connect to the reservoir water source. Subsequent planting and seeding of native trees and shrubs would form a belt of riparian vegetation around the upper edge of the reservoir. Additionally, up to a 10.47-acre of on-site coastal sage scrub area would be planted on the graded slope to the northeast of the riparian and wetland habitat area. Installation of the wetlands/riparian area would require up to 50 vehicle and equipment trips over the course of 12 months. Required equipment would include a skid steer loader, pick-up trucks, ATVs, and a water wagon.

1.4.7 Installation of Recreation Facility

A proposed recreation facility may consist of a walking trail installed for the most part on existing on-site roads and access points as shown on Figure 3A. For example, the existing Highline Canal could be backfilled for installation of the proposed walking trail. Construction of a trail would occur through grading and compacting of native material. No existing vegetation would be impacted by the installation of the trail along existing roads or the Highline Canal. A potential on-site trail extension may be installed east from the existing Highline Canal and would be located on ridges or other relative gradual-sloped terrain. Up to 10 workers would be required to install the on-site trail over the course of 3 months.

1.4.8 Site Restoration/Demobilization

Site restoration/demobilization would involve removal of all equipment, debris and personnel from the site. Site restoration would occur over the course of one month. Required equipment would include an excavator, rubber-tired loaders, a tool carrier, pick-up trucks, and a water truck.

1.4.9 Site Access, Workers, and Equipment Usage

As stated previously, the main access point to the proposed project site would be from the intersection of Sand Canyon Avenue and Portola Parkway. The majority of materials for the embankment fill would be obtained from borrow excavations made in the reservoir area (Figure 3C). Construction of the proposed project would involve the use of a variety of heavy construction machinery on-site. The majority of equipment and vehicles would be associated with the intensive earthwork and the structural and paving phases of construction. Large construction equipment such as backhoes, compactors, cranes, excavators, scrapers, haul trucks, pavers, and rollers would be used during the construction phase of the proposed project.

1.5 Operation and Maintenance

Once operational, all proposed project components would operate and be monitored via IRWD's Supervisory Control and Data Acquisition (SCADA) system. Similar to the current reservoir, operation of the proposed project would not require daily on-site staffing but, rather, would require only periodic maintenance. Water levels at Syphon Reservoir would fluctuate seasonally; water would be stored in winter when recycled water supply exceeds demand, and the reservoir would be drawn down in summer when recycled water demand exceeds supply. The estimated minimum operating capacity of the reservoir would be about 180 AF to maintain water quality. However, IRWD would develop an operating plan for Syphon Reservoir, updated each year to set targets for the volume of water to be contained in the reservoir on a daily, monthly, annual, or seasonal basis. Reservoir operations would vary with time, and would need to consider a wide variety of factors, such as: seasonal storage needs, water quality considerations, impound requirements based on rainfall projections, and operational compatibility with the IRWD recycled water system.

As mentioned previously, during precipitation events, IRWD would maintain reservoir levels well below the spillway crest to create sufficient space for stormwater runoff to enter the reservoir and avoid the need for outflow through the spillway. The annual operating plan would identify a maximum water surface elevation that would ensure overtopping of reservoir and spillway would not occur due to stormwater inflow, wave action, or overfilling of the reservoir from IRWD's recycled water system. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands, and other factors as needed. Under normal operating conditions, all flow in or out of the reservoir would be conveyed through the existing 36-inch inlet/outlet pipeline. In the event of an emergency, IRWD can draw down the reservoir through the existing 48-inch pipeline that discharges the recycled water to the existing storm drain, located in Portola Parkway. IRWD Operations and Maintenance staff would continue to conduct daily safety and security checks of the site, similar to existing conditions.

Maintenance of the proposed wetland/riparian areas would be required for up to 5 years after construction is complete to ensure success of the vegetated areas. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to approximately one crew, 30 days per year for the subsequent two to three years. The wetland/riparian areas would be irrigated as needed using the series of pipelines installed around the perimeter of the reservoir that connect to the reservoir water source.

If IRWD includes a recreational walking trail as part of the proposed project, hours of operation may be restricted to daily or seasonal use.

2.0 Methodology

2.1 Literature Review

Relevant literature resources were reviewed prior to conducting field surveys to determine if special-status biological resources occur within the study area or the surrounding vicinity. The California Natural Diversity Database (CNDDB), a CDFW species account database, was queried for information regarding known observations of special-status species and habitats within the study area and vicinity, which included the following U.S. Geological Survey (USGS) topographic quadrangles: Orange, Black Star Canyon, Corona South, Tustin, El Toro, Santiago Peak, Laguna Beach, San Juan Capistrano, and Canada Gobernadora (CDFW 2020). Species data provided by the USFWS Information for Planning and Consultation (IPaC) and the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants were also reviewed (USFWS 2020a, CNPS 2020). Other data sources reviewed included USFWS critical habitat maps (USFWS 2020b), National Wetland Inventory maps (USFWS 2020c), the United States Department of Agriculture Natural Resources Conservation Service (NRCS) soils mapping (2018), eBird (2012), current and historical aerial photographs (Google Earth 2018), and regional flora and fauna field guides to assist in the identification of species and suitable habitats.

Additional literature sources included the following references:

- *Syphon Reservoir Expansion Engineering Feasibility Study – Geotechnical Data Report* (GEI 2012)
- *Preliminary Draft Syphon Reservoir Environmental Regulatory Evaluation* (Dudek 2012)

A list of all relevant references reviewed is included in Section 7.0 of this report.

2.2 General Biological Surveys

A general biological survey, habitat assessment, and vegetation mapping to document natural communities and existing conditions of the study area was conducted by ESA biologists Maile Tanaka and Tommy Molioo on April 24 and 25, 2018, and by Maile Tanaka on April 26, 2018. Prior to the field visit, ESA reviewed the *Syphon Reservoir Environmental Regulatory Evaluation Preliminary Draft*, which included a reconnaissance-level vegetation map previously prepared by Dudek in January 2011 (Dudek 2012). This information was reviewed in conjunction with recent aerials available on Google Earth. Natural communities were then verified directly in the field, and from vantage points using binoculars for areas with limited accessibility, based on the presence of dominant plant species observed on-site following CDFW's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW 2018) and *Methods Used to Survey the Vegetation of Orange County Parks and Open Space Areas and The Irvine Company Property* (Jones & Stokes 1993). Natural communities were mapped directly in the field utilizing a 200-scale (1" = 200') aerial photograph.

Natural community classifications and descriptions follow *A Manual of California Vegetation, Second Edition* (Sawyer et al. 2009), and comparable names used in the Orange County Habitat Classification System (OCHCS) for the same communities were included in natural community descriptions (Gray and Bramlet 1992). After completing the fieldwork, the natural community polygons were digitized using Geographic Information System (GIS) technology to calculate acreages.

An inventory of all plant and wildlife species observed was compiled during the field surveys. Plant species observed during surveys were either identified in the field or collected and later identified using taxonomic keys. Plant taxonomy followed Baldwin et al. (2012). Common plant names, when not available from Baldwin, were taken from Calflora (2020). Wildlife species were identified during the field reconnaissance by sight and call or other evidence of presence, such as tracks, nests, scat, and remains, and with use of binoculars and taxonomic keys where appropriate. Vertebrate taxonomy followed Crother (2020), CalHerps (2020), and Stebbins (2003) for amphibians and reptiles, the American Ornithological Society for birds (AOS 2020), and Kaufman et al. (2004) for mammals. Because common names vary significantly between references, scientific names are included upon initial mention of each species; common names consistent throughout the report are employed thereafter.

During the surveys, a habitat evaluation was also conducted to determine the potential for each habitat area to support native species. Special attention was paid to habitats having the potential to support special-status biological resources (e.g., special-status plant and wildlife species and sensitive natural communities). Aerial photography and global positioning system (GPS) technology was used to accurately locate and map any sensitive biological resources encountered. However, no focused protocol surveys were conducted during the general biological surveys.

In addition, the evaluation of potential wildlife habitat linkages (i.e., wildlife movement corridors) within or through the study area and immediate vicinity was based on the conditions documented during the field surveys, as well as information compiled from literature and analysis of physical barriers observed on aerial photographs. This information was used to identify whether the study area and immediate vicinity could function as an important wildlife movement corridor connecting large open space areas in the vicinity of the study area.

2.3 Jurisdictional Delineation

ESA conducted a jurisdictional delineation to identify features within the study area that may or may not be subject to U.S. Army Corps of Engineers (USACE), RWQCB, and CDFW jurisdiction and regulatory authority.

Prior to the field survey, ESA reviewed available background information pertaining to Syphon Reservoir and its geography and topography. The following resources were also reviewed prior to the field surveys:

- Color aerial photography for vegetative, topographic, and hydrologic features (Google Earth 2018);
- *El Toro, California* 7.5-minute topographic quadrangle map (USGS 1968);
- *Web Soil Survey*, queried to determine the soils mapped in the study area (NRCS 2018);
- *Hydric Soils List of California* (NRCS 2016);
- *National Wetlands Inventory* (USFWS 2018);
- *Preliminary Draft Syphon Reservoir Environmental Regulatory Evaluation* (Dudek 2012); and
- *Habitat Classification System, Natural Resources, Geographic Information System (GIS) Project* (Gray and Bramlet 1992).

Site maps were generated with available aerial photographs, and potentially jurisdictional features were identified and marked with lines and GPS coordinates to assist in field verification.

ESA biologists May Lau and Tommy Molioo conducted a site visit on April 24, 2018, to evaluate potential jurisdictional features within the study area. The limits of potential jurisdictional features were recorded in the field within accessible areas using aerial maps and a hand-held GPS with sub-foot accuracy. Vegetation communities were described using *A Manual of California Vegetation, Second Edition* (Sawyer et al. 2009). The delineation used the "Routine Determination Method" as described in the *1987 Corps of Engineers Wetland Delineation Manual*, hereafter called the "1987 Manual" (Environmental Laboratory 1987). The 1987 Manual was used in conjunction with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*, hereafter called the "Arid West Supplement" (USACE 2008a). For areas where the 1987 Manual and the Arid West Supplement differ, the Arid West Supplement was followed. Wetlands and waters were classified using commonly accepted habitat types; however, the Cowardin classification of each feature type was noted (Cowardin et al. 1979).

All features, including data points, wetland boundaries, and channels were recorded using a GPS unit (Trimble GeoXT) with real-time differential correction and an instrument-rated mapping accuracy of +/- 1 meter, or were delineated on aerial photography using GIS software (ArcGIS 10.2) and site-specific topographic data and aerial imagery.

In the office, data from data points and wetland boundaries were downloaded from the GPS unit and mapped using GIS software on an overlay of topographic contours and geo-referenced aerial photography. GPS-determined wetland boundaries and data points were visually confirmed. Acreage of wetland and waters of the U.S. polygons, and the length of linear features were determined using ArcGIS. Detailed field methods and data sheets are included in the Preliminary Jurisdictional Delineation Report provided in **Appendix A**.

2.4 Special-Status Species Surveys

2.4.1 Special-Status Plant Surveys

ESA biologists Maile Tanaka, Julie Stout, Alanna Sullivan, and Dale Hameister conducted focused special-status plant surveys on May 8, 11, and August 10, 2018. Due to the heavy rainy season from 2018-2019, focused special-status plant surveys were updated by ESA biologists Maile Tanaka and Doug Gordon-Blackwood on April 30, 2019 and by Daryl Koutnik and Maile Tanaka on May 24, 2019. Surveys were conducted using wandering transects, with special attention paid to areas of suitable habitat. Any observed plant species were recorded in the field, and the locations of any special-status plants observed were collected using a GPS unit.

2.4.2 Special-Status Wildlife Surveys

ESA conducted focused surveys for western spadefoot (*Spea hammondii*), least Bell's vireo (*Vireo bellii pusillus*), and southwestern willow flycatcher (*Empidonax traillii extimus*).

Western spadefoot is an upland species of toad that requires water for breeding purposes only. Although there is no formal survey protocol issued by CDFW, generally accepted survey methods were used by qualified biologists with experience surveying for this species. Surveys included two diurnal (day time) surveys of the water margins around the wetted surface of the reservoir to search for egg clusters, and two nocturnal (night time) surveys immediately after rain events to search for individuals detectable by calls or eye-shine and visual identification. On January 18, 2019, ESA biologists Lily Sam and Robert Sweet conducted a diurnal and nocturnal survey for western spadefoot after substantial rainfall occurred with nearly 1" of precipitation recorded in the area over the preceding 3 days. A second diurnal and nocturnal survey was conducted on March 7, 2019 by ESA biologists Lily Sam and Douglas Gordon-Blackwood, after another rain event with at least 0.4" of rain on March 6, 2019.

Surveys for least Bell's vireo were conducted by ESA biologists Maile Tanaka, Jaclyn Catino-Davenport, and/or Karl Fairchild on April 10, 22; May 3, 15; June 5, 17, 27; and on July 8, 2019 in conformance with USFWS *Least Bell's Vireo Survey Guidelines* (USFWS 2001). Surveys for southwestern willow flycatcher were also conducted by ESA biologist Karl Fairchild on May 29;

June 5, 17, 27; and July 8, 2019 in conformance with USFWS *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher* (Sogge et al. 2010).

Prior to the geotechnical investigations that commenced in September 2019 on the site, ESA also conducted pre-activity surveys for coastal California gnatcatcher (*Polioptila californica*) and coastal cactus wren (*Campylorhynchus brunneicapillus*) on August 29-30, 2019.

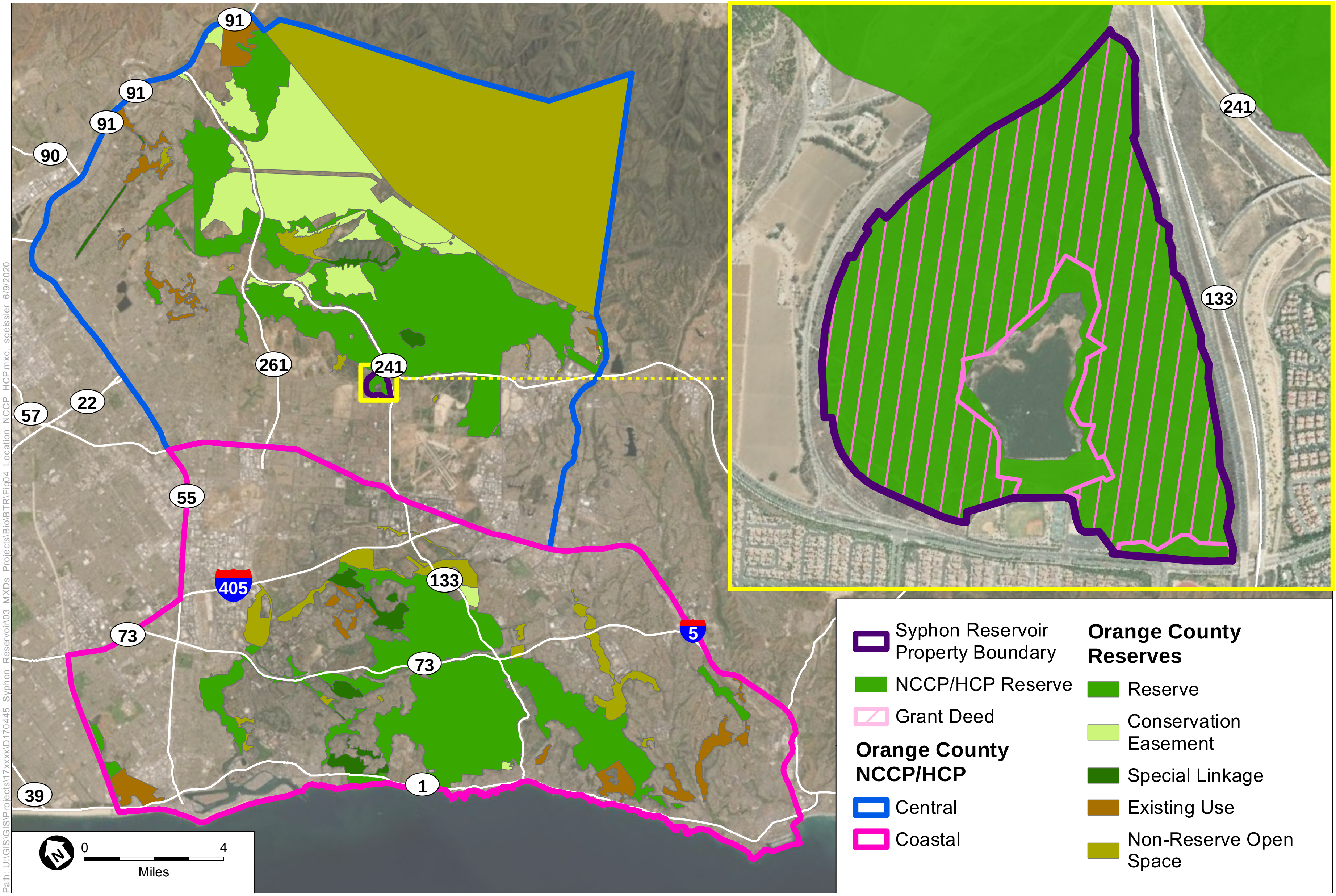
In addition, an inventory of all plant and wildlife species observed was compiled during all field surveys, including special-status wildlife species that were observed on-site. Biological resources data collected from recent surveys conducted by ESA in 2018 and 2019, as well as previous documentation of biological resources within the study area (Dudek 2012) are utilized in this analysis. In addition, focused protocol presence/absence surveys for coastal California gnatcatcher (*Polioptila californica*) were conducted by Dudek in 2011.

3.0 Environmental Setting

3.1 Regional Setting

The study area is located within central Orange County, California. The study area is within the Central Subregion of the County of Orange NCCP/HCP. Although the study area is located within the NCCP/HCP Reserve (**Figure 4**), the existing reservoir is not actually within the NCCP/HCP Reserve; rather, it is surrounded by it. Significant regional geographic features around the area include the Santa Ana Mountains to the northeast, the Tustin plain and the City of Irvine to the north and southwest. The study area is within the Newport Bay watershed. The climate in the region is Mediterranean, with dry summers and moderately wet winters; however, the region has experienced severe drought conditions in recent years.

The study area was previously part of the Irvine Ranch and was subject to disturbance in the 1940s for planting of orchards and construction of the reservoir to provide irrigation for agricultural uses. In the 1970s, agriculture was expanded within the eastern and northern portions of the study area, mainly for citrus orchards. Following construction of the dam, impounded water accumulated from direct runoff from the Highline Canal. Currently within the study area, a portion of the Highline Canal conveys recycled water flows from IRWD's Rattlesnake Reservoir into Syphon Reservoir. The Highline Canal located southwest of the Syphon Reservoir was historically used for irrigation but has been abandoned. Additionally, a culvert inlet in the northeast portion of the study area conveys stormwater runoff from a portion of the open space area east of the reservoir (under SR-133 and SR-241), and multiple culverts within the study area drain the upland portions of the reservoir. The central drainage supports riparian habitat and conveys intermittent flow through the center of the study area to the reservoir. With the exception of limited seasonal inflows from rain events, IRWD controls all flows in and out of the reservoir, as part of their recycled water storage and management. The reservoir currently drains through a series of underground pipes that convey flows through a strainer and chlorination facility, before being distributed to customers through IRWD's recycled water system.



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 4
Study Area Location within NCCP/HCP

ESA

Between 1995 and 2000, approximately 102 acres of the study area were preserved and 112 acres were restored to native coastal sage scrub habitat as mitigation for the TCA Eastern Transportation Corridor Project's impacts to coastal California gnatcatcher. Restoration activities involved removal of orchard trees, native coastal sage scrub planting, temporary irrigation, and monitoring. The revegetation was successfully completed in accordance with regulatory requirements and supported mature coastal sage scrub suitable for California gnatcatcher (Dudek 2012). When IRWD acquired Syphon Reservoir from TIC, the Conveyance Agreement included a Grant Deed with use restrictions to protect biological resources within the area that was used for mitigation for the TCA (as shown in Figure 4).

Since completion of the restoration program in 2000, on-site management of biological resources was limited to annual cowbird trapping (which is required in perpetuity) and few additional studies, including a cactus transplantation and subsequent cactus wren monitoring in the northwest portion of the property. In October 2007, the entire study area burned in the Santiago Fire and was in post-fire succession (Dudek 2012). The study area supports native vegetation communities, restored coastal sage scrub, and some disturbed communities.

It should be noted that the majority of the proposed project site was burned again in the October 2020 Silverado Fire, and much of the vegetation on-site was destroyed by the fire. However, since native natural communities such as coastal sage scrub are adapted to fire, it is anticipated most of the vegetation should regrow to pre-fire conditions or similar, though it is possible the habitat quality may be degraded by opportunistic non-native invasive plant species. To provide a conservative assessment, this analysis presents the biological conditions at the time the Notice of Preparation (NOP) was published and analyzes proposed project impacts against those conditions.

3.2 Topography

The study area is characterized by steep topography of rolling hills, ridgelines and terraced slopes (from previous agricultural activities) surrounding the reservoir in the center of the study area. Within the study area, elevations range from 326 to 654 feet (99 to 200 meters) above mean sea level.

3.3 Soils

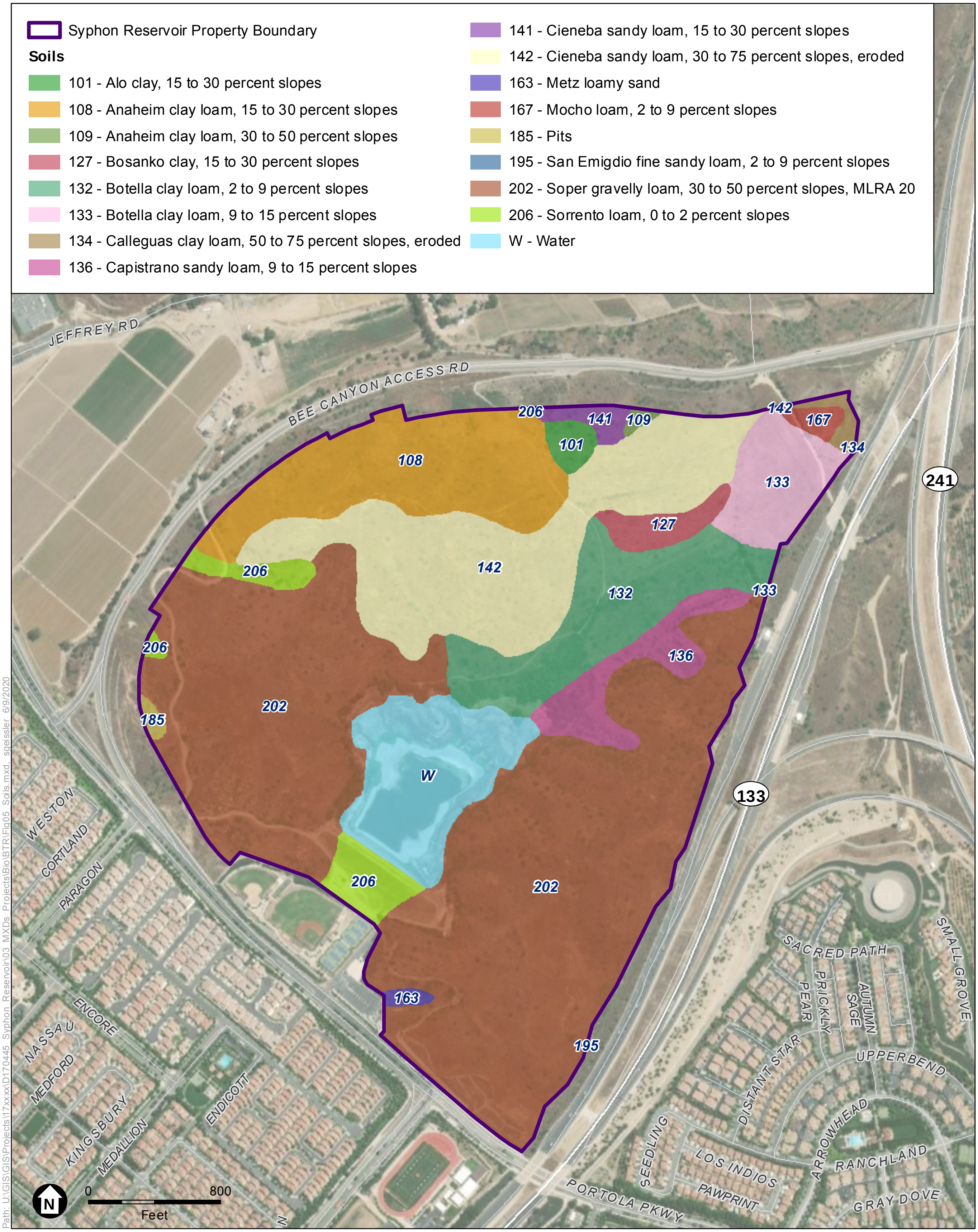
Based on review of the NRCS *Web Soil Survey* (2018), the study area contains 16 soil series (**Figure 5**). The following is a brief description of mapped soils within the study area.

3.3.1 Alo Clay

Alo clay, 15 to 30 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay in the first 22 inches, and weathered bedrock from 22 to 59 inches. Alo clay loam is not considered hydric by the NRCS.

3.3.2 Anaheim Clay Loam

Anaheim clay loam, 15 to 30 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay loam in the first 26 inches, and weathered bedrock from 26 to 59 inches. Anaheim clay loam is not considered hydric by the NRCS.



SOURCE: ESRI, 2016; USDA, 2018

Syphon Reservoir Improvement Project

Figure 5
Soils

Path: U:\GIS\GIS\Projects\17xxxx\D170445_Syphon_Reservoir\03_MXDs_Projects\Bio\BTR\Fig05_Soils.mxd, sgeissler 6/9/2020

ESA

Anaheim clay loam, 30 to 50 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay loam in the first 26 inches, and bedrock from 26 to 59 inches. Anaheim clay loam is not considered hydric by the NRCS.

3.3.3 Bosanko Clay

Bosanko clay, 15 to 30 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is slightly alkaline to moderately acidic. The profile consists of clay in the first 31 inches, and weathered bedrock from 31 to 59 inches. Bosanko clay is not considered hydric by the NRCS.

3.3.4 Botella Clay Loam

Botella clay loam, 2 to 9 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is slightly alkaline to moderately acidic. The profile consists of clay loam in the first 8 inches, silty clay loam between 8 and 35 inches, and clay loam from 35 to 66 inches. Botella clay loam is not considered hydric by the NRCS.

Botella clay loam, 9 to 15 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay loam in the first 8 inches, silty clay loam between 8 and 35 inches, and sandy clay loam from 35 to 66 inches. Botella clay loam is not considered hydric by the NRCS.

3.3.5 Calleguas Clay Loam

Calleguas clay loam, 50 to 75 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of clay loam in the first 11 inches, very channery clay loam between 11 and 15 inches, and bedrock from 15 to 42 inches. Calleguas clay loam is not considered hydric by the NRCS.

3.3.6 Capistrano Sandy Loam

Capistrano sandy loam, 9 to 15 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is neutral to medium acidic. The profile consists of sandy loam in the first 27 inches and fine sandy loam between 27 and 65 inches. Capistrano sandy loam is not considered hydric by the NRCS.

3.3.7 Cieneba Sandy Loam

Cieneba sandy loam, 15 to 30 percent slopes, is a somewhat excessively-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of sandy loam in the first 17 inches, and weathered bedrock from 17 to 59 inches. Cieneba sandy loam is not considered hydric by the NRCS.

Cieneba sandy loam, 30 to 75 percent slopes, is a somewhat excessively drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is neutral to strongly acidic. The profile consists of sandy loam in the first 17 inches and weathered bedrock between 17 and 59 inches. Cieneba sandy loam is not considered hydric by the NRCS.

3.3.8 Metz Loamy Sand

Metz loamy sand is a somewhat excessively-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of loamy sand in the first 17 inches, and stratified sand to fine sandy loam from 17 to 63 inches. Metz loamy sand is not considered hydric by the NRCS.

3.3.9 Mocho Loam

Mocho loam, 2 to 9 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of loam in the first 60 inches. Mocho loam is not considered hydric by the NRCS.

3.3.10 Pits

Pits consist of concave igneous, metamorphic, and sedimentary rock. The profile consists of extremely gravelly coarse sand in the first 6 inches, and extremely gravelly sand, extremely gravelly coarse sand, or very gravelly coarse sand from 6 to 60 inches. Pits are not considered hydric by the NRCS.

3.3.11 San Emigdio Fine Sandy Loam

San Emigdio fine sandy loam, 2 to 9 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of fine sandy loam in the first 7 inches, and stratified gravelly loamy coarse sand to fine sandy loam from 7 to 61 inches. San Emigdio fine sandy loam is not considered hydric by the NRCS.

3.3.12 Soper Gravelly Loam

Soper gravelly loam**,** 30 to 50 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is mildly alkaline to slightly acidic. The profile consists of gravelly loam in the first 8 inches, gravelly clay loam between 8 and 29 inches, and bedrock from 29 to 79 inches. Soper gravelly loam is not considered hydric by the NRCS.

3.3.13 Sorrento Loam

Sorrento loam, 0 to 2 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The profile consists of loam in the first 12 inches, silty clay loam between 12 and 62 inches, and sandy loam from 62 to 72 inches. Sorrento loam is not considered hydric by the NRCS.

3.4 Natural Communities

The upland parts of the study area primarily exhibit forms of coastal sage scrub and non-native herbaceous communities with variable levels of native versus non-native plant species cover. The most prevalent forms include the California sagebrush alliance and non-native herbaceous cover/California sagebrush alliance (i.e., communities intermixed with both native and non-native species) in the upland areas. Woody riparian vegetation (e.g., arroyo willow and mule fat) and patches of tules (i.e., a form of freshwater marsh habitat dominated by cat tails and bulrushes) occur around the fringe of the existing reservoir in areas that are frequently inundated.

Natural communities are mapped in **Figure 6**. The natural communities are described below according to the *Methods Used to Survey the Vegetation of Orange County Parks and Open Space Areas and The Irvine Company Property* (Jones & Stokes Associates 1993), *Orange County Habitat Classification System* (Gray and Bramlet 1992) and California natural alliances described in *A Manual of California Vegetation, Second Edition* (Sawyer et al. 2009). Acreages of each natural community in the study area are summarized in **Table 1**. Alternate names for communities are indicated in parentheses. Natural communities considered that are identified as sensitive on the California Natural Community List (CDFW 2019b) are also noted as such.

TABLE 1
NATURAL COMMUNITIES

Natural Community	Acres	State Rank1
Riparian Communities		
Arroyo Willow Thicket*	0.24	S4
Black Willow Thicket*	4.13	S3
Mule Fat Scrub	2.25	S4
Freshwater Marsh	5.87	S4
Native Upland Communities		
Coyote Brush Scrub**	0.91	S5
Chaparral Bushmallow Scrub**	0.45	S4
Chaparral Bushmallow Scrub/Coyote Brush Scrub**	0.49	S4/S5
Chaparral Bushmallow Scrub/Non-Native Herbaceous Cover**	4.72	S4/None
Sumac Chaparral	1.63	S4
California Sagebrush Scrub**	91.74	S5
California Sagebrush Scrub**/Non-Native Herbaceous Cover	7.86	S5/None
Coast Prickly Pear Scrub*	0.69	S3
Non-Native Upland Communities		
Eucalyptus Woodland	2.78	None
Non-Native Grassland	5.27	None
Non-Native Herbaceous Cover	44.16	None
Non-Native Herbaceous Cover/California Sagebrush Scrub**	71.70	None/S5
Unvegetated Areas		
Open Water	13.93	None
Disturbed	6.92	None
Total	**265.74**	

* Asterisk indicates that an alliance/association is considered sensitive by CDFW.

** Double asterisk indicates that an alliance/association that is a covered habitat type under the NCCP/HCP and is therefore considered a sensitive natural community.

1 CDFW state rank denotes the rarity of a natural type within the state as follows:

S1 = Critically Imperiled – At very high risk of extirpation due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.

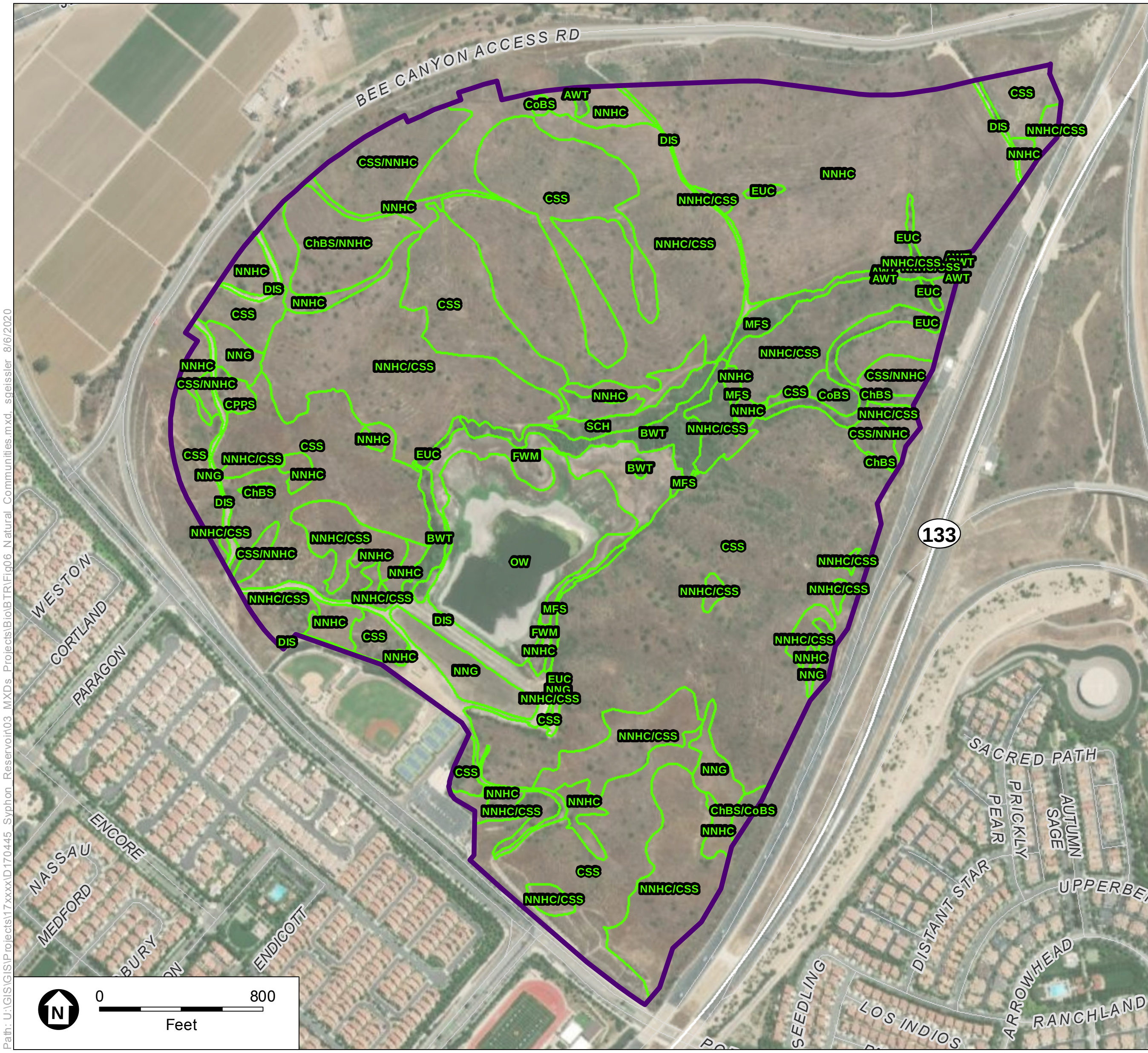
S2 = Imperiled – At high risk of extirpation due to restricted range,

few populations or occurrences, steep declines, severe threats, or other factors.

S3 = Vulnerable – At moderate risk of extirpation due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

S4 = Apparently Secure – At a fairly low risk of extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.

S5 = Secure - At very low or no risk of extirpation due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.



Syphon Reservoir Property Boundary

Natural Communities

Riparian Communities

AWT - Arroyo Willow

BWT - Black Willow Thicket

MFS - Mule Fat Scrub

FWM - Freshwater Marsh

Native Upland Communities

CoBS - Coyote Brush Scrub

ChBS - Chaparral Bushmallow Scrub

ChBS/CoBS - Chaparral Bushmallow Scrub / Coyote Brush Scrub

ChBS/NNHC - Chaparral Bushmallow Scrub / Non-Native Herbaceous Cover

SCH - Sumac Chaparral

CSS - California Sagebrush Scrub

CSS/NNHC - California Sagebrush Scrub / Non-Native Herbaceous Cover

CPPS - Coast Prickly Pear Scrub

Non-Native Upland Communities

EUC - Eucalyptus Woodland

NNG - Non-Native Grassland

NNHC - Non-Native Herbaceous Cover

NNHC/CSS - Non-Native Herbaceous Cover / California Sagebrush Scrub

Unvegetated Areas

DIS - Disturbed

OW - Open Water

Path: U:\GIS\GIS\Projects\17xxxx\D170445_Syphon_Reservoir\03_MXDs_Projects\Bio\BTR\Fig06_Natural_Communities.mxd, sgeissler 8/6/2020

SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 6
Natural Communities

ESA

3.4.1 Arroyo Willow Thicket

Arroyo willow thicket (i.e., *Salix lasiolepis* Shrubland Alliance or Arroyo Willow Riparian Forest [OCHCS 7.6]) is characterized by a canopy cover dominated by mature arroyo willow (*Salix lasiolepis*) with an understory of smaller willows, and variable herbaceous layer. This alliance is typically found within stream banks and benches, slope seeps, and stringers along drainages (Sawyer et al. 2009). A total of 0.24 acre of arroyo willow thicket occurs primarily within the northern and northeastern portions of the study area.

Arroyo willow thicket is considered a sensitive natural community by CDFW (61.201.01 – *Salix lasiolepis*) (CDFW 2019b).

3.4.2 Black Willow Thicket

Black willow thicket (i.e., *Salix gooddingii* Woodland Alliance or Black Willow Riparian Forest [OCHCS 7.7]) is characterized by a canopy cover dominated by mature black willow (*Salix gooddingii*) with an understory of smaller willows, mule fat (*Baccharis salicifolia*), and variable herbaceous layer. This alliance is typically found on terraces along large rivers, canyons, and along rocky floodplains of small, intermittent streams, seeps, and springs (Sawyer et al. 2009). Species associated with this alliance include native arroyo willow and non-native tamarisk (*Tamarix ramosissima*) and red gum (*Eucalyptus camaldulensis*). A total of 4.13 acres of black willow thicket was mapped around the northern and northeastern perimeter of the reservoir within the center of the study area.

Black willow thicket is considered a sensitive natural community by CDFW (61.211.01 – *Salix gooddingii*) (CDFW 2019b).

3.4.3 Mule Fat Scrub

Mule fat scrub (i.e., mulefat thickets [*Baccharis salicifolia* Shrubland Alliance]; OCHCS 7.3) is characterized by large shrub cover dominated by mule fat and variable herbaceous layer. This alliance is typically found within canyon bottoms, floodplains, lake margins, and stream channels with soils of mixed alluvium (Sawyer et al. 2009). Species associated with this alliance include native black willow, California sagebrush (*Artemisia californica*), laurel sumac (*Malosma laurina*), cocklebur (*Xanthium strumarium*), and non-native Spanish false fleabane (*Pulicaria paludosa*), and black mustard (*Brassica nigra*). A total of 2.25 acres of black willow thicket were mapped around the northern and northeastern perimeter of the reservoir within the center of the study area.

Mule fat scrub is not considered a sensitive natural community by CDFW (63.510.01 – *Baccharis salicifolia*) (CDFW 2019b).

3.4.4 Freshwater Marsh

Freshwater marsh (i.e., California Bulrush Marsh [*Schoenoplectus californicus* Herbaceous Alliance]; OCHCS 6.4) is characterized by a dominance of dense stands of California bulrush (*Schoenoplectus californicus*) in the herbaceous layer. This alliance is typically found within freshwater or brackish marshes, shores, bars, and channels of river mouth estuaries, within areas with soils that have a high organic contents and are poorly aerated (Sawyer et al. 2009). Dried cattails (*Typha* sp.) were also observed within this alliance. A total of 5.87 acres of freshwater marsh occur around the northern and northeastern perimeter of the reservoir in the center of the study area.

Freshwater marsh is not considered a sensitive natural community by CDFW (52.114.02 – *Schoenoplectus californicus*) (CDFW 2019b).

3.4.5 Coyote Brush Scrub

Coyote brush scrub (i.e., *Baccharis pilularis* Shrubland Alliance; Coyote Brush [OCHCS 2.3.9]) is characterized by a dominance of coyote brush (*Baccharis pilularis*) in the shrub layer. This alliance is typically found within river mouths, stream sides, terraces, open slopes, and ridges, within variable soils (Sawyer et al. 2009). A total of 0.91 acre of coyote brush scrub was mapped around the northern and northeastern portions of the study area.

Coyote brush scrub is not considered a sensitive natural community by CDFW (32.060.23 – *Baccharis pilularis*) (CDFW 2019b).

3.4.6 Chaparral Bushmallow Scrub

Chaparral bushmallow scrub (i.e., bush mallow scrub [*Malacothamnus fasciculatus* Shrubland Alliance]; Bush Mallow [OCHCS 2.3.11]) is dominated by chaparral bushmallow (*Malacothamnus fasciculatus*) in the shrub layer. This alliance is typically found within gentle to very steep slopes of variable aspect within loam or clay soils (Sawyer et al. 2009). Species associated with this alliance include native laurel sumac, California brittlebush (*Encelia californica*), California matchweed (*Gutierrezia californica*), giant wild rye (*Elymus condensatus*), and non-native short-podded mustard (*Hirschfeldia incana*). A total of 0.45 acre of chaparral bushmallow scrub was mapped around the northeastern and western portions of the study area.

Chaparral bushmallow scrub is not considered a sensitive natural community by CDFW (45.450.01 – *Malacothamnus fasciculatus*) (CDFW 2019b).

3.4.7 Chaparral Bushmallow Scrub/Coyote Brush Scrub

Chaparral bushmallow scrub/coyote brush scrub (OCHCS 2.3.11/2.3.9) is characterized by a shrub layer with a dominance of chaparral bushmallow and a sub-dominance of coyote brush. A total of 0.49 acre of chaparral bushmallow scrub/coyote brush scrub was mapped in the southern portion of the study area.

Chaparral bushmallow scrub/coyote brush scrub is not considered a sensitive natural community by CDFW (45.450.01 – *Malacothamnus fasciculatus*/32.060.23 – *Baccharis pilularis*) (CDFW 2019b).

3.4.8 Chaparral Bushmallow Scrub/Non-Native Herbaceous Cover

Chaparral bushmallow scrub/non-native herbaceous cover (OCHCS 2.3.11; *Brassica (nigra)* and Other Mustards [Semi-Natural Herbaceous Stand]; Ruderal [OCHCS 4.6]) is characterized by a shrub layer with a dominance of chaparral bushmallow and a sub-dominance of non-native herbaceous cover. A total of 4.72 acres of chaparral bushmallow scrub/non-native herbaceous cover were mapped in the western portion of the study area.

Chaparral bushmallow scrub/non-native herbaceous cover is not considered a sensitive natural community by CDFW (45.450.01 – *Malacothamnus fasciculatus*) (CDFW 2019b).

3.4.9 Sumac Chaparral

Sumac chaparral (i.e., *Malosma laurina* Shrubland Alliance; Toyon-Sumac [OCHCS 3.12]) is characterized by large shrub cover dominated by laurel sumac with a variable understory of coastal sage scrub species and/or herbaceous grassy layer. This alliance is typically found on slopes, which are often steep, within soils that are shallow and fine-textured (Sawyer et al. 2009). Species associated with this alliance include native California sagebrush. A total of 1.63 acres of sumac chaparral were mapped throughout the eastern portion of the study area.

Sumac chaparral is not considered a sensitive natural community by CDFW (45.455.01 – *Malosma laurina*) (CDFW 2019b).

3.4.10 California Sagebrush Scrub

California sagebrush scrub (i.e., *Artemisia californica* Shrubland Alliance; Sagebrush [OCHCS 2.3.6]) is characterized by a dominance of by California sagebrush intermixed with coastal sage scrub species and a variable herbaceous layer. This alliance is typically found on slopes that are usually steep and rarely flooded within soils that are alluvial or colluvial derived shallow (Sawyer et al. 2009). Species associated with this alliance include native California buckwheat (*Eriogonum fasciculatum*), laurel sumac, California brittle bush, California matchweed, deerweed (*Acmispon glaber*), lemonadeberry (*Rhus integrifolia*), chaparral bushmallow, coast live oak (*Quercus agrifolia*), toyon (*Heteromeles arbutifolia*), Island false bindweed (*Calystegia macrostegia*), foothill needlegrass (*Stipa lepida*), black sage (*Salvia mellifera*), white sage (*Salvia apiana*), soap plant (*Chlorogalum pomeridianum*), prickly pear (*Opuntia littoralis*), common goldenstar (*Bloomeria crocea*), false rosinweed (*Osmadenia tenella*), California plantain (*Plantago erecta*), and Ladies' tobacco (*Pseudognaphalium californicum*), and non-native black mustard, foxtail chess (*Bromus madritensis*), Mexican fan palm (*Washingtonia robusta*), giant yucca (*Yucca gigantea*), oleander (*Nerium oleander*), Chinese elm (*Ulmus parvifolia*), and fountaingrass (*Pennisetum setaceum*). A total of 91.74 acres of California sagebrush scrub occurs throughout the study area.

California sagebrush scrub is not considered a sensitive natural community by CDFW (32.010.01 – *Artemisia californica*) (CDFW 2019b). However, this alliance is recognized as a covered habitat type within the Central & Coastal NCCP/HCP, and is therefore considered a sensitive natural community.

3.4.11 California Sagebrush Scrub/Non-Native Herbaceous Cover

California sagebrush scrub/non-native herbaceous cover (i.e., *Artemisia californica* Shrubland Alliance; Sagebrush [OCHCS 2.3.6]; *Brassica (nigra)* and Other Mustards [Semi-Natural Herbaceous Stand]; Ruderal [OCHCS 4.6]) is characterized by a dominance of California sagebrush intermixed with a sub-dominance of non-native herbaceous cover primarily comprised of black mustard. Species associated with this alliance include native California buckwheat, chaparral bushmallow, fascicled tarweed (*Deinandra fasciculata*), black sage, prickly pear, splendid mariposa lily (*Calochortus spendens*), wishbone bush (*Mirabilis laevis*), golden yarrow (*Eriophyllum confertiflorum*), and non-native tocalote (*Centaurea melitensis*), slender oat (*Avena barbata*), Australian saltbush (*Atriplex semibaccata*). A total of 7.86 acres of California sagebrush scrub/non-native herbaceous cover occurs throughout the study area.

California sagebrush scrub/non-native herbaceous cover is not considered a sensitive natural community by CDFW (32.010.01 – *Artemisia californica*) (CDFW 2019b). However, this alliance is recognized as a covered habitat type within the Central & Coastal NCCP/HCP, and is therefore considered a sensitive natural community.

3.4.12 Coast Prickly Pear Scrub

Coast prickly pear scrub (i.e., *Opuntia littoralis* Shrubland Alliance; Southern Cactus [OCHCS 2.4]) is characterized by a dominance of by prickly pear intermixed with coastal sage scrub species. This alliance is typically found on south-facing slopes within soils that are shallow loams and clays that may be rocky (Sawyer et al. 2009). Species associated with this alliance include native laurel sumac, lemonadeberry, California sagebrush, California buckwheat, deerweed, blue elderberry (*Sambucus nigra* ssp. *caerulea*), and non-native fountaingrass and tree tobacco (*Nicotiana glauca*). A total of 0.69 acre of coast prickly pear scrub occurs within the western portion of the study area.

Coast prickly pear scrub is considered a sensitive natural community by CDFW (32.150.02 – *Opuntia littoralis* – mixed coastal sage scrub) (CDFW 2019b).

3.4.13 Eucalyptus Woodland

Eucalyptus woodland (i.e., eucalyptus groves [*Eucalyptus* Semi-Natural Woodland Stands]; Ornamental Landscaping [OCHCS 15.5]) is dominated of by planted rows of gum trees. Associated species include native coyote brush and laurel sumac. A total of 2.78 acres of eucalyptus woodland occurs within the central and northeastern portion of the study area.

Eucalyptus woodland is not considered a sensitive natural community by CDFW (CDFW 2019b).

3.4.14 Non-Native Grassland

Non-native grassland (i.e., *Bromus madritensis* [Semi-Natural Herbaceous Stands]; Annual [OCHCS 4.1]) is dominated of by foxtail chess with a mix of non-native and native grasses and forbs. Species associated with this alliance include native telegraph weed (*Heterotheca grandiflora*), Island false bindweed, California buckwheat, deerweed, Menzies' goldenbush (*Isocoma menziesii* var. *menziesii*), blue elderberry, prickly pear, fiddleneck (*Amsinckia* sp.), and non-native red-stemmed filaree (*Erodium cicutarium*), Russian thistle (*Salsola tragus*), castor bean (*Ricinus communis*), and fountaingrass. A total of 5.27 acres of non-native grassland occurs within the southern portion of the study area.

Non-native grassland is not considered a sensitive natural community by CDFW (CDFW 2019b).

3.4.15 Non-Native Herbaceous Cover

Non-native herbaceous cover (i.e., *Brassica (nigra)* and other mustard species [Semi-Natural Herbaceous Stand]; Ruderal [OCHCS 4.6]) is characterized by a dominance of by black mustard. This alliance is typically associated with fallow fields, grasslands, roadsides, disturbed scrublands, riparian areas, and waste places (Sawyer et al. 2009). Species associated with this alliance include native telegraph weed, laurel sumac, fascicled tarweed, Our Lord's candle (*Hesperoyucca whipplei*), foothill needlegrass, mule fat, western prickly pear (*Opuntia occidentalis*), and non-native foxtail chess, Peruvian pepper (*Schinus molle*), ripgut brome (*Bromus diandrus*), horehound (*Marrubium vulgare*), and tuna cactus (*Opuntia ficus-indica*). A total of 44.16 acres of non-native herbaceous cover coast occurs throughout the study area.

Non-native herbaceous cover is not considered a sensitive natural community by CDFW (CDFW 2019b).

3.4.16 Non-Native Herbaceous Cover/California Sagebrush Scrub

Non-native herbaceous cover/California sagebrush scrub (i.e., *Brassica (nigra)* and Other Mustards [Semi-Natural Herbaceous Stand]; Ruderal [OCHCS 4.6]; *Artemisia californica* Shrubland Alliance; Sagebrush [OCHCS 2.3.6]) is dominated by black mustard with a sub-dominance of intermixed coastal sage scrub species. A total of 71.70 acres of non-native herbaceous cover/California sagebrush scrub coast occurs throughout the study area.

Non-native herbaceous cover/California sagebrush scrub is not considered a sensitive natural community by CDFW (CDFW 2019b). Although California sagebrush scrub is recognized as a covered habitat type within the Central & Coastal NCCP/HCP and is considered to have value to covered species in that context, this non-native herbaceous cover/California sagebrush scrub community is predominantly disturbed and dominated by non-native herbaceous cover; thus, it is not considered a sensitive natural community.

3.4.17 Open Water

Open water (OCHCS 12.2) consists of the reservoir, and natural vegetation present within this area is negligible. A total of 13.93 acres of open water occurs within the study area.

Open water is not considered a sensitive natural community by CDFW (CDFW 2019b).

3.4.18 Disturbed

Disturbed (i.e., Disturbed or Barren [OCHCS 16.1]) includes lands that have been significantly disturbed as the result of human activity, and natural vegetation is very sparse or absent from these areas. Associated species found occasionally may include non-native foxtail chess, short-podded mustard, yellow sweetclover (*Melilotus officinalis*), Mexican sprangletop (*Leptochloa fusca* ssp. *uninervia*), fountaingrass, tree tobacco, red-stemmed filaree, and Mediterranean grass (*Schismus barbatus*). Disturbed areas within the study area include unpaved dirt trails that provide access around the perimeter of the reservoir and also include the earthen dam which is actively maintained to limit any vegetation from becoming established. A total of 6.92 acres of disturbed areas occur within the study area.

Disturbed areas are not considered a sensitive natural community by CDFW (CDFW 2019b).

3.5 Jurisdictional Resources

The USACE issued an Approved Jurisdictional Determination letter (**Appendix B**), which confirmed the determination that waters of the U.S. do not occur within the study area since Syphon Reservoir is an intrastate isolated water with no apparent interstate or foreign commerce connection (USACE 2018). Thus, the study area only includes features potentially subject to the jurisdiction of the State (i.e., RWQCB wetlands and non-wetland waters of the State, and CDFW lakes, streams, and associated vegetation). **Table 2** and **Figures 7A and 7B** identify and quantify the areas regulated by the RWQCB and CDFW within the study area.

TABLE 2
POTENTIALLY JURISDICTIONAL AREAS

Jurisdiction Types	Acres
RWQCB Wetlands	4.33
RWQCB Non-Wetland Waters of the State	13.95
CDFW Lakes, Streams, and Associated Vegetation	26.55

SOURCE: ESA, 2018

3.5.1 RWQCB Wetlands and Waters of the State

3.5.1.1 Wetlands

The freshwater wetlands within the study area are largely dominated by native plant species including California bulrush (OBL[1]), black willow (FACW[2]), and yellow sweetclover (*Melilotus officinalis*, FACU[3]). This habitat also supports a range of non-native plant species including seaside heliotrope (*Heliotropium curassavicum*, FACU), spiny cocklebur (*Xanthium strumarium*, FAC), short-podded mustard (UPL[4]), and telegraph weed (UPL). The wetlands occur along the margins of Syphon Reservoir (Figure 7A). Although not mapped as hydric soils according to NRCS, hydric soil indicators were observed in the wetlands include the presence of muck, hydrogen sulfide, depleted below dark surface, redox dark surface, and sandy gleyed matrix. The wetland areas generally had very silty loam, clay soils, while sandy soils were encountered at one soil pit. Indicators of wetland hydrology include a high water table, saturation, biotic crust, and hydrogen sulfide odor.

1 OBL – obligate. Plant species with this wetland indicator status occur almost always under natural conditions in wetlands.

2 FACW – facultative wetland. Plant species with this wetland indicator status usually occur in wetlands but are occasionally found in non-wetlands.

3 FACU – facultative upland. Plant species with this wetland indicator status usually occur in non-wetlands but are occasionally found in wetlands.

4 UPL – upland. Plant species with this wetland indicator status occur in wetlands in another region, but occur almost always under natural conditions in non-wetlands in the Arid West Region.

3.5.1.2 Waters of the State

The OHWM of the reservoir was determined to be along the edge of the reservoir where surface water was observed at the time of the delineation, or based on physical characteristics of water fluctuation, such as downed emergent vegetation (**Figure 7A**). The water surface elevation of the reservoir is influenced by IRWD's management of the recycled water system. The reservoir functions as a seasonal recycled water storage facility; as such, the reservoir includes areas where open water persists throughout the year at a minimum water surface elevation but fluctuates seasonally up to a maximum water surface elevation based on demands for recycled water. The reservoir captures runoff from adjacent areas, including a primary drainage in the central portion of the study area that supports intermittent flows and riparian vegetation north of the reservoir and wetlands. However, there was no OHWM observed in this central drainage and the primary drainage was not mapped as potential waters of the State.

In addition, two ephemeral drainages (Ephemeral Drainage 1 and Ephemeral Drainage 2) were mapped north of the reservoir. These drainages convey stormwater runoff from upland areas to the central drainage via a culvert under the existing dirt road that runs along the west and north sides of the reservoir. The OHWM was an average of two feet wide, based on evidence of shelving. Ephemeral Drainage 1 supports a mix of non-native herbaceous cover and California sagebrush scrub, while Ephemeral Drainage 2 supports a mix of non-native herbaceous cover, California sagebrush scrub, and laurel sumac scrub. No surface water was observed in either drainage.

3.5.2 CDFW Lakes, Streams, and Associated Vegetation

Areas within CDFW jurisdiction typically refer to streambeds and associated wetland or riparian vegetation. Within the study area, the potential extent of CDFW limits was taken to the outer edge of the overhanging riparian or wetland vegetation adjacent to the reservoir, and to the top of bank for the ephemeral drainages (Figure 7B). Therefore, as shown in Table 2, approximately 26.55 acres of the study area are deemed to be subject to CDFW jurisdiction.

3.6 Plant Species

The study area currently supports native vegetation communities, restored coastal sage scrub, and natural communities that are moderately to substantially dominated by non-native species. A compendium of the plant species observed within the study area is included in **Appendix C**. Special-status plant species are discussed in Section 3.8.2.

3.7 Wildlife Species

The upland and riparian communities within the study area provide suitable habitat for a variety of wildlife species including reptiles, birds, and mammals, and many species were observed during surveys conducted in the study area. A compendium of the wildlife species observed within the study area is included in **Appendix C**. Special-status wildlife species are discussed in Section 3.8.2.

3.8 Special-Status Biological Resources

3.8.1 Sensitive Natural Communities

Sensitive natural communities are designated as such by various resource agencies, such as the CDFW, or in local policies and regulations. These communities are generally considered to have important functions or values for wildlife and/or are recognized as declining in extent or distribution and may be considered threatened enough to warrant some level of protection. Sensitive natural communities include those that are identified in the CDFW *California Natural Community List* (CDFW 2019b). The CDFW state rank denotes the rarity and endangerment of a vegetation type within the state as described below, with S1 through S3 considered to be a sensitive natural community by CDFW.

3.8.1.1 State Conservation Rank

S1 = Critically Imperiled – At very high risk of extirpation due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.

S2 = Imperiled – At high risk of extirpation due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

S3 = Vulnerable – At moderate risk of extirpation due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

S4 = Apparently Secure – At a fairly low risk of extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.

S5 = Secure - At very low or no risk of extirpation due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

Based on the state ranks, ten sensitive natural communities occur within the study area: arroyo willow thicket, black willow thicket, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/coyote brush scrub, chaparral bushmallow scrub/non-native herbaceous cover, California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coast prickly pear scrub, and non-native herbaceous cover/California sagebrush scrub (**Figure 8**).

3.8.2 Special-Status Species

"Special-status" species are plants and animals that are listed under the California Endangered Species Act (CESA) or Federal Endangered Species Act (FESA), as well as species protected under other regulations and species that are considered sufficiently rare or sensitive by the scientific community to be considered rare. Special-status species are categorized as follows:

- Species listed or proposed for listing as threatened or endangered, or designated as candidates for possible future listing as threatened or endangered, under CESA or FESA.
- Species protected under the federal Bald and Golden Eagle Protection Act.
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines § 15380).
- Plants designated as rare or endangered in accordance with the California Native Plant Protection Act (NPPA) (Fish and Game Code § 1900 et seq.).

SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 7A
RWQCB Jurisdictional Areas

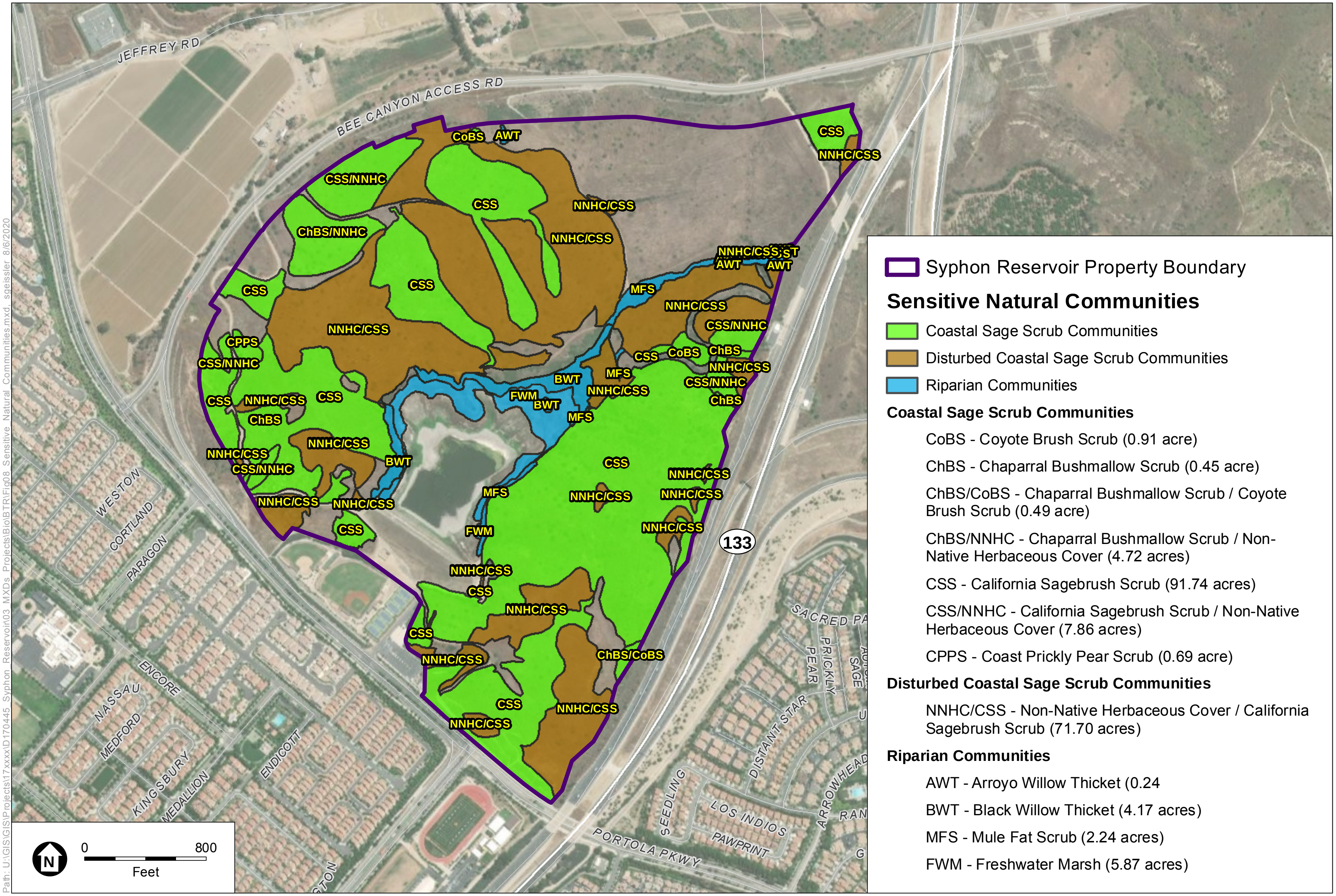
ESA

SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 7B
CDFW Jurisdictional Areas

ESA



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 8

Sensitive Natural Communities

ESA

- Plants considered by CDFW and the CNPS to be rare (California Rare Plant Ranks [CRPR] 1A, 1B, 2A, and 2B) in California.
- Species covered under an adopted Natural Community Conservation Plan (NCCP)/Habitat Conservation Plan (HCP).
- Species identified by CDFW and designated as Special Animals, including wildlife species designated as species of special concern in California (SC).
- Wildlife species listed as fully protected in California (California Fish and Game Code § 3511, 4700, and 5050).

Based on the literature review and field reconnaissance, special-status species were evaluated for their potential to occur within the study area or immediate vicinity, using the following definitions:

Unlikely: The study area or immediate vicinity do not support suitable habitat for a particular species, and therefore the species is unlikely to occur within the study area.

Low Potential: The study area or immediate vicinity only provide low-quality or very limited habitat for a particular species. In addition, the study area may lie outside the known geographic or elevational range for a particular species.

Moderate Potential: The study area or immediate vicinity provide suitable habitat for a particular species. However, the habitat or substrate may be limited or the desired vegetation assemblage or density is less than ideal.

High Potential: The study area or immediate vicinity provides high-quality suitable habitat conditions for a particular species. Additionally, known populations of the species may occur in the study area or immediate vicinity.

Present: The species was observed within the study area during relevant biological surveys or other project visits.

Based on the database search results, a list of potentially occurring special-status species was developed and evaluated for the study area. Special-status species with potential to occur were defined as those species whose geographic and elevational range include the study area and that require habitat similar to habitat present within the study area or immediate vicinity.

3.8.2.1 Special-Status Plant Species

Of the 56 special-status plant species considered for their potential to occur within the study area, 37 species are unlikely to occur and 15 species were assessed as having low potential to occur because the study area is outside of the known elevation range for these species and/or lacks suitable habitat to support these species. None of the special-status plant species with a low potential to occur were observed during focused surveys conducted in 2018 and 2019. Species determined to be unlikely or to have only a low potential to occur are included in **Appendix D**. These species are not discussed further in this analysis.

Four special-status plant species were observed within the study area during focused surveys in 2018 and 2019, including Catalina mariposa lily (*Calochortus catalinae*) (CRPR 4.2, NCCP/HCP Covered), intermediate mariposa lily (*Calochortus weedii* var. *intermedius*) (CRPR 1B.2), multi-stemmed dudleya (*Dudleya multicaulis*) (CRPR 1B.2), and San Diego County viguiera (*Bahiopsis laciniata*) (CRPR 4.3).

Approximately 309 Catalina mariposa lily individuals were observed on-site in the western and southeastern portions of the study area. This species was also observed on-site during previous surveys by Harmsworth Associates in 1998 (Dudek 2012). Approximately 19 intermediate mariposa lily individuals were observed on-site in the western portion of the study area. Approximately 109 multi-stemmed dudleya above-ground specimens were observed on-site in the western portion of the study area. San Diego County viguiera was not noted by the CNDDB and CNPS database searches as a plant with potential to occur; however, one individual was observed on-site in the easternmost portion of the study area.

Appendix D provides details of each special-status species, their habitat, and their potential to occur within the study area. Special-status species noted in the USFWS and CNDDB databases in the vicinity of the study area are shown in **Figures 9A and 9B**. Special-status plant species observed on-site are shown in **Figure 10A**.

3.8.2.2 Special-Status Wildlife Species

Of the 68 special-status wildlife species considered regarding their potential to occur within the study area, 37 species are deemed unlikely to occur due to the lack of any potentially suitable habitat and 14 species were assessed as having low potential to occur because the study area lacks suitable habitat to support these species and/or is outside of the known geographic or elevational range for these species. Species considered but determined to be unlikely or to have a low potential to occur are still included in **Appendix D**. It should be noted that coastal cactus wren (*Campylorhynchus brunneicapillus cousei*) (SC, NCCP/HCP Covered Species) was previously observed on-site in 1999 and reported in the CNDDB and also around 2000, prior to the Santiago Fire that burned the entire site in October 2007 (Dudek 2012). However, there are currently very limited, isolated coast prickly pear cactus plants on-site so this species has a low potential to occur due to presence of a negligible amount of cacti-dominated vegetation on-site or within the immediate vicinity. These species are not discussed further in this analysis.

ESA conducted focused surveys for western spadefoot, least Bell's vireo, and southwestern willow flycatcher in 2019. No western spadefoot (Species of Special Concern [SC], NCCP/HCP Covered Species) or southwestern willow flycatcher (Federally Endangered [FE], State Endangered [SE], NCCP/HCP Conditionally Covered) were detected during focused surveys.

Seven special-status species were observed within the study area during 2018 and/or 2019 surveys, including least Bell's vireo (FE, SE, NCCP/HCP Conditionally Covered Species), coastal California gnatcatcher (*Polioptila californica californica*) (Federally Threatened [FT], SC, NCCP/HCP Covered Species), yellow warbler (*Setophaga petechia*) (SC), yellow-breasted chat (*Icteria virens*) (SC), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*) (NCCP/HCP Covered Species), Vaux's swift (*Chaetura vauxi*) (SC), and orange-throated whiptail (*Aspidoscelis hyperythra*)

(NCCP/HCP Covered Species). In addition, coastal cactus wren and seven other special-status species have been observed within the study area during previous surveys or were reported in the CNDDB, including grasshopper sparrow (*Ammodramus savannarum*) (SC), red-shouldered hawk (*Buteo lineatus*) (NCCP/HCP Covered Species), northern harrier (*Circus cyaneus*) (SC, NCCP/HCP Covered Species), white-tailed kite (*Elanus leucurus*) (State Fully Protected [FP]), prairie falcon (*Falco mexicanus*) (NCCP/HCP Conditionally Covered Species), American peregrine falcon (*Falco peregrinus anatum*) (FP, NCCP/HCP Covered Species), and coyote (*Canis latrans*) (NCCP/HCP Covered Species) (Dudek 2012). It must be recognized that among the raptors (birds of prey) noted above, the prairie falcon and American peregrine falcon are noted as species that may soar above or occasionally forage in this area but that have a negligible potential to nest on-site.

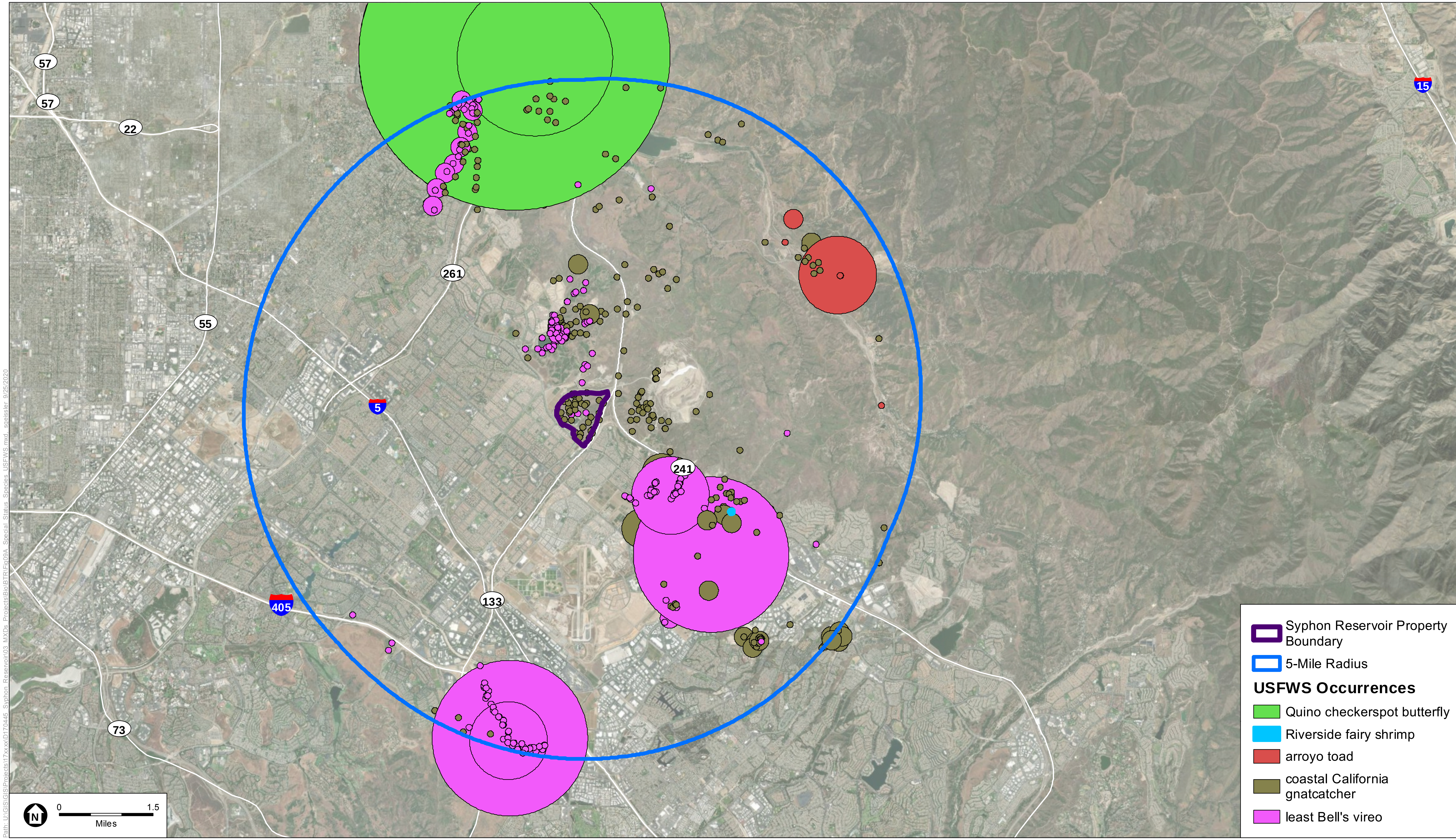
In addition, one special-status species, sharp-shinned hawk (*Accipiter striatus*) (NCCP/HCP Covered Species), has a high potential to occur. Two special-status species, coastal whiptail (*Aspidoscelis tigris stejnegeri*) (SC, NCCP/HCP Covered Species) and San Diego desert woodrat (*Neotoma lepida intermedia*) (SC, NCCP/HCP Covered Species), have a moderate potential to occur.

Appendix D provides details for each special-status species, their habitat associations, and a determination regarding their potential to occur within the study area. Special-status species occurrences from the USFWS and CNDDB occurrences databases within the vicinity of the study area are shown in Figures 9A and 9B. Special-status wildlife species observed on-site are shown in **Figure 10B**.

3.9 Critical Habitat

Under the FESA, when species are proposed for listing as Threatened or Endangered, the USFWS is required to consider whether there are geographic areas that contain essential features or areas that are essential to conserve the specie, and if so, USFWS may propose designating these areas as critical habitat. Critical habitat is defined as areas that contain the physical or biological features that are essential to the conservation of endangered and threatened species and that may need special management or protection. Critical habitat may also include areas that were not occupied by the species at the time of listing but are essential to its conservation. Critical habitat designations affect only Federal agency actions or federally funded or permitted activities. Critical habitat designations do not affect activities by private landowners if there is no Federal "nexus"—that is, no Federal funding or authorization (USFWS 2017).

The study area does not occur within or overlap any USFWS-designated critical habitat areas (USFWS 2020b). The nearest designated critical habitat areas are both located a bit more than 2 miles to the southeast, on the south side of the SR-241 where a very small area is designated as Critical Habitat for the Federally Endangered Riverside fairy shrimp (*Streptocephalus wootoni*) and larger area is designated for the Federally Threatened coastal California gnatcatcher.

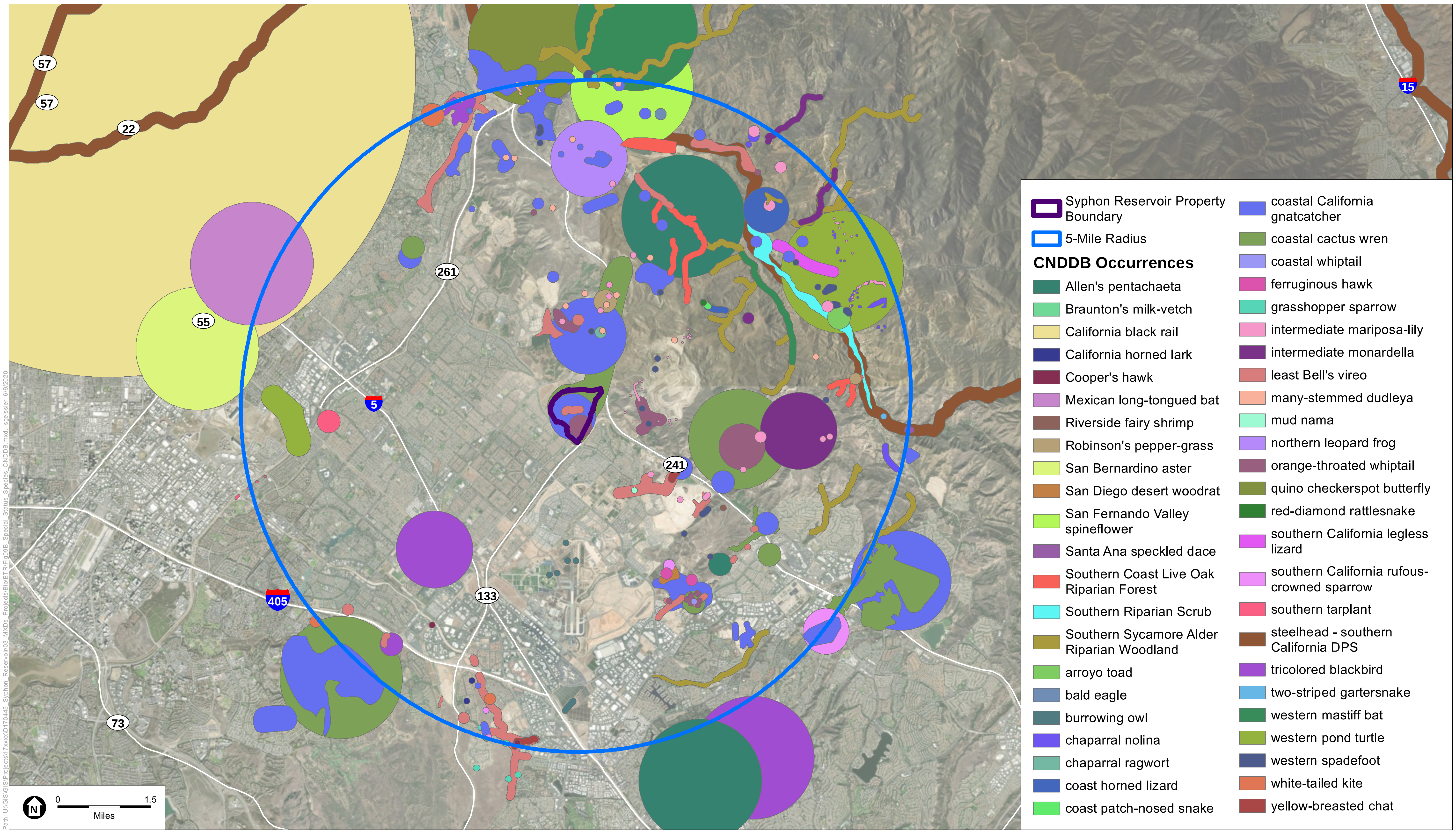


SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 9A
Special-Status Species Occurrences (USFWS)

ESA

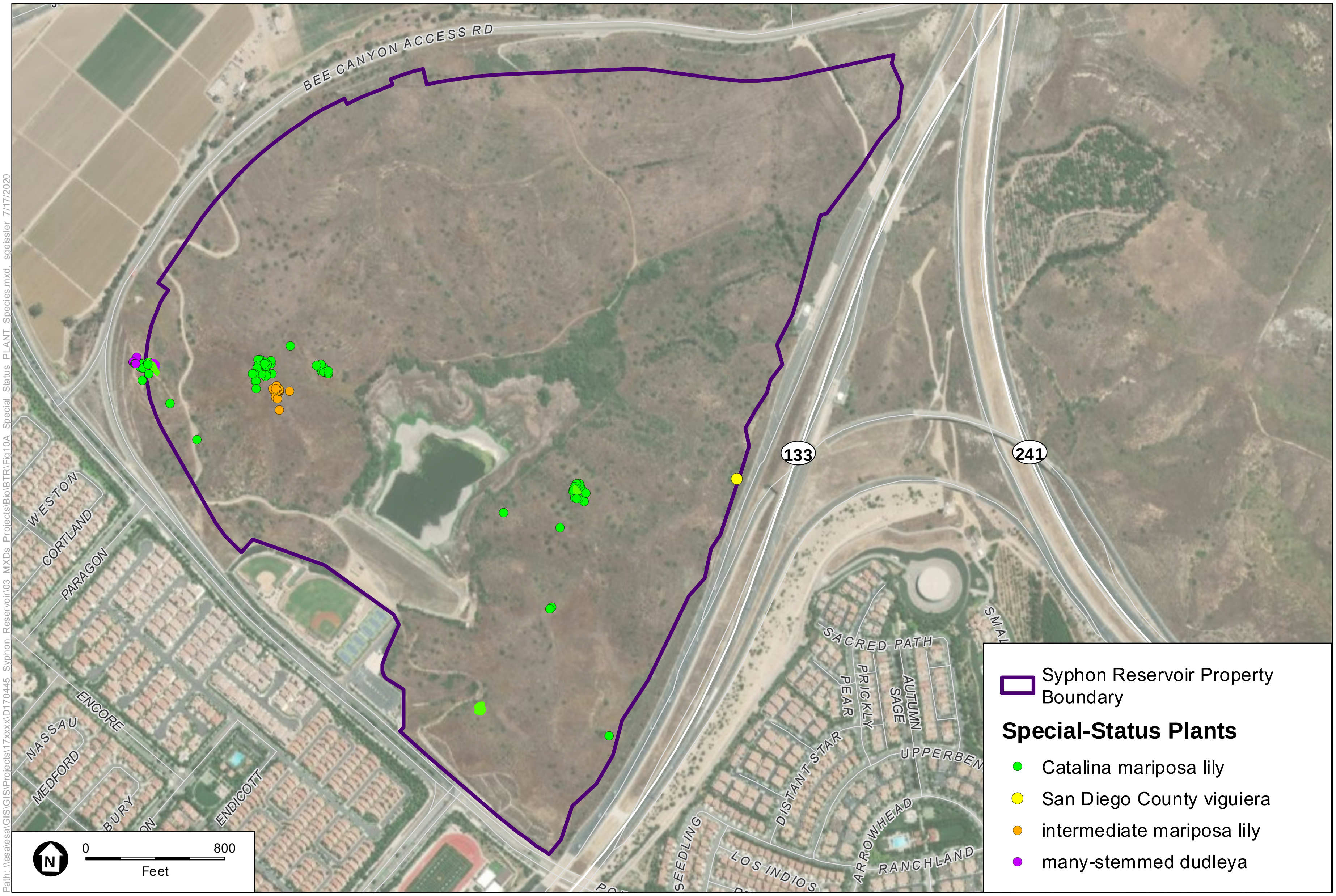


SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 9B
Special-Status Species Occurrences (CNDDB)

ESA

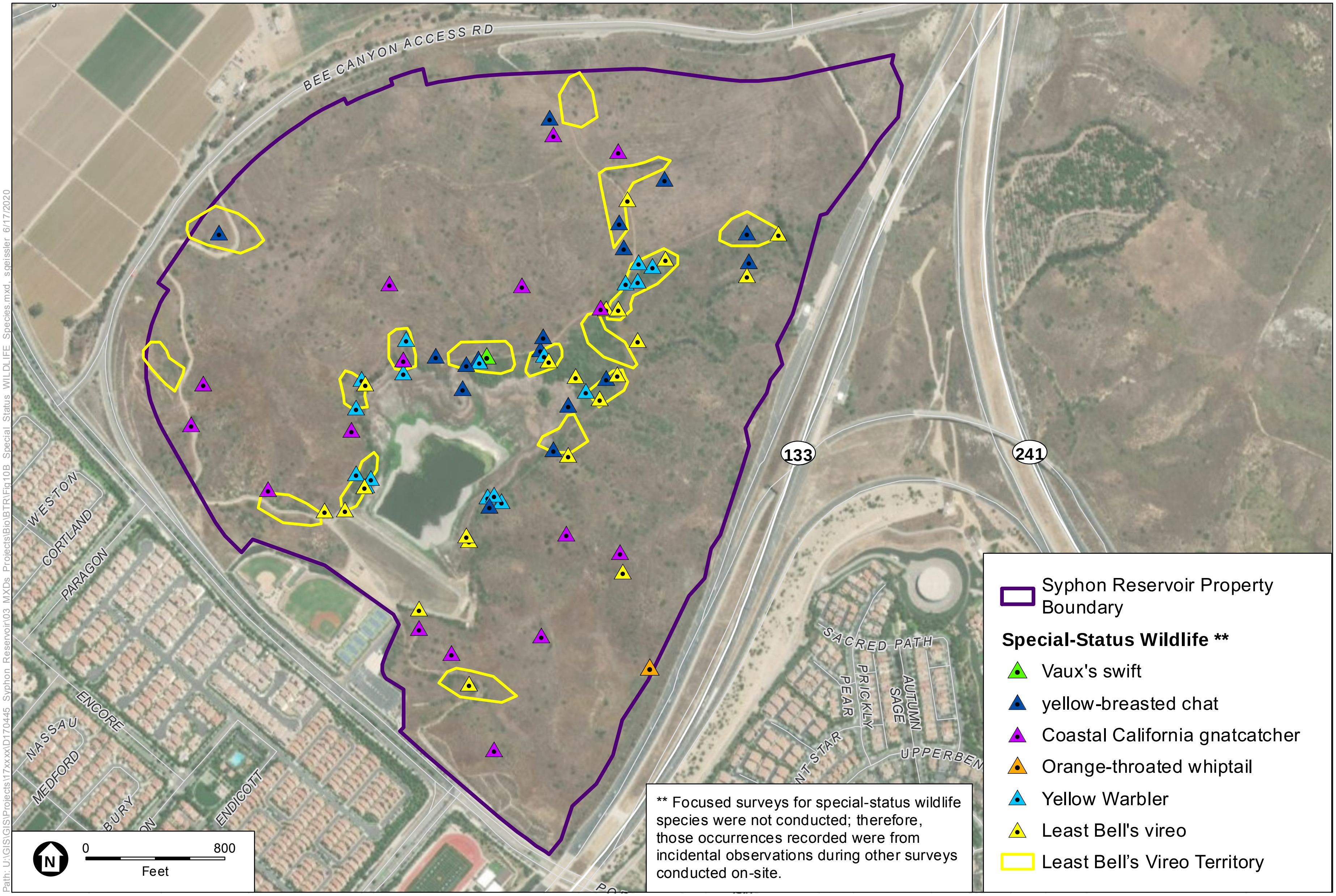


SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 10A
Special-Status Plant Species Observed
Within the Study Area in 2018 and 2019

ESA



Path: U:\GIS\GIS\Projects\17xxxx\D170445_Syphon_Reservoir\03_MXDs_Projects\Bio\BTR\Fig10B_Special_Status_WILDLIFE_Species.mxd, sgeissler 6/17/2020

SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 10B

Special-Status Wildlife Species Observed Within the Study Area in 2018 and 2019

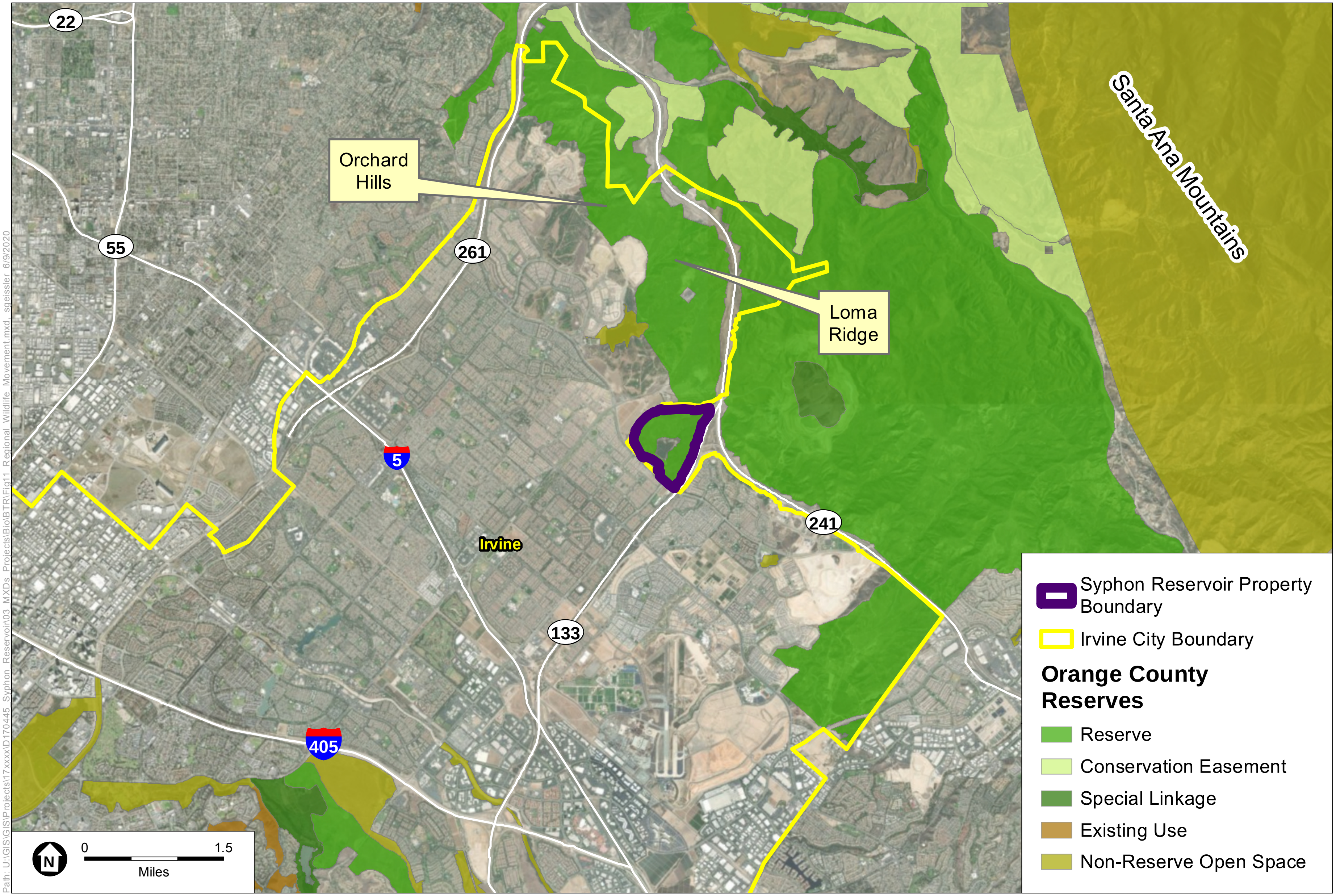
ESA

3.10 Wildlife Movement

Effective wildlife movement is essential for dispersal, genetic exchange, migration, foraging, and breeding. Wildlife movement corridors or habitat linkages are linear habitat features that connect blocks of habitat that are otherwise disconnected. Functional wildlife movement corridors are especially important in highly fragmented habitat, such as developed or agricultural areas. Wildlife movement corridors are generally used by terrestrial animals, although they may also be important for aquatic species, avian dispersal, and as avenues for genetic exchange in plants. On a regional scale, movement corridors can include bird flyways, such as wetland areas that provide essential habitat to be used as a stopover for several days during migration.

The study area lies within central Orange County between the City of Irvine and the foothills of the Santa Ana Mountains. The study area is not identified as a Missing Linkage in the *South Coast Missing Linkages* report (South Coast Wildlands 2008). However, the study area is identified as a Small Natural Area in the California Essential Habitat Connectivity Project (CEHC) (CalTrans and CDFG 2010). CEHC is a CDFW and California Department of Transportation (CalTrans) project that ran a statewide assessment of essential habitat connectivity using spatial analyses and modeling techniques to identify large remaining blocks of intact habitat or natural landscape and model linkages between them that need to be maintained, particularly as corridors for wildlife.

The study area is located within the Central Subregion of the County of Orange NCCP/HCP, and the majority is located within the NCCP/HCP Reserve (i.e., the central portion of the reservoir is excluded from the Reserve) (**Figure 11**). Although the study area is bordered by dense residential development to the southwest and southeast, as well as by the SR-133 and SR-241 and interchange to the east and northeast, it is contiguous to agricultural and undeveloped areas to the west along Loma Ridge in the Orchard Hills planning area. Additionally, the study area includes upland and riparian habitat that provides important resources for wildlife, such as foraging habitat, potential nesting and denning sites, and cover. Although terrestrial wildlife movement through the study area is extremely restricted to the northeast, east, or south, the study area lies at the southeastern limit of a larger contiguous block of habitat that may be used by local terrestrial wildlife movement and provides a small part of regional habitat connectivity for avian species (e.g., dispersal habitat for coastal California gnatcatcher within this region). The reservoir is also an important regional water source that attracts a number of avian species. Thus, from a regional perspective, the study area functions as a part of a wildlife movement corridor, particularly for avian species.



Path: U:\GIS\GIS\Projects\17xxxx\D170445_Syphon_Reservoir\03_MXDs_Projects\Bio\BTR\Fig11_Regional_Wildlife_Movement.mxd, sgeissler 6/9/2020

SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 11
Regional Wildlife Movement

ESA

On a local scale, the study area provides live-in habitat for a variety of invertebrate, fish, amphibian, reptile, bird, and mammal species, and movement habitat for invertebrate, reptile, bird, and mammal species. Immediately surrounding the study area, the City of Irvine is located to the south, and human activity and dense development within these residential and commercial areas do not provide suitable habitat or resources for most native wildlife, with the exception of a few wide-ranging species that are adapted to urban environments (e.g., raccoon, skunk, coyote, some birds). In addition, the SR-133 and Bee Canyon Landfill Access Road, which is frequented by trucks hauling trash to the landfill, are hazards to wildlife. However, the study area is undeveloped, contains natural habitats, and wildlife movement is not restricted within the study area or to and from other undeveloped and agricultural areas to the north with the exception of a chain-link fence around the perimeter of the property. Thus, although some wildlife movement (e.g., more secretive wildlife that require larger home ranges, such as mountain lion and deer) may be deterred by the human activity and development nearby, these barriers to movement (e.g., development and roads) would not preclude smaller wildlife that are better adapted to urbanized areas from moving through the study area or the surrounding region.

In summary, the study area supports live-in and movement habitat for species on a local scale, and likely functions to facilitate movement for a number of avian species on a regional scale.

4.0 Regulatory Framework

The following provides a general description of the applicable regulatory requirements for the proposed project, including federal, state, and local policies and guidelines.

4.1 Federal

4.1.1 Endangered Species Act (USC, Title 16, § 1531 through 1543)

The FESA and subsequent amendments provides for the conservation and protection of wildlife and plant species that are listed or proposed for listing as endangered or threatened species and the ecosystems upon which they depend. The FESA also provides statutory framework for the conservation and recovery of threatened and endangered species as well as for the conservation of designated critical habitat that USFWS determines is required for the survival and recovery of these listed species.

Section 7 of the FESA requires federal agencies, in consultation with and assistance from the Secretary of the Interior or the Secretary of Commerce, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. The USFWS and National Marine Fisheries Service (NMFS) share responsibilities for administering the FESA. Regulations governing interagency cooperation under Section 7 are found in CCR Title 50, Part 402. The opinion issued at the conclusion of consultation will include a statement authorizing “take” (to harass, harm, pursue, hunt, wound, kill, etc.) that may occur incidental to an otherwise legal activity. Although federal funding is not expected, if the proposed project were to receive federal funding the funding agency would be required to initiate a consultation with USFWS under Section 7. The consultation process would then lead to issuance of a Biological Opinion from USFWS. In most cases, a Biological Opinion addresses the proposed project's potential to result in "take" of listed species (as defined below), and includes mandatory conditions that would allow for limited incidental take to occur subject to prescribed conditions.

Section 9 lists those actions that are prohibited under the FESA. Although take of a listed species is prohibited, it is allowed when it is incidental to an otherwise legal activity. Section 9 prohibits take of listed species of fish, wildlife, and plants without special exemption. The definition of "harm" includes significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns related to breeding, feeding, or shelter. "Harass" is defined as actions that create the likelihood of injury to listed species by disrupting normal behavioral patterns related to breeding, feeding, and shelter significantly.

Section 10 provides a means whereby a non-federal action with the potential to result in take of a listed species can be allowed under an incidental take permit which may be issued once a HCP is approved. Application procedures are found at 50 CFR 13 and 17 for species under the jurisdiction of USFWS and 50 CFR 217, 220, and 222 for species under the jurisdiction of NMFS.

In addition, a local regulatory program established by the NCCP/HCP and associated governing documents provides for regional conservation of many species while also allowing limited impacts to biological resources in association with planned development. The NCCP/HCP establishes an alternative pathway to the Section 10 and Section 7 procedures by which local projects in the Plan Area may receive both State and federal incidental take authorization for species identified as "covered" and "conditionally covered", based on compliance with relevant conditions set forth in the plan. Further details about the regional NCCP/HCP and its provisions for incidental take coverage are discussed in Section 4.3.1 below.

4.1.2 Migratory Bird Treaty Act (16 USC 703 through 711)

The Migratory Bird Treaty Act (MBTA) is the domestic law that affirms, or implements, a commitment by the U.S. to four international conventions (with Canada, Mexico, Japan, and Russia) for the protection of a shared migratory bird resource. The MBTA makes it unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, or kill migratory birds. ''Migratory bird'' means any bird protected by any of the treaties and currently includes 1,027 bird species in the United States (50 CFR 10.13), regardless of whether the particular species actually migrates. The law also applies to the removal of nests occupied by migratory birds during the breeding season. The MBTA makes it unlawful to take, pursue, molest, or disturb these species, their nests, or their eggs anywhere in the United States.

4.1.3 Federal Clean Water Act (33 USC 1251 through 1376)

The USACE regulates "discharge of dredged or fill material" into "waters" of the United States, which includes tidal waters, interstate waters, and "all other waters, interstate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce or which are tributaries to waters subject to the ebb and flow of the tide" (33 C.F.R. 328.3(a)), pursuant to provisions of Section 404 of the CWA. The CWA also excludes certain features from this regulation, including "wastewater recycling facility constructed on dry land" (see 33 CFR §230.3 (o)(2)(vii)). Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not considered waters of the U.S. The USACE determination stated that they do not consider the site to contain waters of the U.S. (Appendix B).

4.1.4 Fish and Wildlife Conservation Act

The Fish and Wildlife Conservation Act declares that fish and wildlife are of ecological, educational, esthetic, cultural, recreational, economic, and scientific value to the United States. The purposes of this Act are to encourage all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities and to conserve and to promote conservation of non-game fish and wildlife and their habitats. Another purpose is to provide financial and technical assistance to the states for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife.

4.2 State

4.2.1 California Endangered Species Act (California Fish and Game Code § 2050 et seq.)

CESA establishes the policy of the state to conserve, protect, restore, and enhance threatened or endangered species and their habitats. CESA mandates that state agencies should not approve projects that would jeopardize the continued existence of threatened or endangered species if reasonable and prudent alternatives are available that would avoid jeopardy. There are no state agency consultation procedures under CESA. For projects that would affect a listed species under both CESA and FESA, compliance with FESA would satisfy CESA if CDFW determines that the federal incidental take authorization is "consistent" with CESA under California Fish and Game Code Section 2080.1. For projects that would result in take of a species listed under the CESA only, the project operator would have to apply for a take permit under Section 2081(b). Further details about the regional NCCP/HCP are discussed in Section 4.3.1 below.

4.2.2 California Fish and Game Code § 1600 et seq.

CDFW is responsible for protecting and conserving fish and wildlife resources, and the habitats upon which they depend. Under Section 1600 of the California Fish and Game Code, CDFW administers the Lake and Streambed Alteration (LSA) Program and regulates all substantial diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake (which typically include reservoirs), which supports fish or wildlife.

Applicants proposing changes to such regulated water resources must submit a Lake or Streambed Alteration Notification to CDFW for such projects. CDFW will then determine if the proposed activity may substantially adversely affect an existing fish or wildlife resource and will issue a final agreement for the applicant's signature that includes reasonable measures necessary to protect the resource. Preliminary notification to, and project review by CDFW may occur during or after the CEQA environmental review process but prior to project implementation.

4.2.3 California Fish and Game Code §§ 2080 and 2081

Section 2080 of the California Fish and Game Code states that "No person shall import into this state [California], export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the Commission [State Fish and Game Commission] determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, or the Native Plant Protection Act, or the California Desert Native Plants Act." Pursuant to Section 2081, CDFW may authorize individuals or public agencies to import, export, take, or possess state-listed endangered, threatened, or candidate species. These otherwise prohibited acts may be authorized through Incidental Take permits or Memoranda of Understanding if the take is incidental to an otherwise lawful activity, impacts of the authorized take are minimized and fully mitigated, the permit is consistent with any regulations adopted pursuant to any recovery plan for the species, and the project operator ensures adequate funding to implement the measures required by CDFW, which makes this determination based on available scientific information and considers the ability of the species to survive and reproduce.

Since the NCCP/HCP provides coverage for take of some State-listed species, there would not be a need for an additional 2081 permit process unless a project does not comply with NCCP/HCP requirements and may result in take of a State-listed species or if a State-listed species not covered by the NCCP/HCP were to result in take. Further details about the regional NCCP/HCP are discussed in Section 4.3.1 below.

4.2.4 California Fish and Game Code §§ 3503 and 3503.5

Under these sections of the California Fish and Game Code, the project operator is not allowed to conduct activities that would result in the taking, possessing, or destroying of any birds of prey; the taking or possessing of any migratory nongame bird as designated in the MBTA; the taking, possessing, or needlessly destroying of the nest or eggs of any raptors or nongame birds protected by the MBTA; or the taking of any nongame bird pursuant to California Fish and Game Code Section 3800.

4.2.5 California Environmental Quality Act Guidelines, § 15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines § 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in CEQA primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a candidate species that has not been listed by either USFWS or CDFW. Thus, CEQA provides an agency with the ability to protect a species from the potential impacts of a project until the respective government agencies have an opportunity to designate the species as protected, if warranted. CEQA also calls for the protection of other locally or regionally significant resources, including natural communities. Although natural communities do not at present have legal protection of any kind, CEQA calls for an assessment of whether any such resources would be affected and requires findings of significance if there would be substantial losses. Natural communities listed by CNDDB as sensitive are considered by CDFW to be significant resources and fall under the State CEQA Guidelines for addressing impacts. Local planning documents such as General Plans often identify these resources as well.

4.2.6 California Water Quality Control Act (Porter-Cologne California Water Code Section 13260)

The State Water Resources Control Board (SWRCB) and the RWQCB (together "Boards") are the principal State agencies with primary responsibility for the coordination and control of water quality. The Boards regulate activities pursuant to Section 401(a)(1) of the federal CWA as well as the Porter Cologne Water Quality Control Act (Porter-Cologne) (Water Code Section 13260). Section 401 of the CWA specifies that certification from the State is required for any applicant requesting a federal license or permit to conduct any activity including but not limited to the construction or operation of facilities that may result in any discharge into navigable waters. The certification shall originate from the State in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable water at the point where the discharge originates or will originate. Any such discharge will comply with the applicable provisions of Sections 301, 302, 303, 306, and 307 of the CWA.

In Porter-Cologne, the Legislature declared that the "State must be prepared to exercise its full power and jurisdiction to protect the quality of the waters in the State from degradation..." (California Water Code Section 13000). Porter-Cologne grants the Boards the authority to implement and enforce the water quality laws, regulations, policies and plans to protect the groundwater and surface waters of the State. It is important to note that enforcement of the State's water quality requirements is not solely the purview of the Boards and their staff. Other agencies (e.g., CDFW) have the ability to enforce certain water quality provisions in state law.

The State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (procedures), adopted by the State Water Resources Control Board on April 2, 2019, became effective May 28, 2020. Based on the procedures, artificial wetlands greater than or equal to one acre in size constructed for purposes of treatment, storage, or distribution of recycled water are not waters of the State unless specifically identified in a water quality control plan as a wetland or other water of the State. Since Syphon Reservoir is identified in the 1995 Water Quality Control Plan for the Santa Ana River Basin (most recently updated in June 2019; California Regional Water Quality Control Board 2019) as a water of the State, the wetlands would likely also be considered waters of the State.

4.3 Local

4.3.1 County of Orange Central & Coastal Subregion NCCP/HCP

In 1996, the Orange County Central & Coastal Subregion NCCP/HCP, a comprehensive natural resources conservation and management plan for central and coastal Orange County, was adopted. The purpose of the NCCP/HCP was to create a multiple-species and multiple-habitat reserve system and to implement a long-term conservation program on a subregional level to primarily protect coastal sage scrub and the species that use this habitat, while allowing for social and economic uses compatible with the protection of these resources.

The NCCP/HCP was prepared in cooperation with the UFSWS and CDFW, who are the agencies responsible for implementing the FESA and CESA, respectively. Implementation of the NCCP/HCP in accordance with the terms of the Implementation Agreement allows for the conservation of large, diverse areas of natural habitat, including habitat for the coastal California gnatcatcher and other federally-listed species; provides for the conservation, protection, and management of three “Target Species” and 36 “Identified Species” and their habitats; and satisfies federal and state mitigation requirements for designated development.

IRWD and the County of Orange, among others, are participating landowners of the Central & Coastal NCCP/HCP. As a participating landowner that contributed significant funding toward land acquisition, management, and the implementation of the NCCP/HCP Reserve System, IRWD was allotted 60 acres of Incidental Take Credits from within the NCCP/HCP Reserve and 27 acres of Incidental Take Credits outside of the NCCP/HCP Reserve (i.e., non-Reserve lands) for impacts to coastal sage scrub communities (Dudek 2012). An additional 9 acres of Incidental Take Credits from within the NCCP/HCP Reserve were acquired through IRWD’s consolidation with Santiago County Water District (SCWD). For participating landowners, development activities and uses that are addressed by the NCCP/HCP are considered fully mitigated under the NCCP Act, FESA, and CESA for impacts to habitat occupied by listed and other species “identified” by the NCCH/HCP and Implementation Agreement. Satisfactory implementation of the NCCP/HCP under the terms of the Implementation Agreement means that no additional mitigation is required of the participating landowners for impacts to “identified” species and their habitat, or for species residing in specified non-coastal sage scrub habitats, or covered habitats.

The NCCP/HCP included provisions for IRWD to build a future reservoir “as a permitted use within the Reserve System” (R.J. Meade Consulting 1996a). At the time that the NCCP/HCP was prepared, IRWD was considering four alternative locations (including the Syphon Reservoir site) for seasonal recycled water storage reservoirs, all of which were located within the subregional Reserve System, though only one reservoir would ultimately be needed. The need for a future reservoir was identified as “a permitted use within the Reserve System in the event that public health, safety, and welfare require such a facility in the future. At the time such a facility is needed, IRWD will review the plans with appropriate agencies and propose a specific mitigation plan or pay fees adequate to mitigate the Incidental Take associated with the new reservoir” (R.J. Meade Consulting 1996a).

5.0 Potential Effects

This section describes the potential effects of the proposed project (Figures 3A, 3B, and 3C) on biological resources that may occur as a result of project implementation, including net ecological benefits. Direct, indirect, temporary, and/or permanent effects to biological resources may occur as a result of project implementation, as defined below:

- **Direct Effects:** Any alteration, disturbance, or destruction of biological resources that would result from project-related activities is considered a direct effect. Examples include loss of individual species and/or their associated plant communities, diversion of surface water flows, and encroachment into wetlands. Under FESA, direct effects are defined as the immediate effects of a project on a species or its habitat, including construction noise disturbance, sedimentation, or habitat loss.
- **Indirect Effects:** Biological resources may also be affected in an indirect manner as a result of project-related activities. Under FESA, indirect effects are defined as those effects that are caused by, or would result from, a proposed project but occur later in time and are reasonably certain to occur [50 C.F.R. §402-02]. An example of indirect effects may include irrigation runoff from a developed area into surrounding natural vegetation. Indirect effects could also include increased wildfire frequency as a result of power line failures.
- **Temporary Effects:** Any effects to biological resources that are considered reversible can be viewed as temporary. Examples include the generation of fugitive dust during construction activities.
- **Permanent Effects:** All effects that result in the irreversible removal of biological resources are considered permanent. Examples include constructing a building or permanent road on an area with native vegetation, such that the native vegetation is permanently removed and replaced with a developed structure.

A project is generally considered to have a significant effect if it proposes or results in any of the effects or conditions described in the significance thresholds discussed below (in italics), absent specific evidence to the contrary. Conversely, if a project does not propose or result in any of the following effects or conditions, it would generally not be considered to have a significant effect on biological resources, absent specific evidence of such an effect. These significance thresholds are taken from Appendix G of the State CEQA Guidelines.

5.1 Special-Status Species

5.1.1 Significance Threshold

The project would have an adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

5.1.2 Analysis of Project Effects

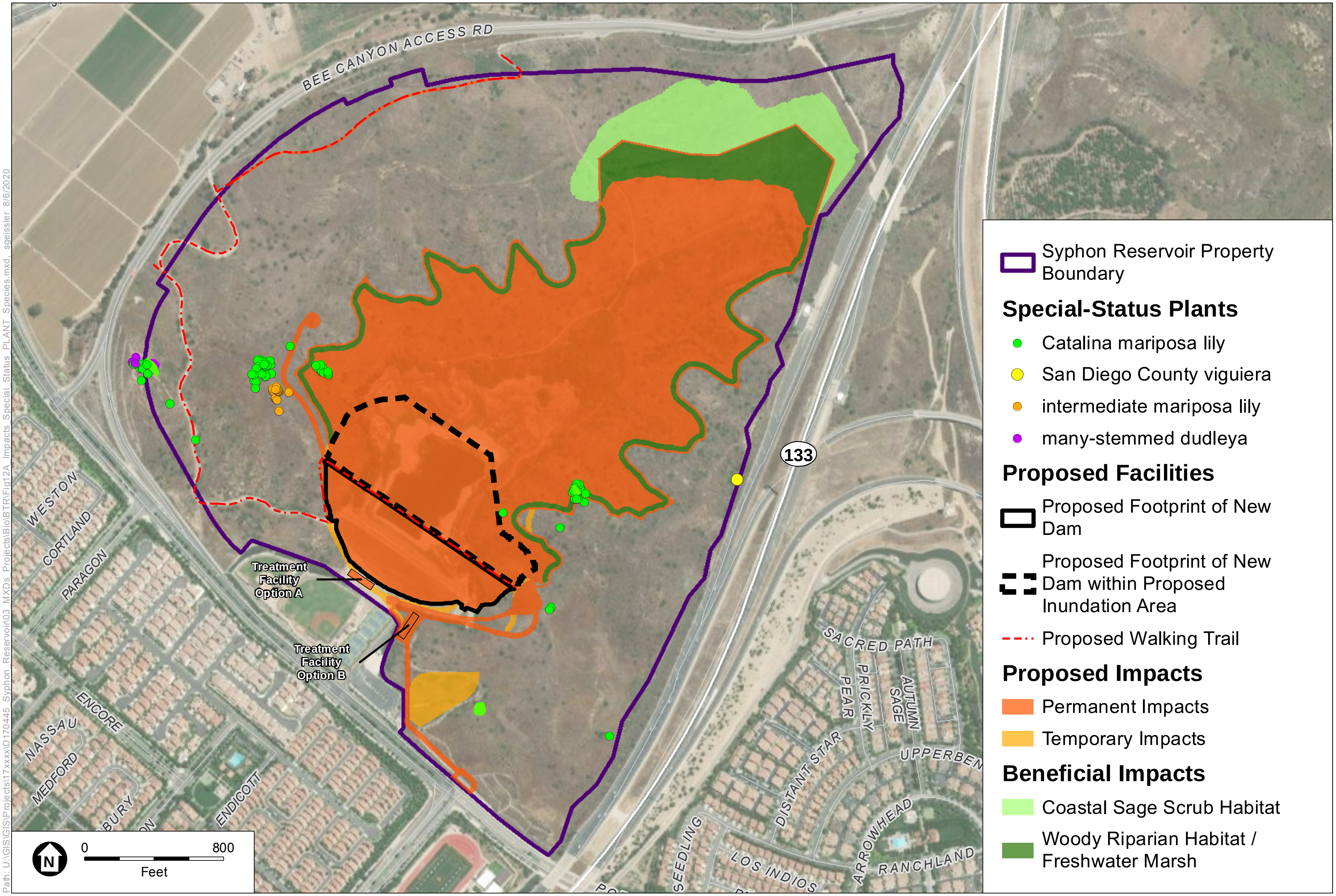
5.1.2.1 Special-Status Plant Species

Four special-status plant species, Catalina mariposa lily (CRPR 4.2, NCCP/HCP Covered), intermediate mariposa lily (CRPR 1B.2), multi-stemmed dudleya (CRPR 1B.2), and San Diego County viguiera (CRPR 4.3), were observed within the study area during focused surveys in 2018 and 2019. The proposed project will avoid removal or damage to any specimens of intermediate mariposa lily, multi-stemmed dudleya, and San Diego County viguiera. Therefore, the proposed project would not impact these special-status plant species, and no mitigation is required.

The proposed project will avoid more than 90 percent of the Catalina mariposa lily specimens identified on-site, and would remove approximately 24 of the total 309 Catalina mariposa lily individuals during construction (shown in **Figure 12A**). The number affected comprises less than 8 percent of the total population on-site. Impacts to 24 individuals is not considered a substantial loss for this species which is known to occur over a wide area in southern California. This loss would not threaten the existence of the on-site population, and would not be significant. Moreover, Catalina mariposa lily is a covered species under the NCCP/HCP provided that the proposed project complies with the NCCP/HCP provisions, and thus this species is considered conserved since the NCCP/HCP Reserve provides for the regional conservation for this and other covered species. Although the majority of the study area is within the NCCP/HCP Reserve and potential impacts to any Catalina mariposa lily would occur within the Reserve, at the time that the NCCP/HCP was prepared the NCCP/HCP included provisions for IRWD to build a future reservoir, and the proposed project is “a permitted use within the Reserve System” (R.J. Meade Consulting 1996a). Thus, even with potential impacts to this species within the Reserve, this species is considered adequately covered under the NCCP/HCP. Therefore, impacts to Catalina mariposa lily are less than significant, and no mitigation is required.

5.1.2.2 Special-Status Wildlife Species

Special-status wildlife species observed, or considered to have a moderate or high potential to occur within the study area, include the following NCCP/HCP Covered Species: coastal California gnatcatcher, orange-throated whiptail, southern California rufous-crowned sparrow, red-shouldered hawk, northern harrier, American peregrine falcon, sharp-shinned hawk, coastal whiptail, San Diego desert woodrat, and coyote. Two species that are Conditionally Covered under the NCCP/HCP, least Bell’s vireo and prairie falcon, were also observed. Several other species that are not “covered species” under the NCCP/HCP were also identified, including yellow warbler, yellow-breasted chat, grasshopper sparrow, Vaux’s swift, and the California fully protected white-tailed kite. It should be noted that the two falcons and Vaux’s swift may fly over the site but have virtually no potential to nest on site. Likewise, white-tailed kite has only been observed foraging or flying over but is not known to nest in the study area. Locations where special-status wildlife species were observed in the study area in 2018 and 2019 are shown in **Figure 12B**.



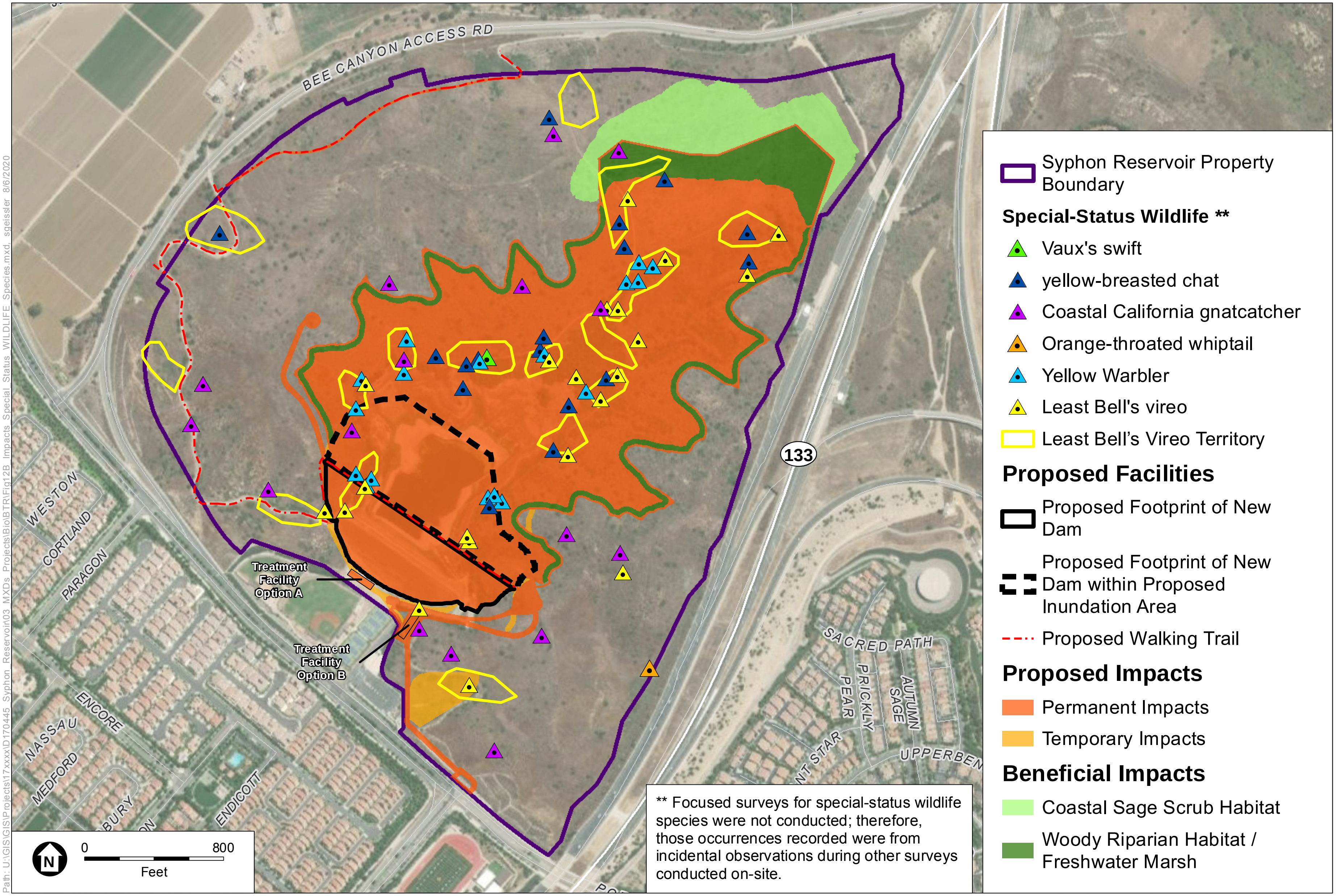
SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 12A

Impacts to Special-Status Plant Species Observed Within the Study Area in 2018 and 2019

ESA



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 12B
Impacts to Special-Status Wildlife Species Observed Within the Study Area in 2018 and 2019

ESA

The coastal California gnatcatcher, orange-throated whiptail, southern California rufous-crowned sparrow, red-shouldered hawk, northern harrier, prairie falcon,[5] American peregrine falcon, sharp-shinned hawk, coastal whiptail, San Diego desert woodrat, and coyote, as covered species under the NCCP/HCP, are considered to be conserved within the NCCP/HCP region provided that the project complies with the NCCP/HCP provisions. As previously mentioned, although the majority of the study area is within the NCCP/HCP Reserve and potential impacts to NCCP/HCP Covered Species may occur within the Reserve, the NCCP/HCP included provisions for IRWD to build a future reservoir.

As a future infrastructure improvement that was originally recognized by the NCCP/HCP and for which IRWD has a credit allotment that can be "spent" or exchanged for the displacement of areas within the NCCP Reserve, the proposed project is considered a permitted use within the Reserve System. Potential impacts to Covered Species within the Reserve are considered adequately covered under the NCCP/HCP provided that the proposed project complies with relevant and applicable NCCP/HCP provisions. The proposed project would permanently impact a total of 28.37 acres (with Treatment Facility Option A[6])/28.49 acres (with Treatment Facility Option B) of coastal sage scrub communities.[7] The proposed project would temporarily impact 0.85 acre of California sagebrush scrub. Implementation of mitigation measure MM BIO-1 (to spend allotted Incidental Take Credits for participating landowners), MM BIO-2, and MM BIO-3, prescribed in Section 6.0 below, would reduce impacts to a less than significant level.

The least Bell's vireo is federal and state Endangered and is a Conditionally Covered species under the NCCP/HCP. This species is found in riparian habitat, and 17 least Bell's vireo individuals and/or territories were observed on-site in 2019 (point locations and territories are shown in Figure 12B). The proposed reservoir improvement project will include dam replacement, reservoir enlargement, and the installation of an on-site riparian and upland habitat area around the perimeter of the reservoir. The proposed project would displace approximately 6.41 acres of woody riparian communities (including 0.09 acre of arroyo willow thicket, 4.07 acres of black willow thicket, and 2.25 acres of mule fat scrub). However, the proposed project would also create at least 6.58 acres of on-site woody riparian habitat that would provide replacement nesting habitat for the least Bell's vireo and will also create up to approximately 5.88 acres consisting of additional on-site woody riparian vegetation and/or freshwater marsh habitat that would replace the other wetland habitat values impacted by construction. The new riparian and wetland habitat areas will be maintained with supplemental irrigation and will not depend on

5 Prairie falcon is a conditionally covered under the NCCP/HCP. Planned activities are authorized if the habitat is more than one-half mile from an active or historically active nesting site, and this species is currently not known to nest within Orange County, and have not occurred within the county for over a decade (CDFW 2020, Catino-Davenport 2019).

6 Indicates impact acreages for Treatment Facility Option A/Option B. The potential locations of the treatment facilities, which would be determined during detailed design, are depicted in Figure 12B (labeled as Treatment Facility Option A and Option B). Only one treatment facility in one of the optional locations will be built-out as part of the proposed project.

7 This total includes 26.37 acres (Treatment Facility Option A)/26.49 acres (Treatment Facility Option B) of California sagebrush scrub, 0.98 acre of California sagebrush scrub/non-native herbaceous cover, 0.06 acre of chaparral bushmallow scrub/non-native herbaceous cover, 0.19 acre of chaparral bushmallow scrub, and 0.77 acre of coyote brush scrub.

the reservoir being full or nearly full to be sustained. Woody riparian and freshwater marsh habitats around the larger reservoir perimeter, once established will provide both foraging and nesting opportunities that would benefit least Bell's vireo and other species.

Ultimately, there will be no net loss of woody riparian habitat for least Bell's vireo, and no net loss of any wetland habitat, with the creation of both riparian and wetland habitat areas on-site as part of the proposed project. IRWD is engaged with the Wildlife Agencies and is collaboratively developing a comprehensive program to address potential impacts to least Bell's vireo. Based on provision of acceptable mitigation, the Wildlife Agencies have indicated that the NCCP/HCP conditional coverage will apply for the proposed project's impacts to least Bell's vireo.[8] Nevertheless, there will be a temporary loss of these habitats until construction is completed and riparian habitat can be reestablished that the species can use again. This temporary loss would be potentially significant in terms of the temporary reduction to the amount of habitat available in the local region. Implementation of mitigation measures MM BIO-3 and MM BIO-4, prescribed in Section 6.0 below, would reduce impacts to a less than significant level.

The yellow warbler, yellow-breasted chat, and grasshopper sparrow are species of special concern, Vaux's swift, and white-tailed kite is a state fully protected species. The yellow warbler and yellow-breasted chat occur within the riparian habitat on-site; the grasshopper sparrow favors native grasslands on rolling hills with a mix of grasses, forbs, and scattered shrubs; Vaux's swift inhabits redwood and Douglas-fir habitat in northern California and the Sierra Nevada; and the white-tailed kite prefers grasslands, meadows, or marshes for foraging next to deciduous woodland with dense-topped trees for nesting and perching. Since Vaux's swift was observed flying over and likely a migrant that is not expected to nest on-site, it is not discussed further in this analysis.

For yellow warbler and yellow-breasted chat, which utilize woody riparian habitat similar to the least Bell's vireo, several of each species were observed on-site in 2019. The locations of yellow warbler and yellow-breasted chat observed within the study area are shown in Figure 12B; many of these are multiple point locations of the same individual taken on multiple dates, but based on the clustering of point locations, there are likely eight yellow warbler territories and nine yellow-breasted chat territories. The proposed project would have both impacts and benefits to the riparian and marsh habitat that supports these special-status species. As stated above, the proposed project would permanently impact 12.28 acres of woody riparian (6.37 acres) and freshwater marsh communities (5.88 acres). However, the proposed project would also create at least 6.58 acres of on-site woody riparian and will also provide approximately 5.88 acres of on-site woody riparian and/or freshwater marsh habitat that would be maintained to consistently provide habitat year-round. Construction of the larger reservoir would also expand the open water areas that may be used for foraging, which would also be a benefit to these and other species. As noted previously, although there will ultimately be no net loss of riparian habitat for these special-status species with the creation of riparian habitat areas on-site, the temporal loss of habitat for

8 This determination was made over the course of extensive discussions between IRWD, ESA, and the Wildlife Agencies, which considered multiple factors to arrive at this determination, including but not limited to IRWD being a Participating Landowner, Syphon Reservoir being a man-made waterbody sustained by an artificial water source, consideration of least Bell's vireo population distribution within the NCCP/HCP plan area, and because impacts will be temporary as riparian habitat will be replaced on-site.

yellow warbler and yellow-breasted chat may be considered potentially significant as it would reduce the amount of available habitat for these species in the local region until an equivalent habitat area is reestablished. Implementation of mitigation measures MM BIO-3 and MM BIO-4, prescribed in Section 6.0 below, would reduce impacts to a less than significant level.

Grasshopper sparrow was previously observed on-site; however, there are no recent records or observations of this species during the numerous surveys conducted in 2018 and 2019. For grasshopper sparrow, which favors native grasslands with a mix of grasses, forbs, and scattered shrubs, the proposed project will impact 2.53 acres of non-native grassland but will avoid 2.74 acres. In addition, the proposed project will impact 27.25 acres of non-native herbaceous cover and 28.18 acres of non-native herbaceous cover/California sage scrub, but avoid 67.31 acres of mixed grass and forblands with scattered shrubs (16.91 acres of non-native herbaceous cover, 43.52 acres of non-native herbaceous cover/California sagebrush scrub, and 6.88 acres California sagebrush scrub/non-native herbaceous cover) that would remain available to this species within the approximately 265-acre study area. Given the potentially suitable habitat acreage that will be avoided by the proposed project, as well as natural areas within the surrounding vicinity, the limited potential impacts to foraging and/or nesting habitat for this species if still present on-site is not expected to threaten regional populations.

White-tailed kite was previously observed on-site; however, there were no recent records or observations of this species during the numerous surveys conducted in 2018 and 2019 and this species has not been documented to nest on-site. For white-tailed kite, which uses grasslands and marshes for foraging and isolated, dense-topped trees for nesting, the proposed project would impact 2.53 acres of non-native grassland, 5.87 acres of freshwater marsh, 0.09 acre of arroyo willow thicket, 4.07 acres of black willow thicket, and 2.67 acres of eucalyptus woodland. The proposed project would avoid 2.74 acres of non-native grassland, 0.15 acre of arroyo willow thicket, 0.06 acres of black willow thicket, and 0.11 acre of eucalyptus woodland, which would provide habitat for this species if still present on-site, as well as natural areas within the surrounding vicinity; thus, potential impacts to foraging and/or nesting habitat for these species are not expected to threaten regional populations. The proposed project would also create at least 6.58 acres of riparian woodland and an additional 5.88 acres of woody riparian and/or freshwater marsh wetland habitat.

Direct impacts to avian species during the non-breeding season would not be potentially significant as these species are mobile and would be expected to fly away from the construction area, if present. However, if construction and maintenance work cannot be scheduled outside of nesting season, impacts to nesting special-status bird species would be potentially significant. Implementation of mitigation measure MM BIO-3, prescribed in Section 6.0 below, would reduce impacts to a less than significant level.

In addition, a walking trail is proposed to be made available for passive recreation along the south and western sides of the study area. The trail will begin at the new permanent access road at Portola Parkway and Sand Canyon Avenue and traveling along that route, then across the dam crest. A large portion of the walking trail will then follow the existing dirt access road along the Highline Canal alignment, and an additional extension is being considered to continue northeast past the

Highline Canal to a northern access road. The proposed walking trail traverses through coastal sage scrub and disturbed coastal sage scrub communities. Three least Bell's vireo territories, three California gnatcatcher occurrences, and one yellow-breasted chat occurrence were observed during 2019 surveys along habitat areas immediately adjacent to the existing Highline Canal and the associated dirt access road. No special-status wildlife species were observed along the alignment of the portion of the proposed trail from the existing Highline Canal along the northwestern boundary of the study area to a northern access road. However, this area also contains coastal sage scrub and disturbed coastal sage scrub communities and, although not directly along the alignment, one least Bell's vireo territory, one California gnatcatcher occurrence, and one yellow-breasted chat occurrence were observed in the vicinity of the northern extent of the proposed walking trail during 2019 surveys. The property is currently closed to public use, so opening a walking trail would increase human use of the area. Noise from pedestrian use would be relatively minimal, and the northwestern boundary of the study area is already subject to considerable noise from truck traffic on the adjacent Bee Canyon Access Road. Nevertheless, pedestrians on the trail could indirectly impact special-status wildlife species and such impacts may occasionally be potentially significant. Implementation of mitigation measure MM BIO-5, prescribed in Section 6.0 below, would reduce impacts to a less than significant level.

Maintenance of the created riparian and upland habitat areas around the perimeter at the maximum fill level is expected to continue for up to 5 years after construction is complete for the proposed habitat areas to meet success criteria and provide good quality wildlife habitat. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The riparian and upland habitat areas would be irrigated as needed from a main supply line installed around the perimeter of the reservoir that connects to the reservoir water source. When maintenance of the riparian and upland habitat areas involves vegetation removal (e.g., weeding) and cannot be scheduled outside of nesting season, such work could impact nesting special-status bird species, which could be potentially significant. Implementation of Mitigation Measure BIO-3, prescribed in Section 6.0 below, would reduce impacts to a less than significant level.

It is anticipated that a strip of opportunistic herbaceous vegetation and some woody riparian species may develop intermittently just below the reservoir's upper inundation limit during periods when the reservoir is not full. If a fringe of incidental vegetation occasionally arises during periods when the reservoir is partly drained, such intermittent vegetation would be purely incidental and would not be associated with the proposed riparian woodland and freshwater marsh that are intended to be established around the perimeter of the reservoir. Any temporary habitat values provided by adventive vegetation below the "rim" of the filled reservoir would not be subject to protection or maintenance and are expected to be very short-lived since soils would not be expected to retain sufficient moisture for extended periods when the water level drops. Also, adventive vegetation below the upper fill level would disappear whenever the reservoir is completely refilled. As any vegetation that may develop around the fringe of the reservoir would not be maintained and is not expected to persist since soils will dry out quickly, it is not likely that such vegetation would provide suitable habitat for special-status species. However, it is possible that special-status birds, such as least Bell's vireo, yellow warbler, or yellow-breasted chat, could use such incidental fringe vegetation. Due to its operational requirements, it will not be practical, and IRWD will be under no obligation, to manage or protect such areas, and removal of such vegetation to avoid creating potential nesting habitat will not be considered a "new" impact as this area is not meant to be vegetated and should not provide potentially suitable nesting habitat that, if occupied, might interfere with operational requirements.

IRWD's operations and maintenance of the expanded Syphon Reservoir may not be construed to result in a "take" of a listed species. Rather, any incidental vegetation that may be allowed to develop briefly during drawdown of the reservoir would be considered to be an unintended indirect benefit to special-status wildlife species.

With implementation of Mitigation Measures MM BIO-1, MM BIO-2, MM BIO-3, MM BIO-4, and MM BIO-5, impacts to special-status species would be less than significant.

5.2 Riparian Habitat or Sensitive Natural Communities

5.2.1 Significance Threshold

The project would not have a substantial adverse effect on riparian habitat or other sensitive natural communities identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

5.2.2 Analysis of Project Effects

Table 3 summarizes the permanent and temporary impacts on natural communities from the proposed project (shown in **Figure 13**). Ten sensitive natural communities occur within the study area: arroyo willow thicket, black willow thicket, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/coyote brush scrub, chaparral bushmallow scrub/non-native herbaceous cover, California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coast prickly pear scrub, and non-native herbaceous cover/California sagebrush scrub (shown in **Figure 14**).

The proposed project would permanently impact 61.56 acres (with Treatment Facility Option A[9])/61.68 acres (with Treatment Facility Option B) acres of sensitive natural communities, including 0.09 acre of arroyo willow thicket, 4.07 acres of black willow thicket, 0.77 acre of coyote brush scrub, 0.19 acre of chaparral bushmallow scrub, 0.06 acre of chaparral bushmallow scrub/non-native herbaceous cover, 27.22 acres (with Option A)/27.34 acres (with Option B) of California sagebrush scrub, 0.98 acre of California sagebrush scrub/non-native herbaceous cover, and 28.18 acres of non-native herbaceous cover/California sagebrush scrub. The proposed project would temporarily impact 0.85 acre of California sagebrush scrub. The proposed project would avoid 121.37 acres (with Option A)/121.25 acres (with Option B) of sensitive natural communities (including 0.15 acre of arroyo willow thicket, 0.06 acre of black willow thicket, 0.14 acre of coyote brush scrub, 0.26 acre of chaparral bushmallow scrub, all 0.49 acre of

[9] The potential locations of the treatment facilities, which would be determined during detailed design, are depicted in Figures 13 and 14 (labeled as Treatment Facility Option A and Option B). Only one treatment facility in one of the optional locations will be built-out as part of the proposed project.

chaparral bushmallow scrub/coyote brush scrub, 4.66 acres of chaparral bushmallow scrub/non-native herbaceous cover, 64.52 acres [with Option A]/64.40 acres [with Option B] of California sagebrush scrub, 6.88 acres of California sagebrush scrub/non-native herbaceous cover, all 0.69 acre of coast prickly pear scrub, and 43.52 acres of non-native herbaceous cover/California sagebrush scrub within the study area.

TABLE 3
IMPACTS TO NATURAL COMMUNITIES

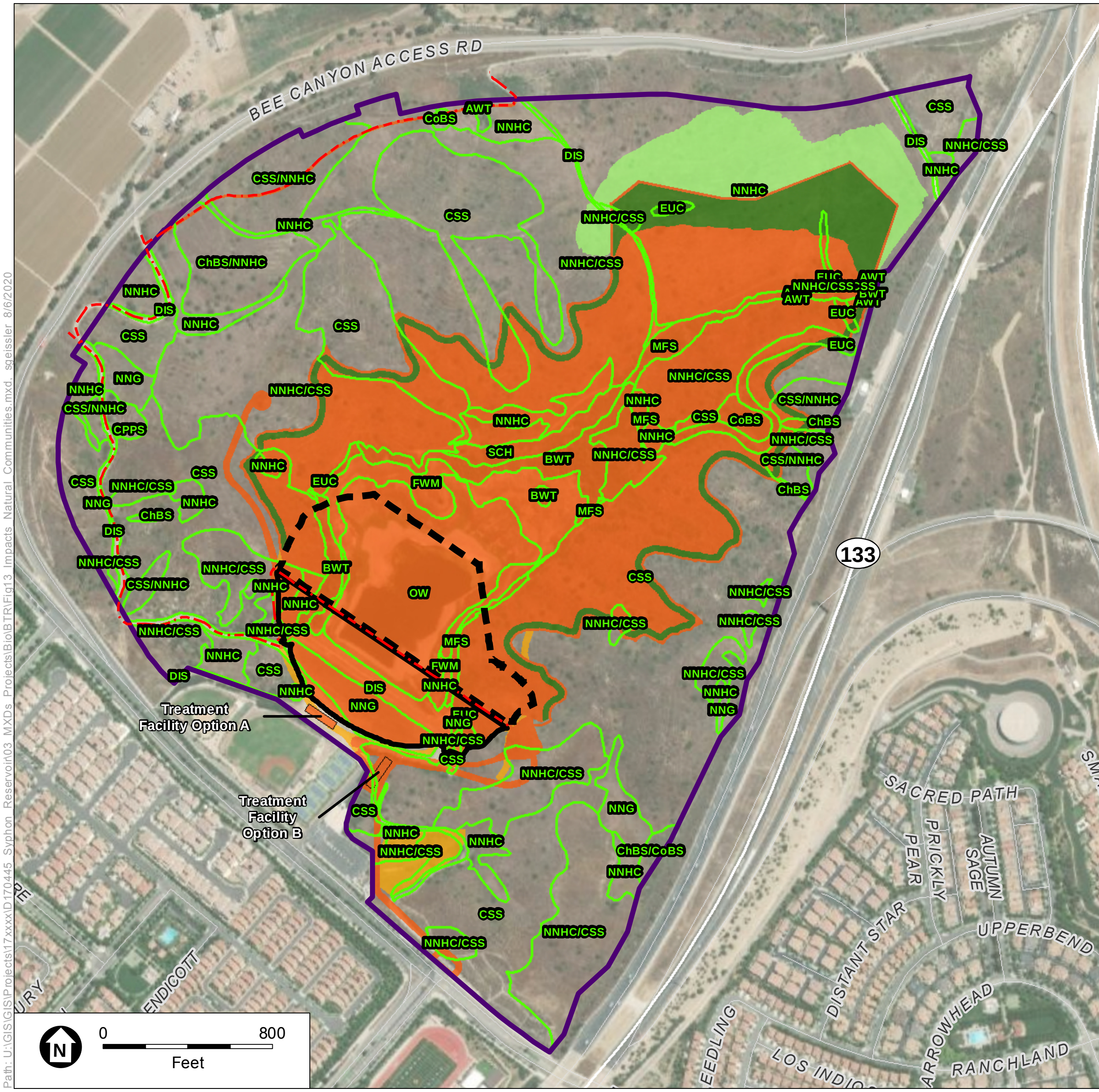
Natural Community	Existing (Acres)	Permanent Impacts (Acres)	Permanent Beneficial Impacts*** (Acres)	Temporary Impacts (Acres)	Total Impacts (Acres)	Avoided (Acres)
Riparian Communities						
Arroyo Willow Thicket*	0.24	0.07	0.02	-	0.09	0.15
Black Willow Thicket*	4.13	4.06	0.01	-	4.07	0.06
Mule Fat Scrub	2.25	2.23	0.02	-	2.25	-
Freshwater Marsh	5.87	5.87	-	-	5.87	-
Native Upland Communities						
Coyote Brush Scrub**	0.91	0.77	-	-	0.77	0.14
Chaparral Bushmallow Scrub**	0.45	0.14	0.05	-	0.19	0.26
Chaparral Bushmallow Scrub/Coyote Brush Scrub**	0.49	-	-	-	-	0.49
Chaparral Bushmallow Scrub/Non-Native Herbaceous Cover**	4.72	0.06	-	-	0.06	4.66
Sumac Chaparral	1.63	1.63	-	-	1.63	-
California Sagebrush Scrub**	91.74	23.22/23.34****	3.15	0.85	27.22/27.34****	64.52/64.40****
California Sagebrush Scrub**/Non-Native Herbaceous Cover	7.86	0.70	0.28	-	0.98	6.88
Coast Prickly Pear Scrub*	0.69	-	-	-	-	0.69
Non-Native Upland Communities						
Eucalyptus Woodland	2.78	2.32	0.37	-	2.67	0.11
Non-Native Grassland	5.27	2.46	-	0.07	2.53	2.74
Non-Native Herbaceous Cover	44.16	10.98	15.89	0.38	27.25	16.91
Non-Native Herbaceous Cover/California Sagebrush Scrub**	71.70	24.14	3.07	0.97	28.18	43.52
Unvegetated Areas						
Open Water	13.93	13.93	-	-	13.93	-
Disturbed	6.92	3.26/3.14****	0.05	0.43	3.74/3.62****	3.18/3.30****
Total	**265.74**	**95.84**	**22.91**	**2.70**	**121.43**	**144.31**

* Asterisk indicates that an alliance/association is considered sensitive by CDFW.

** Double asterisk indicates that an alliance/association that is a covered habitat type under the NCCP/HCP and is therefore considered a sensitive natural community.

*** Although these areas will be permanently impacted by the proposed project, they will be replaced by the creation of riparian and upland habitat areas on-site, which in some cases may have an equivalent or beneficial effect.

**** Indicates impact acreages for Option A/Option B, which were calculated for the Proposed Filter/Chlorination/De-chlorination Facility Option A or Option B. Only one option will be selected.



Syphon Reservoir Property Boundary

Natural Communities

Riparian Communities

- AWT - Arroyo Willow
- BWT - Black Willow Thicket
- MFS - Mule Fat Scrub
- FWM - Freshwater Marsh

Native Upland Communities

- CoBS - Coyote Brush Scrub
- ChBS - Chaparral Bushmallow Scrub
- ChBS/CoBS - Chaparral Bushmallow Scrub / Coyote Brush Scrub
- ChBS/NNHC - Chaparral Bushmallow Scrub / Non-Native Herbaceous Cover
- SCH - Sumac Chaparral
- CSS - California Sagebrush Scrub
- CSS/NNHC - California Sagebrush Scrub / Non-Native Herbaceous Cover
- CPPS - Coast Prickly Pear Scrub

Non-Native Upland Communities

- EUC - Eucalyptus Woodland
- NNG - Non-Native Grassland
- NNHC - Non-Native Herbaceous Cover
- NNHC/CSS - Non-Native Herbaceous Cover / California Sagebrush Scrub

Unvegetated Areas

- DIS - Disturbed
- OW - Open Water

Proposed Facilities

- Proposed Footprint of New Dam
- Proposed Footprint of New Dam within Proposed Inundation Area
- Proposed Walking Trail

Proposed Impacts

- Permanent Impacts
- Temporary Impacts

Beneficial Impacts

- Coastal Sage Scrub Habitat
- Woody Riparian Habitat / Freshwater Marsh

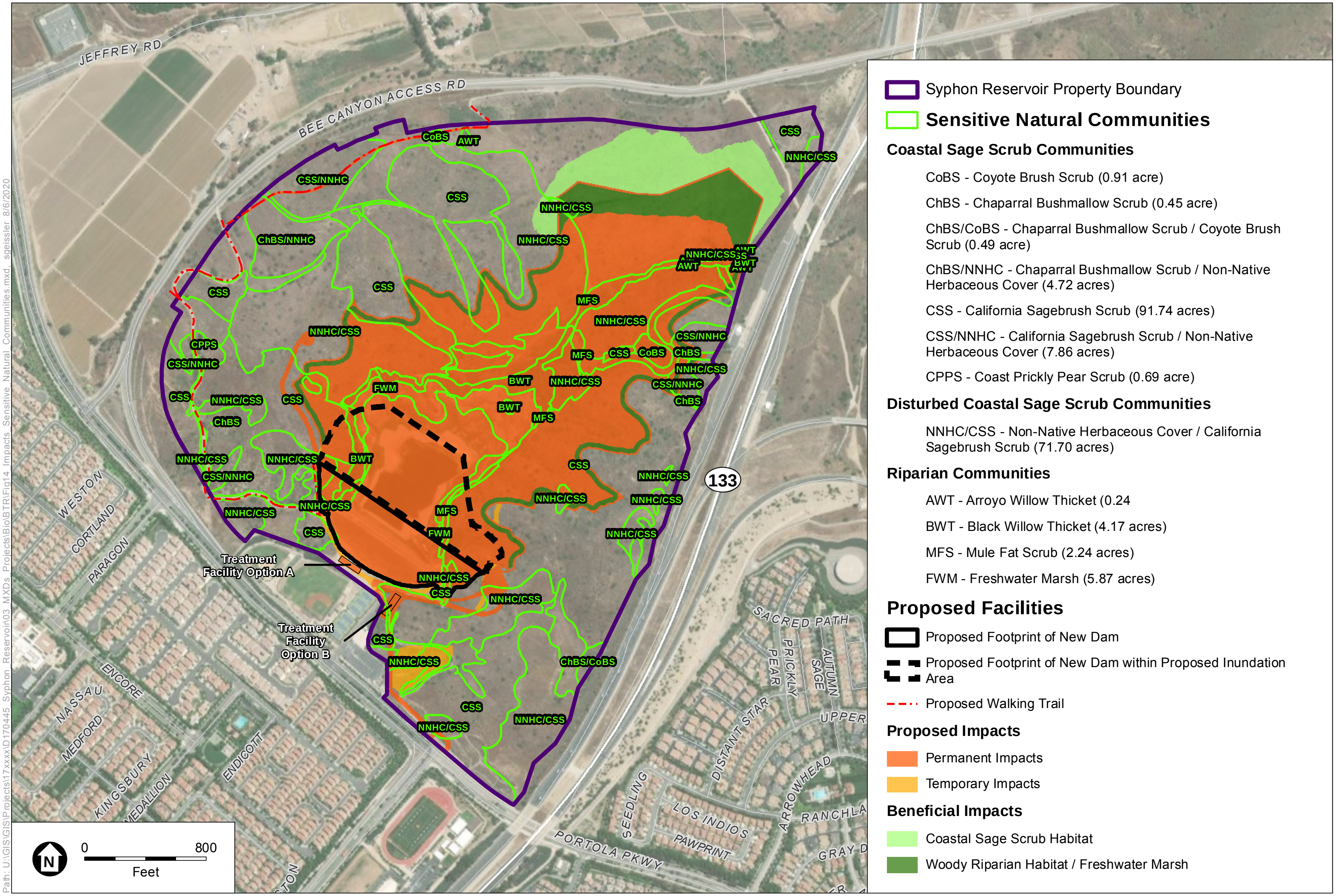
SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 13

Impacts to Natural Communities

ESA

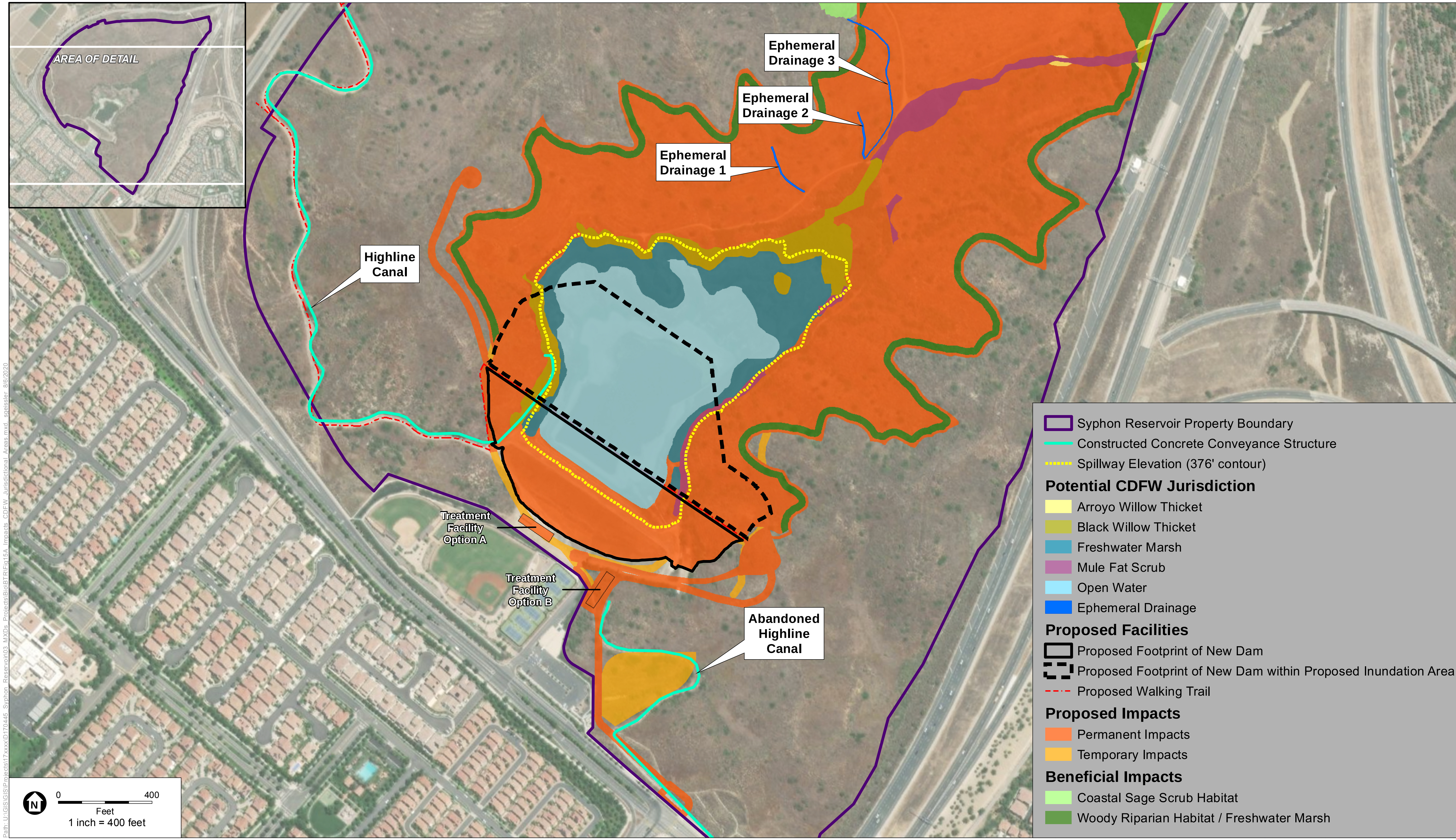


SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 14

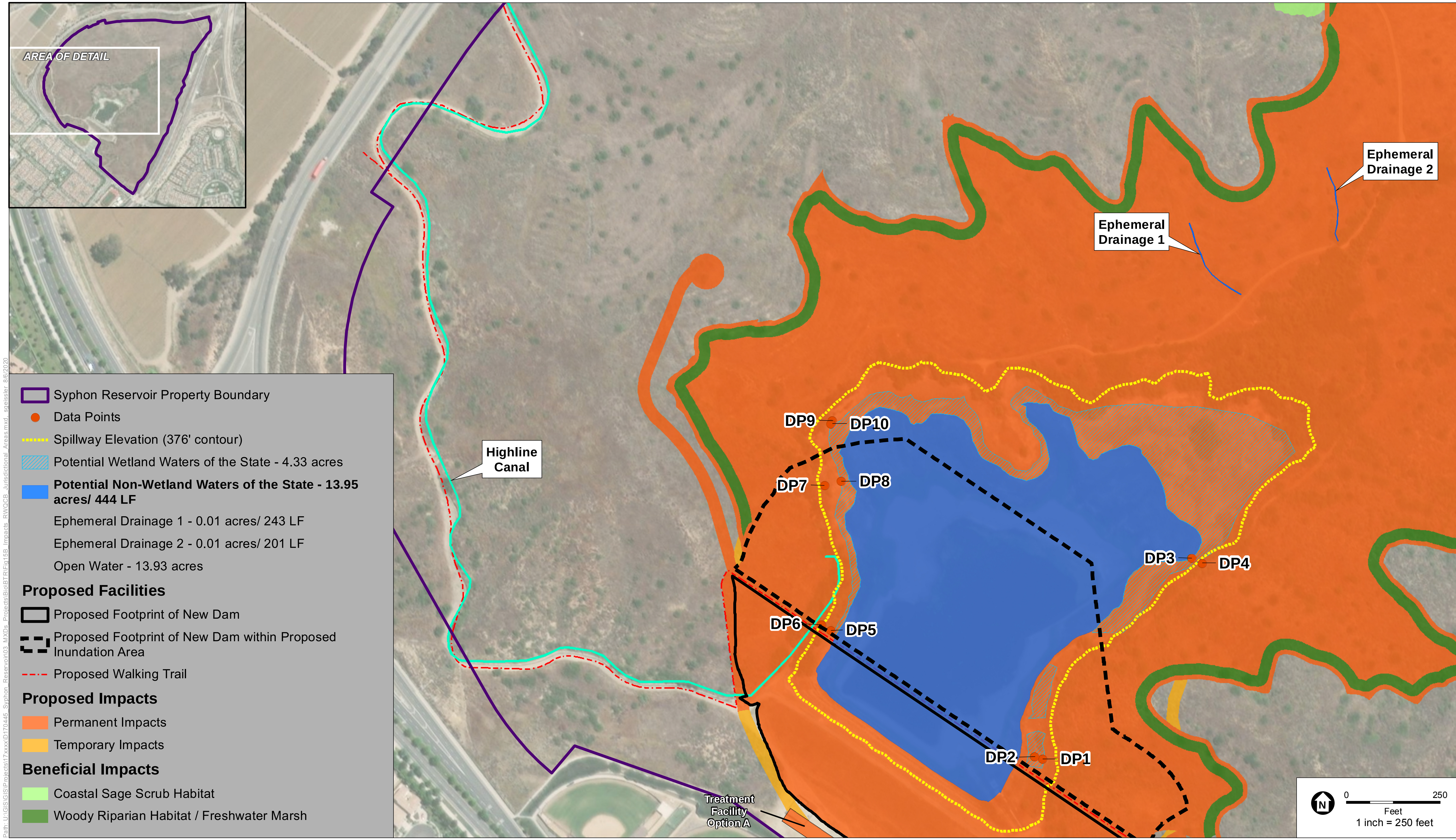
Impacts to Sensitive Natural Communities



SOURCE: ESRI, 2016

Syphon Reservoir Improvement Project

Figure 15A
Impacts to CDFW Jurisdictional Areas



SOURCE: ESRI, 2016

Syphon Reservoir Geotechnical Investigations Project

Figure 15B
Impacts to RWQCB Jurisdictional Areas

ESA

The proposed project would also create at least 6.58 acres of riparian woodland, and approximately 5.88 acres of additional woody riparian and/or freshwater marsh habitat. The proposed project would also potentially add more than 10 acres of coastal sage scrub habitat where it is planned to be restored on the slope that will be cut northeast of the proposed reservoir to make space for the on-site riparian/wetland habitat areas.

Impacts to sensitive natural communities that would result from the proposed project would be potentially significant. Implementation of mitigation measure MM BIO-6, prescribed in Section 6.0 below, would reduce impacts to a less than significant level.

In addition, a large portion of the study area contains riparian and freshwater marsh habitat as well as the open water associated with the existing reservoir, which are all considered to be subject to CDFW jurisdiction, which includes lakes, streams, and associated vegetation. The proposed project would temporarily impact 26.35 acres of CDFW jurisdictional lakes, streams, and associated vegetation, of which 0.05 acre would be considered a beneficial impact (i.e., the areas will be impacted to create riparian woodland or freshwater marsh habitat). **Table 4** summarizes the temporary impacts on CDFW jurisdictional riparian habitat from the proposed project (shown in **Figure 15A**). The proposed project would avoid 0.20 acre of CDFW jurisdictional lakes, streams, and associated vegetation within the study area. The proposed project would also create at least 6.58 acres of on-site riparian woodland and approximately 5.88 acres of additional on-site woody riparian and/or freshwater marsh habitat and enlarge the reservoir, which would expand the open water resources on-site. Thus, the proposed project would result in a beneficial impact, which would increase the amount of CDFW jurisdictional riparian habitat, and impacts would be less than significant. Because the proposed project will be altering a substantial area subject to CDFW jurisdiction, the proposed project must comply with MM BIO-7, prescribed in Section 6.0 below, to obtain a Streambed Alteration Agreement from CDFW.

TABLE 4
IMPACTS TO CDFW POTENTIALLY JURISDICTIONAL AREAS

Jurisdiction Types	Existing (Acres)	Permanent Impacts (Acres)	Permanent Beneficial Impacts* (Acres)	Temporary Impacts (Acres)	Total Impacts (Acres)	Avoided (Acres)
CDFW Lakes, Streams, and Associated Vegetation	26.55	26.30	0.05	-	26.35	0.20
Total	**26.55**	**26.30**	**0.05**	**0.0**	**26.35**	**0.20**

* Although these areas will be permanently impacted by the proposed project, they will have the beneficial effect of creating riparian and upland habitat areas on-site.

Maintenance of the created riparian/wetland habitat areas, which will include creation of sensitive riparian communities that include riparian habitat subject to CDFW regulatory jurisdiction, would be required for up to 5 years after construction is complete for the proposed habitat areas to meet success criteria and provide good quality wildlife habitat. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The work will promote establishment of the habitat that will replace the existing riparian/wetland habitat area currently subject to CDFW jurisdiction. Reestablishing an equivalent or greater area of such habitat would be considered to have a beneficial impact as it would result in no net loss of CDFW jurisdictional area.

With implementation of Mitigation Measure MM BIO-6, impacts to sensitive natural communities would be less than significant and impacts to riparian habitat would be less than significant.

5.3 Jurisdictional Wetlands

5.3.1 Significance Threshold

The project would not have a substantial adverse effect on federal- or state-protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

5.3.2 Analysis of Project Effects

In response to a request to review the resources on site as described in the delineation report, the USACE issued an Approved Jurisdictional Determination letter (Appendix B), which confirmed that waters of the U.S. do not occur within the study area since Syphon Reservoir is an intrastate isolated water with no apparent interstate or foreign commerce connection (USACE 2018). The CWA also excludes certain features from this regulation, including “wastewater recycling facility constructed on dry land” (see 33 CFR §230.3 (o)(2)(vii)). Thus, jurisdictional features identified are only subject to the jurisdiction of the State (i.e., wetlands and non-wetland waters of the State [discussed in this section below], and CDFW lakes, streams, and associated vegetation [previously discussed in Section 5.2 above]).

The proposed project would permanently impact 18.28 acres of wetlands and waters of the State (4.33 acres of wetlands, 13.95 acres of non-wetland waters of the State). **Table 5** summarizes the impacts on wetlands and waters of the State from the proposed project (shown in **Figure 15B**). The proposed project would also create 5.88 acres of freshwater marsh wetland habitat and enlarge the reservoir, which would expand the open water resources on-site. Thus, the proposed project would result in a beneficial impact, which would increase the amount of potential RWQCB jurisdictional wetlands and water of the State, and impacts would be less than significant.

TABLE 5
IMPACTS TO RWQCB POTENTIALLY JURISDICTIONAL AREAS

Jurisdiction Types	Existing (Acres)	Permanent Impacts (Acres)	Permanent Beneficial Impacts* (Acres)	Temporary Impacts (Acres)	Total Impacts (Acres)	Avoided (Acres)
Wetland Waters of the State	4.33	4.33	-	-	4.33	-
Non-Wetland Waters of the State	13.95	13.95	-	-	13.95	-
Total	**18.28**	**18.28**	**0.0**	**0.0**	**18.28**	**0.0**

* Although these areas will be permanently impacted by the proposed project, they will have the beneficial effect of creating riparian and upland habitat areas on-site.

Maintenance of the created wetland areas would be required for up to 5 years after construction is complete to ensure success of the vegetated areas. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. Operations and maintenance efforts to establish and maintain the proposed riparian/wetland habitat around the fringe of the future reservoir would avoid a net loss of areas subject to RWQCB jurisdiction and would therefore have a beneficial impact.

Impacts to wetlands and waters would be less than significant.

5.4 Wildlife Movement and Nursery Sites

5.4.1 Significance Threshold

The project could interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

5.4.2 Analysis of Project Effects

The existing toll roads (SR-133 and SR-241) effectively stop most terrestrial wildlife movement from the study area to the west and Portola Parkway and dense suburban development also block most wildlife from proceeding to the south. Nevertheless, the study area lies at the southeastern edge of a large contiguous block of habitat that is an important element in the context of regional wildlife movement, particularly for avian species (e.g., dispersal habitat for coastal California gnatcatcher within this region). The reservoir is also one of several local water sources that attracts a number of avian species and provides habitat for migrating birds. Thus, the study area functions as a part of a wildlife movement corridor from a regional perspective, as well as providing live-in and movement habitat for a variety of species on a local scale.

The proposed project would temporarily drain the reservoir, which is used by a number of birds and other wildlife for water supply and foraging. IRWD already periodically drains the reservoir as part of its current normal operations; however, the reservoir will be drained until project completion. It should be noted that there is another nearby water feature, Rattlesnake Reservoir, which lies 1.1 miles to the north-northwest that could be utilized as a water source and for riparian habitat by migratory species moving through the region. The proposed project would impact 121.43 acres of natural communities during construction on-site, which could disrupt local movement and displace wildlife within the proposed project's footprint, particularly within the riparian habitats on-site. The proposed project would avoid 144.31 acres of natural communities; thus, displaced wildlife utilizing upland habitats can disperse to other upland areas on-site, and the impacted areas would not inhibit local or regional movement of wildlife within these avoided areas of the study area, though wildlife that is more sensitive to human disturbances and noise may be deterred by the nearby construction activities. Once completed, the enlarged reservoir will provide greater water storage capacity and an expanded open water area for migrating birds, and the proposed project will create at least 6.58 acres of on-site riparian woodland and approximately 5.88 acres of additional on-site woody riparian and/or freshwater marsh habitat that would be maintained to consistently provide habitat year-round, which would be a benefit to migratory species. In addition, approximately 10.47 acres of coastal sage scrub habitat would be created in an area northeast of the reservoir that currently exhibits predominantly low-value ruderal grassland. Therefore, with the creation of the on-site riparian and upland habitat, impacts to local movement are not expected to be significant. Thus, impacts to regional and local wildlife movement are considered less than significant, and no mitigation is required.

In addition, a walking trail is proposed along the northwestern boundary of the study area. The proposed walking trail traverses through coastal sage scrub and disturbed coastal sage scrub communities. The property is currently closed to public use, but a proposed walking trail would increase human use of the area. However, the level of activity and disturbance associated with people occasionally using the proposed trail would not impede local wildlife movement through the area. Thus, impacts would be less than significant and no mitigation is required.

Regarding the proposed project's potential to "impede the use of native wildlife nursery sites", to the extent mass grading and construction activities occur during the breeding season and in close proximity to active nests or suitable nesting habitat, the proposed project may have potentially significant direct impacts. Nesting activity typically occurs from February 15 to August 31 (or January 15 to June 31 for raptors). Active nests and eggs are protected under Fish and Wildlife Code Section 3503. Impacts to any active songbird or raptor nests would violate State law and may be considered potentially significant, particularly with regard to special status bird species. Implementation of mitigation measure MM BIO-3, prescribed in Section 6.0 below, would avoid violation of the Fish and Game Code and reduce potential impacts to special status birds to a less than significant level.

Maintenance of the created riparian and upland habitat areas would be required for up to 5 years after construction is complete for the proposed habitat areas to meet success criteria and provide good quality wildlife habitat. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The riparian and upland habitat areas would be irrigated as needed from a main supply line installed around the perimeter of the reservoir that connects to the reservoir water source. When maintenance of the riparian and upland habitat areas involves vegetation removal (e.g., weeding) and cannot be scheduled outside of nesting season, such work could impact nesting bird species, which could be potentially significant. Implementation of Mitigation Measure BIO-3 would reduce impacts to a less than significant level.

With implementation of Mitigation Measures MM BIO-3, impacts to wildlife movement and nursery sites would be less than significant.

5.5 Local Policies, Ordinances, and Adopted Plans

5.5.1 Significance Threshold

The project would not conflict with one or more local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance, and/or would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

5.5.2 Analysis of Project Effects

The study area is within the Central Subregion of the County of Orange NCCP/HCP, and is located with the NCCP/HCP Reserve. IRWD is participating landowner and a signatory of the Central & Coastal Subregion NCCP/HCP. The NCCP/HCP included provisions for IRWD to build a future reservoir “as a permitted use within the Reserve System” (R.J. Meade Consulting 1996a). At the time that the NCCP/HCP was prepared, IRWD had identified and was considering four alternative seasonal recycled water storage reservoirs (including the Syphon Reservoir site), all of which were located within the subregional Reserve System, though only one reservoir would ultimately be needed. Thus, the need for a future reservoir was identified as “a permitted use within the Reserve System in the event that public health, safety, and welfare require such a facility in the future. At the time such a facility is needed, IRWD will review the plans with appropriate agencies and propose a specific mitigation plan or pay fees adequate to mitigate the Incidental Take associated with the new reservoir” (R.J. Meade Consulting 1996a).

The proposed Syphon Reservoir Improvement Project is a permitted use within the Reserve System. Compliance with specific conditions required for NCCP/HCP conditionally covered species (i.e., least Bell’s vireo) are discussed in Section 5.1. However, the removal of coastal sage scrub communities would be considered potentially significant. Implementation of mitigation measures MM BIO-1 and MM BIO-2, prescribed in Section 6.0 below, would reduce impacts to a less than significant level.

Maintenance of the created upland habitat areas would be required for up to 5 years after construction is complete to ensure success of the vegetated areas. Approximately 2 crews of 6 workers each would be required 40 days per year for the first two years, with level of effort tapering off to one crew 30 days per year for the subsequent two to three years. The upland habitat areas would be irrigated from a main supply line installed around the perimeter of the reservoir that connects to the reservoir water source. When maintenance of the riparian and upland habitat areas involves vegetation removal (e.g., weeding) and cannot be scheduled outside of nesting season, such work could impact nesting special-status bird species, which could be potentially significant. Implementation of Mitigation Measure BIO-3 would reduce impacts to a less than significant level, and thus would not conflict with the provisions of the Central & Coastal Subregion NCCP/HCP.

With implementation of Mitigation Measures MM BIO-1, MM BIO-2, and MM BIO-3, the project would not conflict with the provisions of any local policies or ordinances protecting biological resources or any adopted NCCP/HCPs.

6.0 Mitigation Measures

To minimize and avoid significant impacts to sensitive biological resources as a result of proposed project implementation, the following mitigation measures are recommended.

6.1 Measures to Mitigate Potentially Significant Impacts to Special-Status Species

MM BIO-1: IRWD has been engaged in close coordination with the Wildlife Agencies (i.e., USFWS and CDFW) since 2018 to develop a multi-faceted mitigation strategy to address impacts to California gnatcatcher, as well as to address the additional mitigation the agencies mandate to compensate for displacement of habitat and land previously set aside for mitigation and subject to the restrictions and requirements imposed under the Mitigation Grant Deed, of which USFWS is a third party beneficiary. To date, IRWD has researched numerous off-site lands with high value habitat and biological resources, and initiated negotiations with landowners for possible acquisition. IRWD shall implement one, or a combination, of the following measures to mitigate permanent impacts to special-status wildlife species:

a. Use of Incidental Take Credits for participating landowners (within the Reserve, or outside of the Reserve) to offset permanent impacts to coastal sage scrub (e.g., California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/non-native herbaceous cover, and non-native herbaceous cover/California sagebrush scrub) at a 1:1 impact-to-mitigation ratio.

b. On- and/or off-site creation, restoration, and/or enhancement containing natural communities suitable for special-status species or comparable, as determined acceptable by the USFWS and CDFW.

c. Off-site land acquisition, preservation, creation, restoration, and/or enhancement containing natural communities suitable for special-status species or comparable, as determined acceptable by the USFWS and CDFW.

d. Areas where temporary impacts occur would be returned to pre-project conditions (i.e., pre-project elevation contours and revegetated with native upland scrub species) within one-year after construction is completed, and will be monitored for three years, or until a qualified biologist determines that the project site has returned to pre-project conditions. A revegetation plan would be prepared to re-seed/re-plant the area with local species, and would include performance standards, success criteria, maintenance, and future monitoring.

MM BIO-2: IRWD will implement the following:

a. In accordance with the NCCP/HCP, certain construction-related mitigation measures are required to minimize impacts to the coastal California gnatcatcher and other coastal sage scrub species. The removal of coastal sage scrub communities will be conducted in compliance with the NCCP/HCP's Construction Related Minimization Measures:

    1. To the maximum extent practicable, no grading of coastal sage scrub habitat that is occupied by nesting gnatcatchers will occur during the breeding season (February 15 through July 15).

    2. Prior to the commencement of grading operations or other activities involving significant soil disturbance, all areas of coastal sage scrub habitat to be avoided under the provisions of the NCCP/HCP shall be identified with temporary fencing or other markers clearly visible to construction personnel. Additionally, prior to the commencement of grading operations or other activities involving disturbance of coastal sage scrub, a survey will be conducted to locate gnatcatchers and cactus wrens within 100 feet of the outer extent of projected soil disturbance activities and the locations of any such species shall be clearly marked and identified on the construction/grading plans.

    3. A monitoring biologist, acceptable to USFWS/CDFW, will be on-site during any clearing of coastal sage scrub. IRWD will advise USFWS/CDFW at least seven calendar days (and preferably fourteen calendar days) prior to the clearing of any habitat occupied by Identified Species[10] to allow USFWS/CDFW to work with the monitoring biologist in connection with bird flushing/capture activities. The monitoring biologist will flush Identified Species (avian or other mobile Identified Species) from occupied habitat areas immediately prior to brush-clearing and earth-moving activities. If birds cannot be flushed, they will be captured in mist nets, if feasible, and relocated to areas of the site to be protected or to the NCCP/HCP Reserve System. It will be the responsibility of the monitoring biologist to assure that Identified bird species will not be directly impacted by brush-clearing and earth-moving equipment in a manner that also allows for construction activities on a timely basis.

    4. Following the completion of initial grading/earth moving activities, all areas of coastal sage scrub habitat to be avoided by construction equipment and personnel will be marked with temporary fencing and other appropriate markers clearly visible to construction personnel. No construction access, parking, or storage of equipment or materials will be permitted within such marked areas.

    5. In areas bordering the NCCP Reserve System or Special Linkage/Special Management areas containing significant coastal sage scrub identified in the NCCP/HCP for protection, vehicle/equipment transportation routes and staging areas will be restricted to a minimum number during construction consistent with

[10] NCCP/HCP Identified Species that occur, or have potential to occur, on-site include the following: coastal California gnatcatcher, coastal cactus wren, orange-throated whiptail, coastal western whiptail, red-diamond rattlesnake, coast horned lizard, northern harrier, sharp-shinned hawk, prairie falcon, American peregrine falcon, red-shouldered hawk, southern California rufous-crowned sparrow, San Diego desert woodrat, gray fox, and coyote.

project construction requirements. Waste dirt or rubble will not be deposited on adjacent coastal sage scrub identified in the NCCP/HCP for protection. Pre-construction meetings involving the monitoring biologist, construction supervisors, and equipment operators will be conducted and documented to ensure maximum practicable adherence to these measures.

6. Coastal sage scrub identified in the NCCP/HCP for protection and located within the likely dust drift radius of construction areas shall be periodically sprayed with water to reduce accumulated dust on the leaves as recommended by the monitoring biologist.

MM BIO-3: Impacts to nesting birds would be avoided by conducting all clearing and grubbing outside of the bird nesting season (i.e., work should occur September 1 to February 14, or July 1 to January 14 for raptors). If clearing and grubbing cannot avoid the bird nesting season, the following measures would be implemented:

a. Prior to work during the bird nesting season (February 15 to August 31, or January 15 to June 31 for raptors), a qualified biologist should conduct a pre-construction survey of all suitable habitat for the presence of nesting birds no more than 7 days prior to construction and/or maintenance activities. The results of the pre-construction survey would be valid for 7 days; if vegetation removal activities do not commence within 7 days following the survey, a new pre-construction nesting bird survey should be conducted before these activities begin again. If no active nests are found, then no further mitigation is required.

b. If any active nests are found during a pre-construction nesting bird survey, a buffer of 300 feet (500 feet for raptors), or as determined appropriate by the qualified biologist (based on species-specific tolerances and site-specific conditions) in consultation with IRWD, would be delineated, flagged, and avoided until the nesting cycle is complete (i.e., the qualified biologist determines that the young have fledged or the nest has failed). The qualified biologist may also recommend other measures to minimize disturbances to the nest, which may include, but are not limited to, erection of sound barriers (e.g., noise blankets), erection of visual barriers (e.g., hay bales), or full-time monitoring by a qualified biologist.

MM BIO-4: With the creation of on-site riparian and wetland habitat areas, as part of the proposed project, there will be no net loss of woody riparian habitat for least Bell's vireo and no net loss of any wetland habitat. Nevertheless, there will be a temporary loss of these habitats until construction is completed and riparian habitat can be reestablished that the species can use again. IRWD is engaged with the Wildlife Agencies and is collaboratively developing a comprehensive program to address temportal impacts to least Bell's vireo and other riparian-associated special-status wildlife species (e.g., yellow warbler, yellow-breasted chat). IRWD shall implement the following measure to compensate for impacts to least Bell's vireo and associated riparian special-status wildlife species (e.g., yellow warbler, yellow-breasted chat):

a. Off-site land acquisition and preservation, and/or creation, restoration, and/or enhancement, of areas containing habitat suitable for least Bell's vireo and associated riparian special-status wildlife species (e.g., yellow warbler, yellow-breasted chat) to compensate for temporal loss in an amount or at a ratio determined acceptable by the USFWS and CDFW. Any private lands acquired and/or restored for this mitigation would be permanently preserved and dedicated for habitat conservation.

MM BIO-5: IRWD shall implement the following measure to mitigate indirect impacts to special-status wildlife species:

a. Educational signage shall be posted at the entrances of the proposed walking trail to inform the public about the sensitive biological resources in the area and local wildlife in the area (e.g., rattlesnakes, coyotes). Signage would also be posted periodically along the proposed trail to remind public to keep on the trail and out of sensitive habitat areas.

b. The proposed trail shall only be open during daylight hours (e.g., dawn to dusk).

c. A Resource Management Plan (RMP) shall be prepared to outline long-term maintenance and management responsibilities for the preservation of the biological resources on-site (e.g., invasive species management, monitoring access issues, off-trail use, erosion, trash). The RMP should also provide guidance to ensure that all operations and maintenance activities performed on-site must also comply with all applicable requirements of the NCCP/HCP and the preservation of the biological resources on-site. The RMP would also outline monitoring requirements for species populations for federal and state-listed species (i.e., least Bell's vireo and California gnatcatcher).

6.2 Measures to Mitigate Potentially Significant Impacts to Riparian Habitat and Sensitive Natural Communities

MM BIO-6: IRWD shall implement one, or a combination, of the following measures to mitigate impacts to sensitive natural communities:

a. Use of Incidental Take Credits for NCCP/HCP participating landowners (within the Reserve, or outside of the Reserve) to offset permanent impacts to coastal sage scrub (e.g., California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/non-native herbaceous cover, and non-native herbaceous cover/California sagebrush scrub) at a 1:1 impact-to-mitigation ratio.

b. On- and/or off-site land acquisition and preservation, and/or creation, restoration, and/or enhancement of sensitive natural communities comparable or equivalent to a 1:1 impact-to-mitigation ratio, as determined acceptable by the USFWS and CDFW.

c. Areas where temporary impacts occur to sensitive natural communities (e.g., California sagebrush scrub) would be returned to pre-project conditions (i.e., pre-project elevation contours and revegetation initiated) within one-year after the construction is completed, and will be monitored for three years, or until a qualified biologist determines that affected natural communities have been restored to equivalent or better condition as compared to pre-project conditions. A revegetation plan would be prepared to re-seed/re-plant the area with locally indigenous native species, and would include performance standards, success criteria, maintenance, and future monitoring.

MM BIO-7: IRWD shall negotiate and execute a Lake or Streambed Alteration Agreement under Section 1602 of the California Fish and Game Code with CDFW.

7.0 References

American Ornithological Society (AOS). 2020. *Checklist of North American and Middle American Birds*. AOS website http://checklist.americanornithology.org/taxa/.

Baldwin, et al. 2012. *Jepson Manual: Vascular Plants of California; Second Edition*. University of California Press.

Calflora. 2020. *Information on California Plants for Education, Research and Conservation* [web application]. Berkeley, California: The Calflora Database [a non-profit organization]. Available: http://www.calflora.org/ (Accessed: April 26, 2018 and June 2, 2020).

California Herps (CalHerps). 2020. *A Guide to the Amphibians and Reptiles of California*. Accessed online at http://www.californiaherps.com/.

California Department of Fish and Wildlife (CDFW). 2018. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. State of California Natural Resources Agency. March 20, 2018.

———. 2019a. *Special Animals List.* California Natural Diversity Database (CNDDB). August 2019. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406.

———. 2019b. *California Natural Community List.* Vegetation Classification and Mapping Program. November 8, 2019. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline.

———. 2020. *California Natural Diversity Database (CNDDB) Rarefind 5*. Electronic database, Sacramento, California. Accessed at: https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed on April 6 and December 12, 2018 and June 5, 2020.

California Department of Transportation and California Department of Fish and Game (CalTrans and CDFG). 2010. *California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California*. Prepared with Funding from: Federal Highways Administration. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18366

California Native Plant Society (CNPS). 2020. *Inventory of Rare and Endangered Plants (online edition, v8-01a)*. Sacramento, CA. http://www.rareplants.cnps.org/. Accessed on April 6 and December 12, 2018 and June 5, 2020.

California Regional Water Quality Control Board, Santa Ana Region. 2019. *Water Quality Control Plan for the Santa Ana River Basin (Region 8)*. January 24, 1995. Updated June 2019 to include approved amendments. https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/.

Catino-Davenport, Jaclyn of ESA (formerly of Bloom Biological). 2019. Personal communication via email with Maile Tanaka (Biologist) of ESA on January 16, 2019.

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Crother, B. 2020. *Checklist of the Standard English and Scientific Names of Amphibians and Reptiles*. Society for the Study of Amphibians and Reptiles. Accessed at https://ssarherps.org/publications/north-american-checklist/.

Dudek. 2012. *Syphon Reservoir Environmental Regulatory Evaluation Preliminary Draft*. Prepared for Irvine Ranch Water District. October 2012.

eBird. 2012. *eBird: An Online Database of Bird Distribution and Abundance*. Species Maps. eBird, Ithaca, New York. Available: http://www.ebird.org. Accessed: December 12, 2018 and June 2, 2020.

Environmental Laboratory. 1987. *U.S. Army Corps of Engineers Wetland Delineation Manual*. Prepared for the U.S. Army Corps of Engineers.

Environmental Science Associates (ESA). 2019a. *Results of Focused Western Spadefoot Toad Surveys for the Syphon Reservoir Improvement Project, Unincorporated Orange County, California*. Prepared for Irvine Ranch Water District. March 29, 2019.

———. 2019b. *Irvine Ranch Water District – Syphon Reservoir – Geotechnical Investigations Project – Final Initial Study/Mitigated Negative Declaration SCH #2019029041*. Prepared for Irvine Ranch Water District. June 2019.

———. 2019c. *Results of 2019 Focused Least Bell's Vireo Surveys for the Syphon Reservoir Improvement Project, Unincorporated Orange County, California*. August 1, 2019.

———. 2019d. *Results of 2019 Focused Southwestern Willow Flycatcher Surveys for the Syphon Reservoir Improvement Project, Unincorporated Orange County, California*. August 1, 2019.

———. 2019e. *Results of Pre-Construction Surveys for the Syphon Reservoir Geotechnical Investigations Project, Orange County, California*. August 30, 2019.

GEI Consultants, Inc. (GEI). 2012. *Syphon Reservoir Expansion Engineering Feasibility Study – Geotechnical Data Report*. Prepared by GEI in association with Stantec Consulting, Inc.; Dudek; and Flow Science, Inc. August 2012.

———. 2016. *Syphon Reservoir Dry Lakebed Geotechnical Exploration*. June 13, 2016.

Google Earth. 2018. 36°35’49.33” N, 118°01’52.95” W. Imagery Date: April 2, 2018. Accessed December 12, 2018.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System, Natural Resources, Geographic Information System (GIS) Project*. County of Orange Environmental Management Agency, Santa Ana, CA.

HDR 2018. *Syphon Reservoir Expansion Project Geotechnical Investigation Work Plan (Preliminary Draft), Syphon Reservoir Expansion Project, Irvine, California*. September 4, 2018.

Jones & Stokes Associates, Inc. 1993. *Methods Used to Survey the Vegetation of Orange County Parks and Open Space Areas and The Irvine Company Property*. Prepared for County of Orange, Environmental Management Agency.

Kaufman, Kenn, Nora Bowers, Rick Bowers. 2004. *Field Guide to Mammals of North America*. New York, New York: Houghton Mifflin Company.

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *Arid West 2016 Regional Wetland Plant List*. Phytoneuron 2016-30: 1-17. Published 28 April 2016.

Munsell. 2000. *Munsell Soil Color Charts*. GretagMacbeth, New Windsor, New York, USA.

Natural Resources Conservation Service (NRCS). 2010. *Field Indicators of Hydric Soils in the United States, Version 7.0, 2010*. Edited by L.M. Vasilas, G.W. Hurt, and C.V. Noble. U.S. Department of Agriculture, Natural Resources Conservation Service, in cooperation with the National Technical Committee for Hydric Soils.

———. 2016. *Hydric Soils List of California*. Available at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/. Accessed March 2018.

———. 2018. *Web Soil Survey*. U.S. Department of Agriculture. Accessible online at: https://www.nrcs.usda.gov/wps/portal/nrcs/main/ soils/survey/.

R.J. Meade Consulting, Inc. 1996a. Co*unty of Orange Natural Community Conservation Plan & Habitat Conservation Plan. Central & Coastal Subregion. Parts I & II: NCCP/HCP*. July 17, 1996.

———. 1996b. *County of Orange Natural Community Conservation Plan & Habitat Conservation Plan. Central & Coastal Subregion. Part III: Joint Programmatic EIR/EIR*. May 22, 1996.

———. 1996c. *County of Orange Natural Community Conservation Plan & Habitat Conservation Plan. Central & Coastal Subregion. Part IV: Implementation Agreement*. July 14, 1996.

Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. *A Manual of California Vegetation, Second Edition*. California Native Plant Society, Sacramento, CA.

Sogge, M. K., D. Ahlers, and S. J. Sferra. 2010. *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher*. U.S. Geological Survey Techniques and Methods 2A-10, 38 p.

South Coast Wildlands. 2008. *South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion*. http://www.scwildlands.org/reports/SCMLRegionalReport.pdf. March 2008.

Stebbins, R. C. 2003. *A Field Guide to Western Reptiles and Amphibians Third Edition*. Boston: Houghton-Mifflin.

Toland, Scott of IRWD. 2020. Personal communication via email with Scott Holbrook (Biologist) of ESA on May 5, 2020.

U.S. Army Corps of Engineers (USACE). 2008a. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*. Wetlands Regulatory Assistance Program. September 2008. http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/reg_supp/trel08-28.pdf.

———. 2008b. *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. A Delineation Manual. August 2008. http://www.dtic.mil/dtic/tr/fulltext/u2/ a486603.pdf.

———. 2010. *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. July 2010.

———. 2018. *Approved Jurisdictional Determination*. December 17, 2018.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). January 19, 2001. *Least Bell's Vireo Survey Guidelines*. Ecological Services. Carlsbad Fish and Wildlife Office.

U.S. Fish and Wildlife Service (USFWS). 2014. *Quino Checkerspot Butterfly Survey Protocol*. https://www.fws.gov/carlsbad/tespecies/Documents/QuinoDocs/Quino%20Survey%20Guidelines_version%2015DEC2014.pdf. February 2014.

———. 2017. *Critical Habitat: What is it?* Accessible online at: https://www.fws.gov/endangered/esa-library/pdf/critical_habitat.pdf.

———. 2018. *National Wetland Inventory*. https://www.fws.gov/wetlands/data/Mapper.html. Accessed 2018.

———. 2020a. *Information for Planning and Consultation*. Accessible online at: https://ecos.fws.gov/ipac/. Accessed on April 6 and December 12, 2018 and June 5, 2020.

———. 2020b. *Critical Habitat Portal*. Accessible online at: http://ecos.fws.gov/crithab/.

———. 2020c. *National Wetland Inventory*. https://www.fws.gov/wetlands/data/Mapper.html. Accessed on June 5, 2020.

United States Geological Survey (USGS). 1968. *El Toro, California*. 7.5-minute topographic quadrangle map. Photorevised 1982.

Appendix A
Preliminary Jurisdictional Delineation Report

Final

Syphon Reservoir Improvement Project

Preliminary Jurisdictional Delineation Report

Prepared for
Irvine Ranch Water District

July 2018

Final

Syphon Reservoir Improvement Project

Preliminary Jurisdictional Delineation Report

Prepared for
Irvine Ranch Water District

July 2018

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300
www.esassoc.com

Bend	Oakland	San Francisco
Camarillo	Orlando	Santa Monica
Delray Beach	Pasadena	Sarasota
Destin	Petaluma	Seattle
Irvine	Portland	Sunrise
Los Angeles	Sacramento	Tampa
Miami	San Diego	

170445

Table of Contents

Syphon Reservoir Improvement Project
Preliminary Jurisdictional Delineation Report

Page

Figures

Tables

Section 1
Introduction

1.1 Introduction and Purpose

Environmental Science Associates (ESA) conducted a jurisdictional delineation for the Irvine Ranch Water District's (IRWD) Syphon Reservoir Improvement Project (project). The study area includes approximately 266 acres of the Syphon Reservoir property, including 241 acres of deed-restricted parcels within the Central and Coastal Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) reserve boundary. The purpose of conducting a jurisdictional delineation in the study area was to determine the location and size of the areas defined as waters of the United States, waters of the State, and habitats subject to the California Department of the Fish and Wildlife's (CDFW) jurisdiction. The collected data will be used to determine which jurisdictional regulations apply and to calculate project impacts to jurisdictional waters and habitat during the permitting process. The results from this analysis will be used to prepare any necessary permits from the regulatory agencies.

IRWD is seeking to expand the recycled water storage capacity of Syphon Reservoir to meet the demand of its recycled water customers, enhance IRWD's water supply reliability, and reduce the need for imported water. The total storage capacity of Syphon Reservoir would be expanded from 500 acre-feet to approximately 5,000 acre-feet by raising the existing dam. In addition to an expanded dam footprint and inundation level up to the 456-foot elevation, the project would include infrastructure facilities constructed between the toe of the new dam and the IRWD property boundary, as well as roadways in order to connect the reservoir with the recycled water system.

1.2 Study Area Location

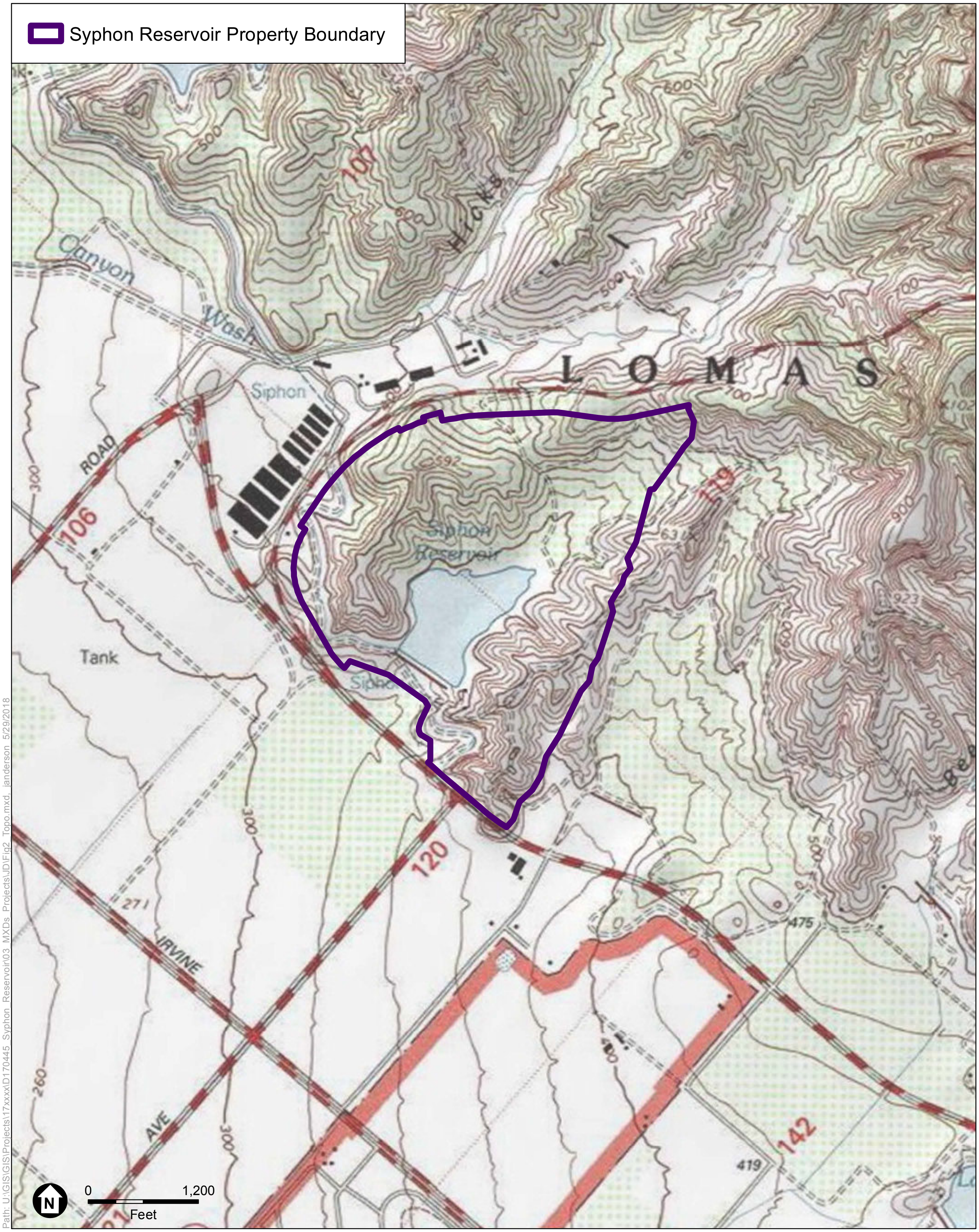
Syphon Reservoir is located in the northern portion of Irvine, California, within IRWD's service area, within Orange County, California, as shown on **Figure 1-1**. Syphon Reservoir is a 60-year-old facility historically used to store irrigation water supplies. Currently, the reservoir functions as a seasonal storage facility within the IRWD recycled water system.

The study area is within the El Toro U.S. Geological Survey 7.5-minute quadrangle map and within the land grant Lomas de Santiago (**Figure 1-2**). Coordinates for the study area are: 33°43'0.10"N, 117°43'20.83"W for the northeast corner and 33°42'41.00"N, 117°44'7.85"W for the southwest corner.

SOURCE: ESRI, 2016; OC LAFCO, 2018

IRWD Syphon Reservoir

Figure 1-1
Project Location



Path: U:\GIS\GIS\Projects\17xxxx\D170445_Syphon_Reservoir\03_MXDs_Projects\JD\Fig2_Topo.mxd, janderson 5/29/2018

SOURCE: ESRI, 2016; El Toro USGS 7.5 minute Quadrangle

IRWD Syphon Reservoir

Figure 1-2
USGS Topographic Map

ESA

Section 2
Environmental Setting

2.1 Wetland Delineation Study Area

The 266-acre study area was historically part of the Irvine Ranch and was initially subject to disturbance in the 1940s for construction of the reservoir to provide irrigation for agricultural lands. Irvine Ranch Water District purchased the reservoir and surrounding land in 2010 for the purpose of storing recycled water. In 2014, IRWD completed a project which integrated the existing capacity of the reservoir into its recycled water system as a small storage facility for recycled water, with the intent of increasing storage capacity in the future. Syphon Reservoir is currently a recycled water storage reservoir surrounded by sensitive upland, wetland, and riparian vegetation communities. The IRWD property surrounding the reservoir has been the subject of previous habitat restoration and mitigation activity as part of state and federal regulatory approvals and is within the reserve boundary of the NCCP/HCP. Consistency with the NCCP/HCP is discussed in Syphon Reservoir Environmental Regulatory Evaluation Preliminary Draft (Dudek, 2012).

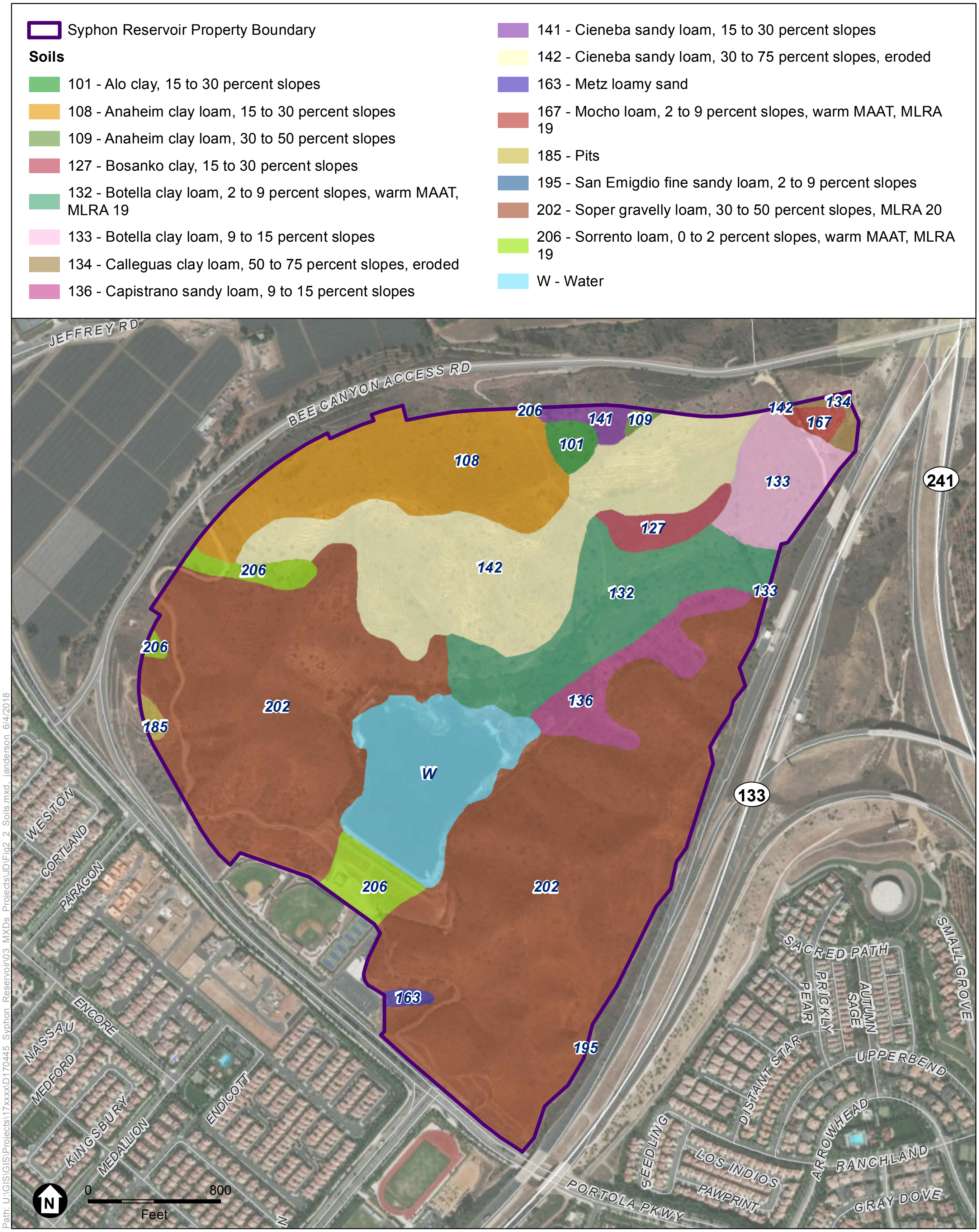
2.2 Soils

Based on review of the Natural Resources Conservation Services (NRCS) web soil survey, the study area contains 16 soil series (**Figure 2-1**) (NRCS, 2017). The following is a brief description of mapped soils within the study area underlain by potential waters of the U.S.:

Soper gravelly loam, 30 to 50 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is mildly alkaline to slightly acidic. The profile consists of gravelly loam in the first 8 inches, gravelly clay loam between 8 and 29 inches, and bedrock from 29 to 79 inches. Soper gravelly loam is not considered hydric by the Natural Resources Conservation Service (NRCS) (NRCS, 2016).

Botella clay loam, 2 to 9 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is slightly alkaline to moderately acidic. The profile consists of clay loam in the first 8 inches, silty clay loam between 8 and 35 inches, and clay loam from 35 to 66 inches. Botella clay loam is not considered hydric by the NRCS (NRCS, 2016).

Cieneba sandy loam, 30 to 75 percent slopes, is a somewhat excessively drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is neutral to strongly acidic. The profile consists of sandy loam in the first 17 inches and weathered bedrock between 17 and 59 inches. Cieneba sandy loam is not considered hydric by the NRCS (NRCS, 2016).



SOURCE: ESRI, 2016; USDA, 2018

IRWD Syphon Reservoir

Figure 2-1
Soils

ESA

Capistrano sandy loam, 9 to 15 percent slopes, is a well-drained soil that is unlikely to pond or flood with an average depth of over 80 inches to the water table. The soil is neutral to medium acidic. The profile consists of sandy loam in the first 27 inches and fine sandy loam between 27 and 65 inches. Capistrano sandy loam is not considered hydric by the NRCS (NRCS, 2016).

2.3 Hydrology

Syphon Reservoir's total basin area is approximately 205 acres within the central drainage and reservoir area. A culvert inlet in the northeast portion of the study area conveys stormwater runoff from a portion of the open space area east of the reservoir (under SR-133 and SR-241). The central drainage supports riparian habitat and conveys intermittent flow through the center of the study area to the reservoir. In addition, multiple culverts within the study area drain the upland portions of the reservoir.

With the exception of limited seasonal inflows from rain events, IRWD controls all flows in and out of the reservoir, as part of their recycled water storage and management. Following construction of the dam in the 1940s, impounded water accumulated from direct runoff from the Highline Canal. Currently, within the study area, a portion of the Highline Canal conveys periodic recycled water overflows from IRWD's Rattlesnake Reservoir into Syphon Reservoir. The Highline Canal located southwest of the Syphon Reservoir was historically used for irrigation but has been abandoned. The reservoir currently drains through a series of underground pipes that convey flows through a strainer and chlorination facility, before getting distributed to customers through IRWD's recycled water system.

2.4 Vegetation Communities

The study area is dominated by California sagebrush alliance and non-native herbaceous cover/California sagebrush alliance (i.e., communities intermixed with both native and non-native species) in the upland areas, and arroyo willow thicket within the riparian areas immediately adjacent to open water within the reservoir. Vegetation communities are mapped in **Figure 2-2**.

Acreages of each vegetation community in the study area are summarized in **Table 2-1**, and are listed according to the Orange County Habitat Classification System (Gray and Bramlet, 1992) and California vegetation alliances (Sawyer et al., 2009). Vegetation communities considered a special-status vegetation community by CDFW as listed in the California Natural Community List (CDFW, 2018) are also identified with an asterisk. Vegetation communities that are habitat type under the Central and Coastal Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and also considered a special-status vegetation community are identified with a double asterisk.

TABLE 2-1
VEGETATION COMMUNITIES

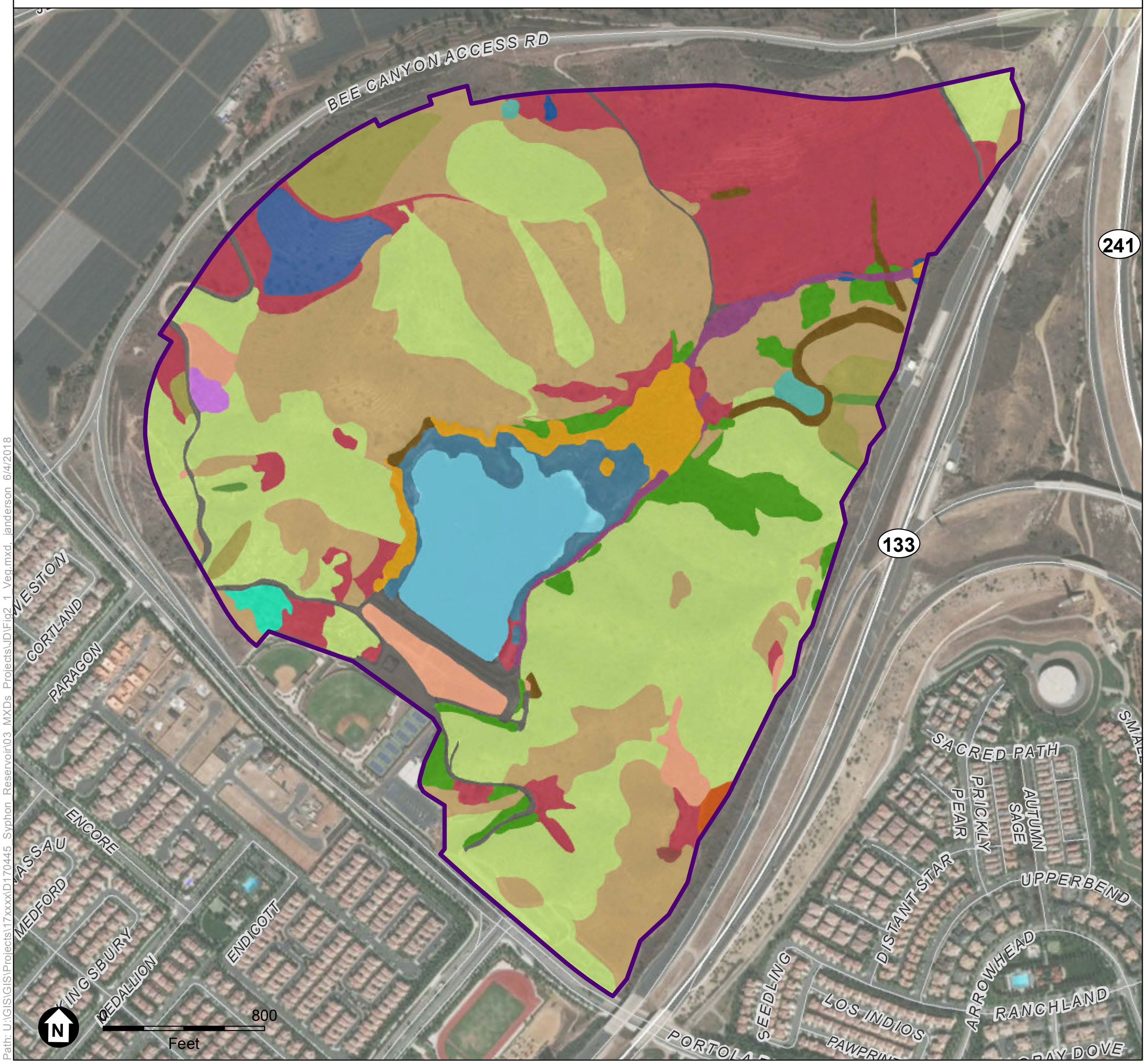
Vegetation Community	Acres	State Rank[1]
Arroyo Willow Thicket*	0.24	S4
Black Willow Thicket*	6.28	S3
Mule Fat Scrub	2.55	S4
Freshwater Marsh	6.62	S4
Coyote Brush Scrub	0.90	S5
Chaparral Bushmallow Scrub	0.45	S4
Chaparral Bushmallow Scrub/Coyote Brush Scrub	0.49	S4/S5
Chaparral Bushmallow Scrub/Non-Native Herbaceous Cover	4.72	S4/None
Laurel Sumac Scrub	9.20	S4
Lemonadeberry Scrub*	0.15	S3
California Sagebrush Scrub**	85.50	S5
California Sagebrush Scrub**/Non-Native Herbaceous Cover	7.86	S5/None
Coast Prickly Pear Scrub*	0.69	S3
Eucalyptus Woodland	2.78	None
Non-Native Grassland	5.27	None
Non-Native Herbaceous Cover	44.27	None
Non-Native Herbaceous Cover/California Sagebrush Scrub	66.61	None/S5
Non-Native Herbaceous Cover/Laurel Sumac Scrub	1.02	None/S4
Open Water	13.21	None
Disturbed	6.93	None
Grand Total	**265.74**	

* Asterisk indicates that an alliance/association is considered special-status by CDFW.
** Double asterisk indicates that an alliance/association that is a covered habitat type under the NCCP/HCP and is therefore considered a special-status vegetation community.
1 CDFW state rank denotes the rarity of a vegetation type within the state as follows:
S1 = Critically Imperiled – At very high risk of extirpation due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
S2 = Imperiled – At high risk of extirpation due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3 = Vulnerable – At moderate risk of extirpation due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4 = Apparently Secure – At a fairly low risk of extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5 = Secure - At very low or no risk of extirpation due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

Syphon Reservoir Property Boundary

Vegetation Communities

- Arroyo Willow Thicket
- Black Willow Thicket
- California Sagebrush Scrub
- California Sagebrush Scrub / Non-Native Herbaceous Cover
- Chaparral Bushmallow Scrub
- Chaparral Bushmallow Scrub / Coyote Brush Scrub
- Chaparral Bushmallow Scrub / Non-Native Herbaceous Cover
- Coast Prickly Pear Scrub
- Coyote Brush Scrub
- Disturbed
- Eucalyptus Woodland
- Freshwater Marsh
- Laurel Sumac Scrub
- Lemonadeberry Scrub
- Mule Fat Scrub
- Non-Native Grassland
- Non-Native Herbaceous Cover
- Non-Native Herbaceous Cover / California Sagebrush Scrub
- Non-Native Herbaceous Cover / Laurel Sumac Scrub
- Open Water



SOURCE: ESRI, 2016

IRWD Syphon Reservoir

Figure 2-2
Vegetation Communities

ESA

Section 3
Regulatory Framework

3.1 Waters of the U.S.

The U.S. Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) have issued a set of guidance documents detailing the process for determining Clean Water Act (CWA) jurisdiction over waters of the United States (waters of the U.S.) following the 2008 Rapanos decision. The EPA and USACE issued a summary memorandum of the guidance for implementing the Supreme Court's decision in Rapanos that addresses the jurisdiction over waters of the United States under the CWA. The complete set of guidance documents, summarized as key points below, were used to collect relevant data for evaluation by the EPA and the USACE to determine CWA jurisdiction over the project and to complete the "significant nexus test" as detailed in the guidelines.

The significant nexus test includes consideration of hydrologic and ecologic factors. For circumstances such as those described in point (B) below, the significant nexus test would take into account physical indicators of flow (evidence of an ordinary high water mark [OHWM]), if a hydrologic connection to a Traditionally Navigable Water (TNW) exists, and if the aquatic functions of the water body have a significant effect (more than speculative or insubstantial) on the chemical, physical, and biological integrity of a TNW. The USACE and EPA will apply the significant nexus standard to assess the flow characteristics and functions of the tributary drainage to determine if it significantly affects the chemical, physical, and biological integrity of the downstream TNW.

Based on the 2003 joint legal memorandum signed by General Counsels of EPA and the Department of the Army regarding the Supreme Court's decision in Solid Waste Agency of Northern Cook County vs. United States Army Corps of Engineers, 531 U.S. 159 (2001) ('SWANCC'), geographically isolated waters, including wetlands, are generally not considered to be jurisdictional under the CWA because they lack links to interstate commerce. However, for each specific request for isolated waters (i.e., approved jurisdictional determination), the USACE and EPA will need to make a case by case determination on the jurisdictional status of the resource.

Rapanos Key Points Summary

(A) The USACE and EPA will assert jurisdiction over the following waters:

- TNWs.
- Wetlands adjacent to TNW.

- Non-navigable tributaries of TNWs that are relatively permanent.
- Where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months).
- Wetlands that directly abut such tributaries.

(B) The USACE and EPA will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a TNW:

- Non-navigable tributaries that are not relatively permanent.
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent.
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

(C) The USACE and EPA generally will not assert jurisdiction over the following features:

- Swales or erosion features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow).
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

3.2 Waters of the State

Most projects involving water bodies or drainages are regulated by the Regional Water Quality Control Board (RWQCB), the principal State agency overseeing water quality of the State at the local/regional level. The study area is located within the jurisdiction of the Santa Ana RWQCB. The State Water Resources Control Board (State Water Board) directly regulates multi-regional projects and supports the Section 401 certification and wetlands program statewide. The RWQCB regulates activities pursuant to Section 401(a)(1) of the federal CWA, which specifies that certification from the State is required for any applicant requesting a federal license or permit to conduct any activity including but not limited to the construction or operation of facilities that may result in any discharge into navigable waters. The certification shall originate from the State or appropriate interstate water pollution control agency in/where the discharge originates or will originate. Any such discharge will comply with the applicable provisions of Sections 301, 302, 303, 306, and 307 of the CWA.

Absent any federal jurisdiction pursuant to Section 404 of the CWA, the RWQCB regulates discharges under the Porter-Cologne Water Quality Control Act primarily through issuance of NPDES permits for point source discharges and waste discharge requirements (WDRs) for non-point source discharges. Anyone discharging or proposing to discharge materials that could affect water quality (other than to a community sanitary sewer system regulated by an NPDES permit) must file a report of waste discharge. The Porter-Cologne Water Quality Control Act applies to the project since grading, filling, and other construction-related activities could affect the water quality of waters of the State.

3.3 Lakes, Streams, and Associated Vegetation

Pursuant to Division 2, Chapter 6, Section 1602 of the Fish and Game Code, California Department of Fish and Wildlife (CDFW) regulates all diversions, obstructions, or changes to the natural flow or bed, channel or bank of any river, stream, or lake which supports fish or wildlife. A notification of a Lake or Streambed Alteration Agreement must be submitted to CDFW for "any activity" that may substantially change the bed, channel, or bank of any river, stream, or lake." In addition, CDFW has jurisdiction over wetland and riparian habitats associated with watercourses. The CDFW reviews proposed actions, and if necessary, submits to the applicant a proposal that includes measures to protect affected fish and wildlife resources. The final proposal that is mutually agreed upon by CDFW and the applicant is the Lake or Streambed Alteration Agreement (LSAA).

Section 4
Methodology

4.1 Database and Literature Review

Prior to conducting the jurisdictional delineation, ESA conducted a review of available background information pertaining to Syphon Reservoir, geography, and topography. The following resources were also reviewed or used prior to the field surveys:

Natural Resources Conservation Service's (NRCS) *Web Soil Survey*, queried to determine the soils mapped in the study area (NRCS, 2017);

Hydric Soils List of California, *2016* (2018);

El Toro, CA USGS 7.5-minute topographic quadrangle maps;

Color aerial photography for vegetative, topographic, and hydrologic features (Google Earth, 2017);

The National Wetlands Inventory (U.S. Department of the Interior, 2018); and

Preliminary Draft Syphon Reservoir Environmental Regulatory Evaluation (Dudek, 2012).

Habitat Classification System, Natural Resources, Geographic Information System (GIS) Project (Gray and Bramlet, 1992).

Site maps were generated with available aerial photographs, and potentially jurisdictional features were identified and marked with lines and global positioning system (GPS) coordinates to assist in field verification.

4.2 Field Survey Methods

ESA biologists May Lau and Tommy Molioo conducted a site visit on April 24, 2018, to evaluate potentially jurisdictional features within the study area. The limits of potential jurisdictional features were recorded in the field within accessible areas using aerial maps and a hand-held GPS with sub-foot accuracy. Vegetation communities were described using *A Manual of California Vegetation, Second Edition* (Sawyer et al., 2009).

Delineating Waters of the U.S.

The delineation used the "Routine Determination Method" as described in the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987), hereafter called the "1987 Manual." The 1987 Manual was used in conjunction with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (U.S. Army Corps of Engineers, 2008), hereafter called the "Arid West Supplement." For areas where the 1987 Manual and the Arid West Supplement differ, the Arid West Supplement was followed. Wetlands and waters were classified using commonly accepted habitat types; however, the Cowardin classification (Cowardin et al., 1979) of each feature type is noted in the discussion in Chapter 5.

Wetlands

To determine the extent of potential jurisdictional wetlands on a project site, the Corps of Engineers *Wetlands Delineation Manual* (USACE, 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (USACE, 2008b) was used as a guide for identifying wetland characteristics.

Three positive wetland parameters must normally be present for an area to be considered a wetland: 1) a dominance of wetland vegetation, 2) presence of hydric soils, and 3) presence of wetland hydrology. Presence or absence of positive indicators for wetland vegetation, soils and hydrology was assessed per the 1987 Manual and Arid West Supplement guidelines. Data points were taken within suspected wetlands and a paired point was taken (where applicable) in nearby uplands. Data points were recorded on Arid West wetland determination data forms. Data forms are provided in **Appendix A**.

At each data point, a visual assessment of the dominant plant species within a 6-foot radius was made. Dominant species were assessed using the recommended "50/20" rule per the Arid West Supplement. Plants were identified to species using the *The Jepson manual: Vascular plants of California, second edition* (Baldwin et al., 2012). The *Arid West 2016 Regional Wetland Plant List* (Lichvar et al., 2016) was used to determine the wetland indicator status of all plants. Hydric soils were identified using soil indicators presented in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (USACE 2008b) and the *Field Indicators of Hydric Soils in the United States*, Version 7.0, 2010 (NRCS 2010). Soils at each data point were characterized by color, texture, organic matter accumulation, and the presence or absence of hydric soil indicators. The coloration of the soil samples, matrix, and mottles is assessed using the *Munsell Soil Color Charts* (Munsell, 2000). Presence of wetland hydrology was determined at each data point by presence of one or more of the primary and/or secondary indicators, per guidance of the Arid West Supplement.

Other Waters of the U.S.

Federal jurisdiction over a non-wetland waters of the U.S. extends to the ordinary high-water mark (OHWM), defined in 33 C.F.R. § 328.3 as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, or the presence of litter and debris. In the Arid West region of the United States, waters are variable and include ephemeral/intermittent and perennial channel forms. The most problematic ordinary high-water (OHW) delineations are associated with the commonly occurring ephemeral/intermittent channel forms that dominate the Arid West landscape. Delineation methods were completed in accordance with *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE, 2008a), and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE, 2010).

Delineating Waters of the State

Waters of the State have been delineated using the same methodology as waters of the U.S.

Delineating Lakes, Streams, and Associated Vegetation

Potential CDFW-jurisdictional waters were delineated by the top of the bank of a stream, and the outer dripline of riparian vegetation or wetlands supported by the lake or stream.

4.3 Mapping and Acreage Calculations

All features, including data points, wetland boundaries, and channels were recorded using a GPS unit (Trimble GeoXT) with real-time differential correction and an instrument-rated mapping accuracy of +/- 1 meter, or were delineated on aerial photography using Geographic Information System (GIS) software (ArcGIS 10.2) and site-specific topographic data and aerial imagery.

In the office, data from data points and wetland boundaries were downloaded from the GPS unit and mapped using GIS software on an overlay of topographic contours and geo-referenced aerial photography. GPS-determined wetland boundaries and data points were visually confirmed. Acreage of wetland and waters of the U.S. polygons, and the length of linear features were determined using ArcGIS.

Section 5
Results and Conclusions

The results of the database/literature review and jurisdictional delineation are discussed in this section. Representative photographs from the field delineation are located in **Appendix B**.

This jurisdictional delineation identified 18.28 acres of potentially jurisdictional waters of the U.S., subject to jurisdiction under Section 404 of the CWA. Potentially jurisdictional features include 4.33 acres of wetlands and 13.95 acres of other waters of the U.S. Potentially jurisdictional features within the study area include Syphon Reservoir, riverine and wetland habitats. **Table 5-1** provides the total extent of potentially jurisdictional wetlands and waters of the U.S. within the study area. Potentially jurisdictional features are depicted in detailed maps provided in **Figure 5-1** and **Figure 5-2**. Each type of wetland and other waters is described in greater detail in Section 5.1.

TABLE 5-1
POTENTIALLY JURISDICTIONAL WATERS OF THE U.S. IN THE STUDY AREA

Feature Type	Cowardin Classification	Extent	
		Linear feet	Area (acres)
Wetland Waters of the U.S.			
Wetlands	Palustrine emergent wetlands (semipermanently flooded)	N/A	4.33
	Total Wetlands		**4.33**
Other Waters of the U.S.			
Reservoir	Palustrine (diked/impounded, permanently flooded)	N/A	13.93
Drainage 1	Riverine (ephemeral)	243	0.01
Drainage 2	Riverine (ephemeral)	201	0.01
	Total Other Waters	444	13.95
	Total Waters of the U.S./State	**444**	**18.28**

NOTE: Area subtotals subject to rounding.

5.1 Potentially Jurisdictional Wetlands

The following is a discussion of those areas identified to be potentially jurisdictional wetland waters of the U.S., based upon observations or inferences of wetland hydrology, soils, and vegetation.

Wetlands

The freshwater wetlands within the study area are classified as *Palustrine Emergent Wetlands, Semipermanently Flooded* according to the Cowardin classification system (Cowardin et al., 1979). These are areas that become at least partially inundated all year, support facultative (or wetter) annual plants, and are located along the edges of the reservoir. Data points that correspond with freshwater wetland are DP2, DP3, DP5, DP8, and DP10. Corresponding upland points are DP1, DP4, DP6, DP7, and DP9.

The wetlands are largely dominated by native plant species including California bulrush (*Schoenoplectus californicus*, OBL[1]), black willow (*Salix gooddingii*, FACW[2]), and yellow sweet clover (*melilotus officinalis*, FACU[3]). This habitat also supports a range of non-native plant species including seaside heliotrope (*Heliotropium curassavicum*, FACU), spiny cocklebur (*Xanthium spinosum*, FACU), short podded mustard (*Hirschfeldia incana*, UPL[4]), and telegraph weed (*Heterotheca grandiflora*, UPL).

The wetlands occur along the margins of Syphon Reservoir (see Figures 2-2 and 5-1). Although not mapped as hydric soils according to NRCS, hydric soil indicators observed in the wetlands include the presence of muck (A9), hydrogen sulfide (A4), depleted below dark surface (A11), redox dark surface (F6), and sandy gleyed matrix (S4). The wetland areas generally had very silty loam, clay soils, while sandy soils were encountered at DP8. Indicators of wetland hydrology include a high water table (A2), saturation (A3), biotic crust (B12), and hydrogen sulfide odor (C1).

5.2 Potentially Jurisdictional Other Waters of the U.S.

Following is a discussion of those areas identified to be potentially jurisdictional waters of the U.S., based upon observations or inferences of wetland hydrology, soils, and vegetation.

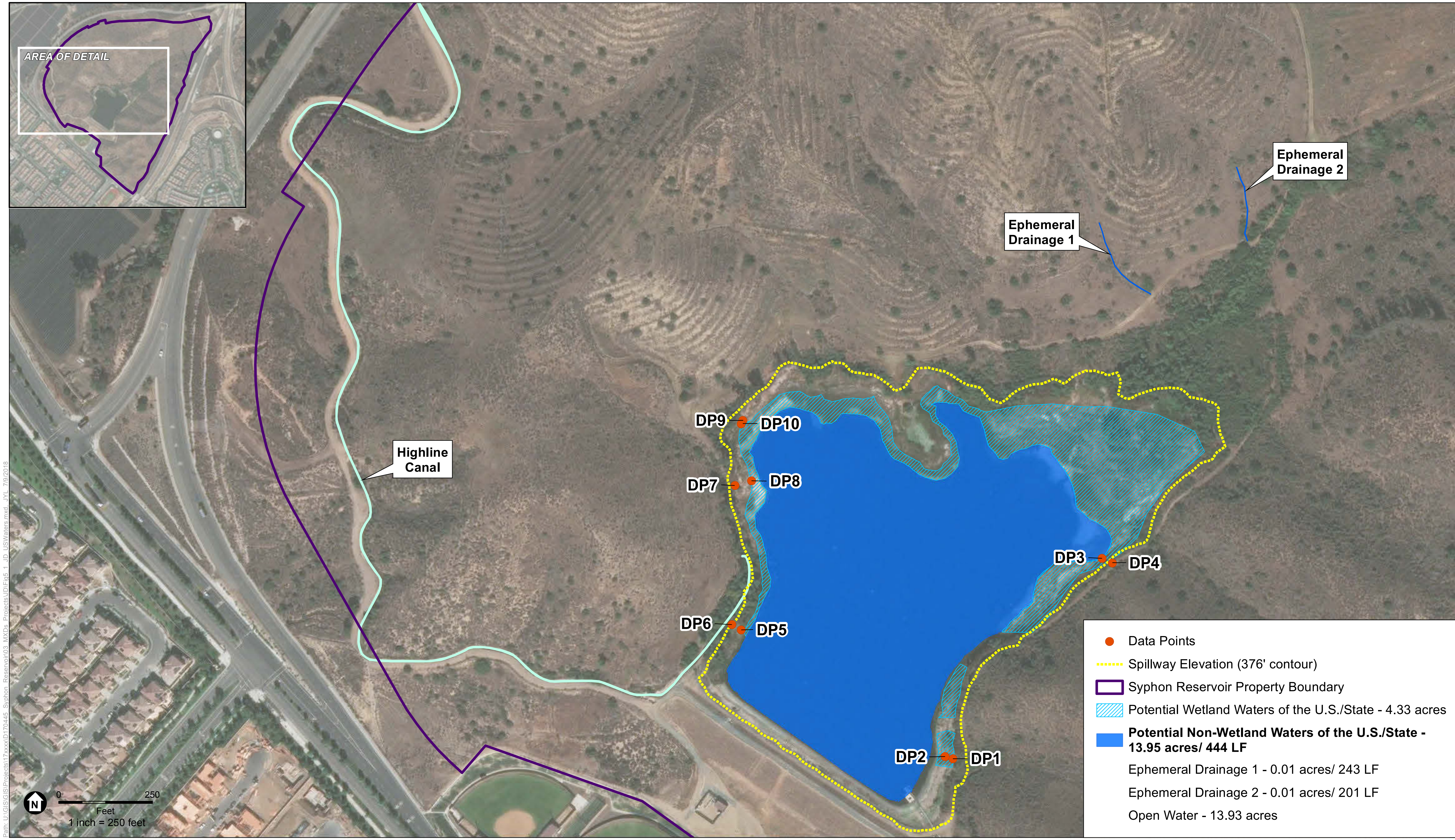
---

1 OBL – obligate. Plant species with this wetland indicator status occur almost always under natural conditions in wetlands.

2 FACW – facultative wetland. Plant species with this wetland indicator status usually occur in wetlands but are occasionally found in non-wetlands.

3 FACU – facultative upland. Plant species with this wetland indicator status usually occur in non-wetlands but are occasionally found in wetlands.

4 UPL – upland. Plant species with this wetland indicator status occur in wetlands in another region, but occur almost always under natural conditions in non-wetlands in the Arid West Region.

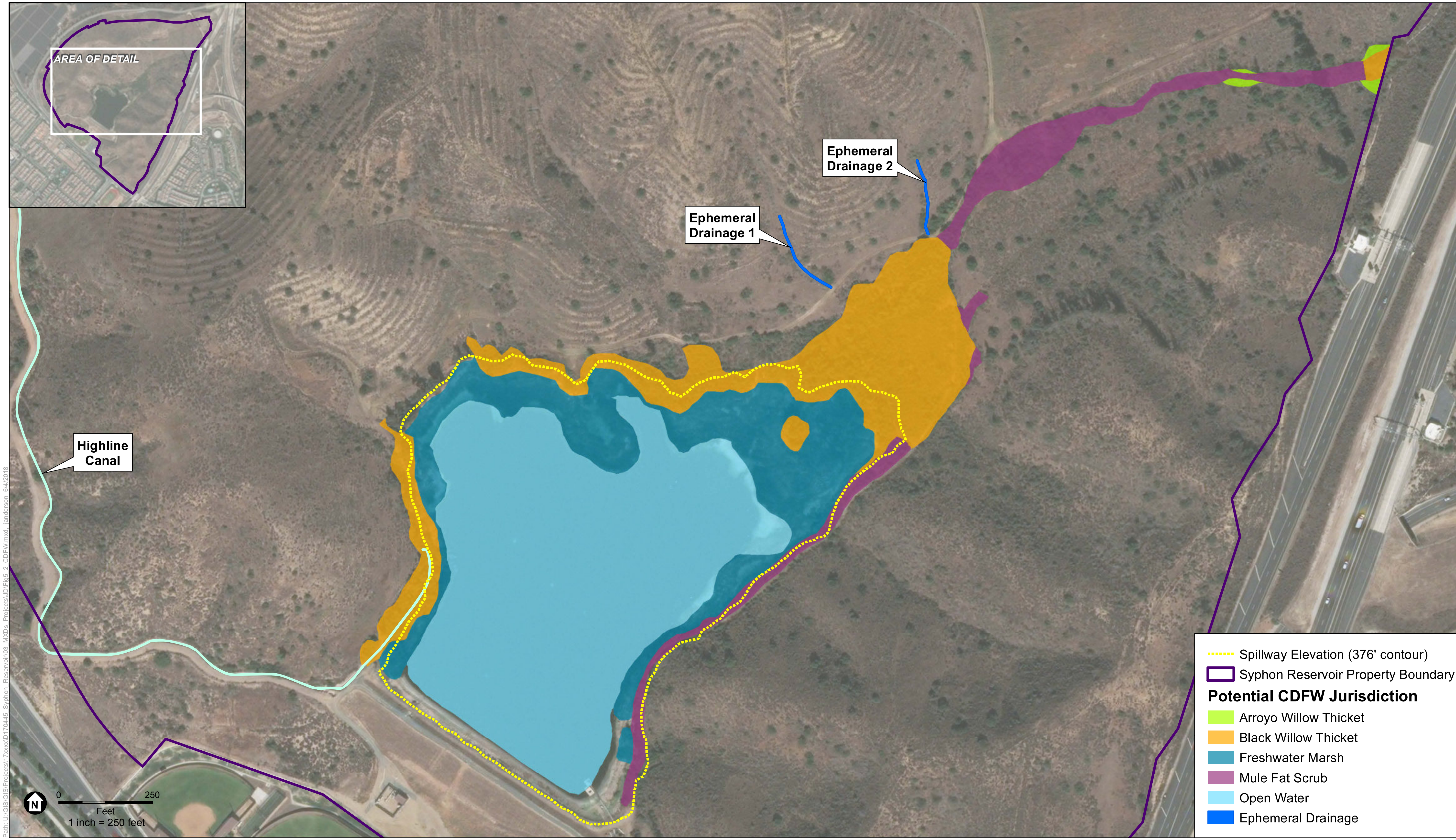


SOURCE: ESRI, 2016

IRWD Syphon Reservoir

Figure 5-1
Jurisdictional Delineation Map
Potential Waters of the U.S./State

ESA



SOURCE: ESRI, 2016

IRWD Syphon Reservoir

Figure 5-2
Jurisdictional Delineation Map – Potential CDFW Jurisdiction

ESA

Reservoir

Syphon Reservoir is considered *Lacustrine* habitat according to the Cowardin classification system (Cowardin et al., 1979). Lacustrine habitats are inland depressions or dammed riverine channels containing standing water. The OHWM of the reservoir was determined to be along the edge of the reservoir where surface water was observed at the time of the delineation, or based on physical characteristics of water fluctuation such as downed emergent vegetation. The water surface elevation of the reservoir is influenced by IRWD's management of the recycled water system. The reservoir functions as a seasonal recycled water storage facility; as such, the reservoir includes areas where open water persists throughout the year at a minimum water surface elevation but fluctuates seasonally up to a maximum water surface elevation based on demands for recycled water. The reservoir captures runoff from adjacent areas, including a primary drainage in the central portion of the study area that supports intermittent flows and riparian vegetation north of the reservoir and wetlands shown in **Figure 5-1**. However, there was no OHWM observed in this central drainage and the primary drainage was not mapped as potential other waters of the U.S.

Ephemeral Drainages

Two ephemeral drainages (Nos. 1 and 2) are considered *Riverine* habitat according to the Cowardin classification system (Cowardin et al., 1979). Riverine habitats include rivers, streams, and creeks, and can occur in association with many terrestrial habitats. Riverine habitats are also found contiguous to lacustrine and fresh emergent wetland habitats. Both ephemeral drainages were mapped north of the reservoir (Figure 5-1). These drainages convey stormwater runoff from upland areas to the central drainage via a culvert under the existing dirt road that runs along the west and north sides of the reservoir. The OHWM was an average of two feet wide, based on evidence of shelving. Ephemeral Drainage 1 supports a mix of non-native herbaceous cover and California sagebrush scrub, while Ephemeral Drainage 2 supports a mix of non-native herbaceous cover, California sagebrush scrub, and laurel sumac scrub. No surface water was observed in either drainage.

5.3 Potentially Jurisdictional Section 1602 Lakes, Streams and Associated Vegetation

Areas within CDFW jurisdiction typically refer to streambeds and associated wetland or riparian vegetation. Within the study area, the potential extent of CDFW limits was taken to the outer edge of the overhanging riparian or wetland vegetation adjacent to the reservoir, and to the top of bank for the ephemeral drainages (**Figure 5-2**). Therefore, as shown in **Table 5-2**, approximately 27.26 acres of the study area could be subject to CDFW jurisdiction.

TABLE 5-2
SUMMARY OF SECTION 1602 LAKES, STREAMS, AND ASSOCIATED VEGETATION

Feature	Stream/Riparian Limits Acres	Length (feet)	Average Stream Width	Vegetation/Habitat Type
Syphon Reservoir	13.93	N/A	N/A	Open water
Riparian	8.93	N/A	N/A	Blackwillow thicket, arroyo willow thicket, mulefat scrub
Freshwater Marsh	4.33	N/A	N/A	Freshwater marsh
Ephemeral Drainage 1	0.04	243	7	Non-native herbaceous cover/California sagebrush scrub
Ephemeral Drainage 2	0.03	201	7	Non-native herbaceous cover/California sagebrush scrub, and laurel sumac scrub
Totals:	**27.26**	**444**	**N/A**	

5.4 Jurisdictional Analysis

The following analysis discusses the delineated water features within the study area and which regulatory agencies could require approvals/permits prior to impacts. This includes wetland and riparian vegetation, Syphon Reservoir, and the two ephemeral drainages within the study area.

Wetlands

The wetlands within the study area are fringe wetlands associated with the reservoir. These wetlands are isolated from downstream waters of the U.S. and lack hydrologic connectivity to interstate commerce. As discussed in Section 3.1 above, geographically isolated waters, including wetlands, are generally not considered to be jurisdictional under the CWA because they lack links to interstate commerce. However, for each specific request for isolated waters (i.e., approved jurisdictional determination), the USACE and EPA will need to make a case by case determination on the jurisdictional status of the resource, which would dictate the appropriate permitting requirements.

Other Waters of the U.S.

As previously discussed, the reservoir currently drains through a series of underground pipes that convey flows through the strainer and chlorination facility, before being distributed to customers through IRWD's recycled water system. As such, the waters within Syphon Reservoir and the two ephemeral drainages do not exhibit hydrologic connectivity to downstream waters of the U.S. or the Pacific Ocean (TNW), and are considered isolated waters. As discussed in Section 3.1 above, geographically isolated waters, including wetlands, are generally not considered to be jurisdictional under the CWA because they lack links to interstate commerce. However, for each specific request for isolated waters (i.e., approved jurisdictional determination), the USACE and EPA will need to make a case by case determination on the jurisdictional status of the resource, which would dictate the appropriate permitting requirements.

Waters of the State

All areas mapped as potential waters of the U.S./State are regulated by the Santa Ana RWQCB pursuant to the Porter-Cologne Water Quality Control Act. Assuming the USACE and EPA will determine absence of federal jurisdiction (waters of the U.S.) onsite, a WDR and/or a WDR amendment will be required from the RWQCB for the project.

Lakes, Streams, and Associated Vegetation

Within the study area, Syphon Reservoir, wetland and riparian vegetation, and the two ephemeral drainages could be subject to CDFW jurisdiction. A Streambed Alteration Agreement (SAA) will be required from the CDFW per Section 1602 of the Fish and Game Code.

5.5 Conclusions

Based on the jurisdictional analysis presented in Section 5.4 above, it is presumed that there are no waters of the U.S. within the study area. A total of 18.28 acres of potentially jurisdictional wetlands and other waters of the State occur within the 266-acre study area, consisting of 4.33 acres of wetlands and 13.95 acres of other waters. A total of 27.26 acres of lakes, streams and associated vegetation occur within the study area that are potentially subject to Section 1602 of the Fish and Game Code.

This report documents the wetland boundary delineation and best professional judgment of ESA investigators. All conclusions presented for waters of the U.S. should be considered preliminary and subject to change pending official review and preliminary jurisdictional determination in writing by the USACE. All conclusions presented for Section 1602 lakes, streams and associated vegetation should be considered preliminary and subject to change pending official review by the CDFW.

Section 6
Supplemental Information

6.1 Directions to the Study Area

From Los Angeles, take Interstate 5 South for approximately 31 miles. Use the right 2 lanes to take exit 96B to merge onto CA-133 North toward Santa Margarita. Take exit 12 for Irvine Boulevard and turn left onto Irvine Boulevard. Turn right onto Sand Canyon Avenue and use the left 2 lanes to turn left onto Portola Parkway. Syphon Reservoir will be on your right behind the Crean Lutheran High Athletic Complex.

6.2 Project Applicant Contact Information

Jo Ann Corey
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618
(949) 453-5300
Corey@irwd.com

6.3 Field Delineator Contact Information

May Lau
Environmental Science Associates
626 Wilshire Blvd. Suite 1100
Los Angeles, CA 90017
(213) 599-4300
mlau@esassoc.com

Section 7
References

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, editors, 2012. The Jepson manual: Vascular plants of California, second edition. University of California Press, Berkeley, CA

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe, 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Dudek. 2012. Syphon Reservoir Environmental Regulatory Evaluation Preliminary Draft, October.

Environmental Laboratory, Department of the Army, 1987. Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1). U.S. Army Corps of Engineers. Waterways Experimental Station. Vicksburg, Mississippi.

Google Earth. 2017. Desktop application Available at: http://www.google.com/earth/index.html. Accessed May 2017.

Gray, J. and D. Bramlet. 1992. Habitat Classification System, Natural Resources, Geographic Information System (GIS) Project. County of Orange Environmental Management Agency, Santa Ana, CA.

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. Arid West 2016 Regional Wetland Plant List. Phytoneuron 2016-30: 1-17. Published 28 April 2016.

Munsell. 2000. Munsell soil color charts. GretagMacbeth, New Windsor, New York, USA.

Natural Resources Conservation Service (NRCS). 2010. 2010. *Field Indicators of Hydric Soils in the United States, Version 7.0, 2010*. Edited by L.M. Vasilas, G.W. Hurt, and C.V. Noble. U.S. Department of Agriculture, Natural Resources Conservation Service, in cooperation with the National Technical Committee for Hydric Soils.

———2016. *Hydric Soils List of California* Available at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/. Accessed May 2017.

———2017. Web Soil Survey. Available at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed May 2017.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. *A Manual of California Vegetation, Second Edition*. California Native Plant Society, Sacramento, CA. 1300 pp.

U.S. Environmental Protection Agency and Department of the Army. 2003. *Legal Memoranda Regarding Solid Waste Agency of Northern Cook County (SWANCC) v. United States* [68 FR 1991, 1995 (January 15, 2003)].

U.S. Army Corps of Engineers (USACE). 2008a. *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. August.

———2008b. *Arid West Supplement to the 1987 Wetlands Delineation Manual*.

———2010. *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. July.

Appendix A
Field Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphen City/County: Irvine, OC Sampling Date: 4/24/18

Applicant/Owner: IRWD State: ____ Sampling Point: 1

Investigator(s): ML, TM Section, Township, Range: ____

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR): C Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ~~X~~ No ____	
Wetland Hydrology Present?	Yes ____ No X	

Remarks: Eastern edge of reservoir south

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix goodingii	1	Y	FACW
2.			
3.			
4.			
	1 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15')			
1. Schoenoplectus californicus	70	Y	OBL
2. Baccharis salicifolia	5	N	FAC
3.			
4.			
5.			
	75 = Total Cover		
Herb Stratum (Plot size: 5')			
1. Heliotropium curassavicum	15	Y	FACU
2. Melilotus officinalis	14	Y	FACU
3. Artemesia douglasiana	1	N	FAC
4.			
5.			
6.			
7.			
8.			
	30 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	70	x 1 = 70
FACW species	1	x 2 = 2
FAC species	6	x 3 = 18
FACU species	29	x 4 = 116
UPL species		x 5 =
Column Totals:	106 (A)	206 (B)

Prevalence Index = B/A = 1.94

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	7.5YR 3/2	70	7.5YR 5/8	30	C	M	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
X Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: rock
Depth (inches): 6

Hydric Soil Present? Yes X No __

Remarks: living roots; oxidized root pores

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Thin Muck Surface (C7)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? Yes __ No X Depth (inches): __
Water Table Present? Yes __ No X Depth (inches): __
Saturation Present? (includes capillary fringe) Yes __ No X Depth (inches): __

Wetland Hydrology Present? Yes __ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: downed veg. possibly from fluctuation of reservoir levels

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine, OC Sampling Date: 4/24/18
Applicant/Owner: IRWD State: ________ Sampling Point: 2
Investigator(s): ML, TM Section, Township, Range: ________
Landform (hillslope, terrace, etc.): ________ Local relief (concave, convex, none): ________ Slope (%): ________
Subregion (LRR): C Lat: ________ Long: ________ Datum: ________
Soil Map Unit Name: ________ NWI classification: ________
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes ____ No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks: wetland adjacent to water line, south eastern edge of reservoir

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix goodingii	5	Y	FACW
2.			
3.			
4.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15')			
1. Schoenoplectus californicus	95	Y	OBL
2.			
3.			
4.			
5.			
	95 = Total Cover		
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ________ % Cover of Biotic Crust ________

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ________

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 2/1	100					loamy, mucky	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- X 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks: organic top layer 1"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___
Water Table Present? Yes ___ No ___ Depth (inches): 4
Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine, OC Sampling Date: 4/24/18

Applicant/Owner: IRWD State: ______ Sampling Point: 3

Investigator(s): ML, TM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes X	No ______
Wetland Hydrology Present?	Yes X	No ______

Is the Sampled Area within a Wetland? Yes X No ______

Remarks: Northeastern edge of reservoir

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
	______ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15')			
1. Schoenoplectus californicus	85	Y	OBL
2. Xanthium spinosum	5	N	FACU
3.			
4.			
5.			
	90 = Total Cover		
Herb Stratum (Plot size: 5')			
1. melilotus officinalis	10	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	______ = Total Cover		

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	85	x 1 = 85
FACW species		x 2 =
FAC species		x 3 =
FACU species	15	x 4 = 60
UPL species		x 5 =
Column Totals:	100 (A)	145 (B)

Prevalence Index = B/A = 1.45

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- X Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks:

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	5YR 3/2	85	7.5YR 4/6	15	C	PL	Clay	loam - silty

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 6

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine, OC Sampling Date: 4/28/18

Applicant/Owner: IRWD State: ______ Sampling Point: 4

Investigator(s): ML, TM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): 5

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___ No X	
Wetland Hydrology Present?	Yes ___ No X	

Remarks: northeastern edge of reservoir

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Rhus lobata	10	Y	UPL
2. Malosma laurina	5	Y	UPL
3.			
4.			
	15	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. Malosma laurina	5	Y	UPL
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 5')			
1. Melilotus officinalis	30	Y	FACU
2. Xanthium spinosum	10	N	FACU
3. Schoenoplectus californicus	50	Y	OBL
4.			
5.			
6.			
7.			
8.			
	90	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	50	x 1 = 50
FACW species		x 2 =
FAC species		x 3 =
FACU species	40	x 4 = 160
UPL species	20	x 5 = 100
Column Totals:	110 (A)	310 (B)

Prevalence Index = B/A = 2.8

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- X Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: upland scrub sp.

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/2	100					loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 4

Hydric Soil Present? Yes ______ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ________

Water Table Present? Yes ____ No ____ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ________

Wetland Hydrology Present? Yes ______ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine, OC Sampling Date: 4/24/18

Applicant/Owner: IRWD State: ______ Sampling Point: 5

Investigator(s): ML, TM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland?	Yes X No ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks: Southwest edge of reservoir

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1. Salix gooddingii	25	Y	FACW
2.			
3.			
4.			
= Total Cover	25		
Sapling/Shrub Stratum (Plot size: 15')			
1. Schoenoplectus californicus	75	Y	OBL
2.			
3.			
4.			
5.			
= Total Cover	75		
Herb Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2								organic layer
2-6	10YR4/1	100					Silty loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- X 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 6

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 2

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine ~~EA~~OC Sampling Date: 4/24/18

Applicant/Owner: IRWD State: CA Sampling Point: 6

Investigator(s): ML, TM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present?	Yes X No ______	
Wetland Hydrology Present?	Yes ______ No X	

Remarks: Southwest edge of reservoir

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix goodingii	20	Y	FACW
2. Malosma laurina	25	Y	UPL
3.			
4.			
	~~B~~45 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15')			
1. Baccharis salicifolia	50	Y	FAC
2. Xanthium spinosum	5	N	FACU
3.			
4.			
5.			
	55 = Total Cover		
Herb Stratum (Plot size: 5')			
1. Schoenoplectus californicus	80	Y	OBL
2. heliotropium curassavicum	2	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	82 = Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	______ = Total Cover		

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: Pit between bulrush & mulefat

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	90	10YR 5/8	10	C	PL	Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 12

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ___ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine, OC Sampling Date: 4/24/18

Applicant/Owner: IRWD State: CA Sampling Point: 7

Investigator(s): ML, TM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present?	Yes ______ No X	
Wetland Hydrology Present?	Yes ______ No X	

Remarks: western edge of reservoir

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix gooddingii	30	Y	FACW
2.			
3.			
4.			
	30	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 5')			
1. Melilotus officinalis	2	N	FACU
2. Bromus madritensis	1	N	UPL
3. Schoenoplectus californicus	40	Y	OBL
4.			
5.			
6.			
7.			
8.			
	43	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 27 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks:

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 5/3	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ______ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ______
Water Table Present? Yes ____ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ______

Wetland Hydrology Present? **Yes** ______ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine, OC Sampling Date: 4/24/18

Applicant/Owner: IRWD State: ______ Sampling Point: 8

Investigator(s): MI, TM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil X, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes X	No ______
Wetland Hydrology Present?	Yes X	No ______

Is the Sampled Area within a Wetland? Yes X No ______

Remarks: western edge of reservoir; disturbed soils (ie, stakes in ground)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5')			
1. Schoenoplectus californicus	70	Y	OBL
2. Heliotropium sp. curassavicum	5	N	FACU
3. Hirschfeldia incana	2	N	UPL
4. Heterotheca grandiflora	2	N	UPL
5.			
6.			
7.			
8.			
= Total Cover	79		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 25 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks:

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10	Gley 1 4/10y	100%					sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- X Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: rock
Depth (inches): 10

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes X No ___ Depth (inches): 2
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine, OC Sampling Date: 4/24/18

Applicant/Owner: IRWD State: CA Sampling Point: 9

Investigator(s): ML, TM Section, Township, Range: ____

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No X
Hydric Soil Present?	Yes ____	No X
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: Northwestern edge of reservoir

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Eucalyptus globulus	25	Y	UPL
2.			
3.			
4.			
	25 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5')			
1. Schoenoplectus californicus	30	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	30 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 70 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	30	x 1 = 30
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species	25	x 5 = 125
Column Totals:	~~[illegible]~~ 55 (A)	155 (B)

Prevalence Index = B/A = 2.8

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- X Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5YR5/2	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Fill

Depth (inches): 6

Hydric Soil Present? Yes ___ No X

Remarks: Fill

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Syphon City/County: Irvine, OC Sampling Date: 4/24/18

Applicant/Owner: IRWD State: ____ Sampling Point: 10

Investigator(s): ML, TM Section, Township, Range: ____

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: Northwestern edge of reservoir by eucalyptus woodland

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5')			
1. Schoenoplectus californicus	60	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	60		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- X Dominance Test is >50%
- __ Prevalence Index is ≤3.0[1]
- __ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	5Y 4/2	98	5YR 5/8	2	C	PL	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: N/A

Depth (inches): ______

Hydric Soil Present? Yes X No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ____________

Water Table Present? Yes ______ No X Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No X Depth (inches): ____________

Wetland Hydrology Present? Yes X No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix B
Representative Photographs

Photograph 1-Photo facing south across open water habitat in Syphon Reservoir.

Photograph 2-Photo facing west at Data Point 3. This sample met all 3 wetland criteria to be considered a USACE wetland.

Photograph 3-Photograph facing east at Data Point 4. DP4 is an upland sample that supports hydrophytic vegetation, but lacks both hydric soils and wetland hydrology.

Photograph 4-Photograph facing west at Data Point 6. DP6 is an upland sample that supports hydrophytic vegetation and hydric soils, but lacks wetland hydrology.

Photograph 5-Photo facing north at Data Point 8. This sample met all 3 wetland criteria to be considered a USACE wetland. Note the high water table in the soil pit.

Photograph 6- Photo facing southeast at Data Point 10. This sample met all 3 wetland criteria to be considered a USACE wetland.

Photograph 7- Photo facing north from dirt access road at Ephemeral Drainage 1.

Photograph 8- Photo facing south at the head of Ephemeral Drainage 2.

Photograph 9-Photo facing north along the central drainage's riparian corridor. Note no ordinary high water mark or bed or bank features.

Photograph 10-Photo west along the abandoned Highland Canal located in the southwest portion of the study area.

Appendix B
Approved Jurisdictional Determination

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, LOS ANGELES DISTRICT
915 WILSHIRE BOULEVARD, SUITE 930
LOS ANGELES, CA 90017

December 17, 2018

SUBJECT: Approved Jurisdictional Determination

Jo Ann Corey
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

Dear Ms. Corey:

I am responding to your request (File No. SPL-2018-00528-MY) dated August 9, 2018, for an approved Department of the Army jurisdictional determination (JD) for the Syphon Reservoir Improvement Project (lat. 34.710547°N, long. -117.731105°W) located near the city of Irvine, Orange County, California.

The Corps' evaluation process for determining whether or not a Department of the Army permit is needed involves two tests. If both tests are met, a permit would likely be required. The first test determines whether or not the proposed project is located within the Corps' geographic jurisdiction (i.e., it is within a water of the United States). The second test determines whether or not the proposed project is a regulated activity under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act. This evaluation pertains only to geographic jurisdiction.

Based on available information, I have determined waters of the United States do not occur on the project site. The basis for our determination can be found in the enclosed Approved Jurisdictional Determination (JD) form(s).

The aquatic resource identified as Syphon Reservoir in project documentation you provided is an intrastate isolated water with no apparent interstate or foreign commerce connection. As such, this aquatic resource is not currently regulated by the Corps of Engineers. This disclaimer of jurisdiction is only for Section 404 of the Clean Water Act. Other federal, state, and local laws may apply to your activities. In particular, you may need authorization from the California State Water Resources Control Board, the California Department of Fish and Wildlife, and/or the U.S. Fish and Wildlife Service.

This letter includes an approved jurisdictional determination for the Syphon Reservoir Improvement project site. If you wish to submit new information regarding this jurisdictional determination, please do so within 60 days. We will consider any new information so submitted and respond within 60 days by either revising the prior determination, if appropriate, or reissuing the prior determination. If you object to this or any revised or reissued jurisdictional determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) and Request for Appeal (RFA) form. If you wish to appeal this decision, you must submit a completed RFA form within

60 days of the date on the NAP to the Corps South Pacific Division Office at the following address:

Tom Cavanaugh
Administrative Appeal Review Officer
U.S. Army Corps of Engineers
South Pacific Division, CESPD-PDS-O, 2042B
1455 Market Street
San Francisco, California 94103-1399

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5 (see below), and that it has been received by the Division Office by **January 29, 2018**.

This determination has been conducted to identify the extent of the Corps' Clean Water Act jurisdiction on the particular project site identified in your request, and is valid for five years from the date of this letter, unless new information warrants revision of the determination before the expiration date. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

Thank you for participating in the regulatory program. If you have any questions, please contact me at (213) 452-3411 or via e-mail at Miriam.Yemane@usace.army.mil. Please help me to evaluate and improve the regulatory experience for others by completing the customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

Sincerely,

FARRAR.CORICE.JEAN.1251907028

Digitally signed by FARRAR.CORICE.JEAN.1251907028
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=FARRAR.CORICE.JEAN.1251907028
Date: 2018.12.17 13:51:26 -08'00'

Corice Farrar.
Chief, South Coast Branch
Regulatory Division
Los Angeles District

Enclosure(s)

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL			
Applicant: Jo Ann Corey		File Number: SPL-2018-00528-MY	Date: December 17, 2018
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
X	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/cecw/pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

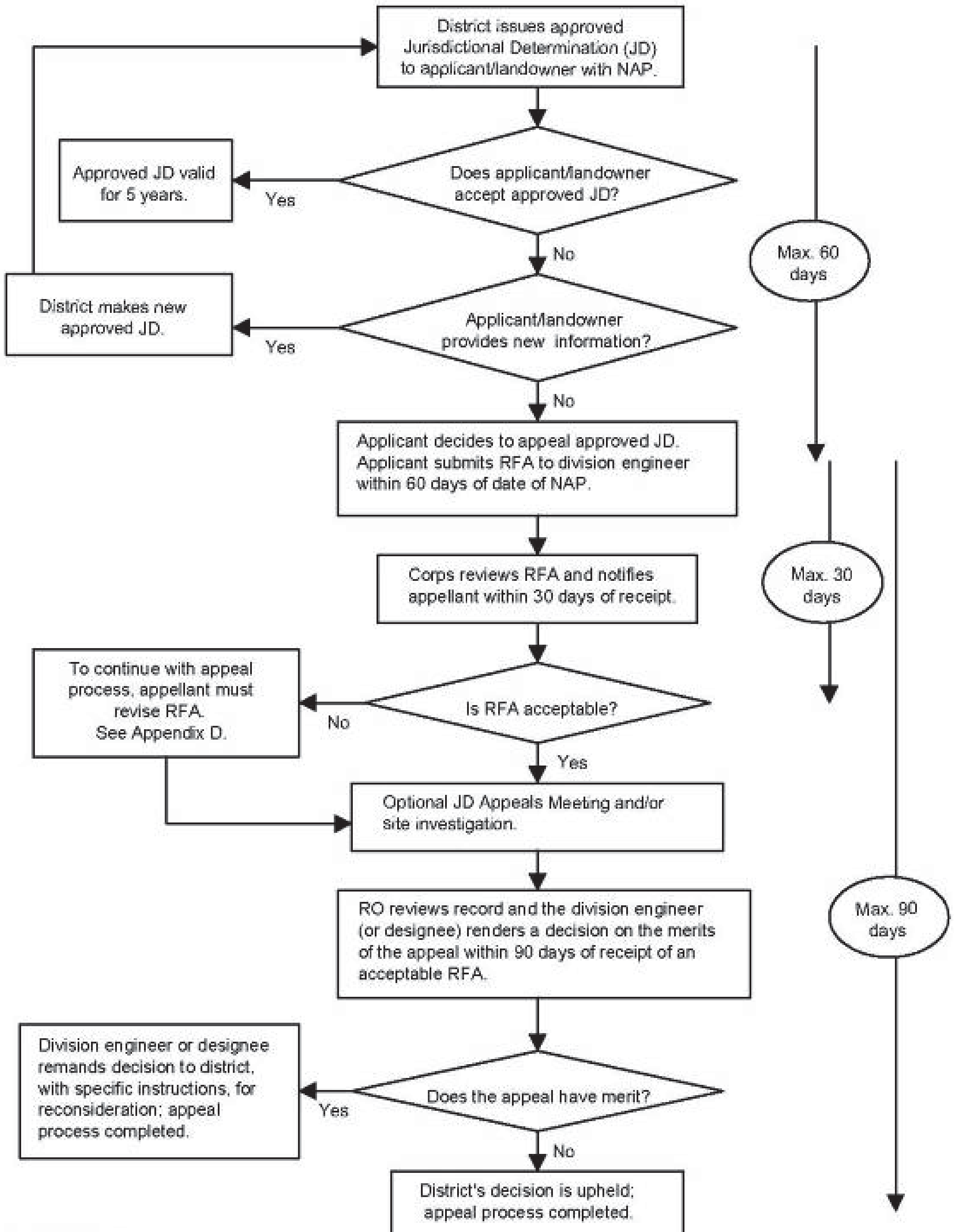
POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Miriam Yemane U.S. Army Corps of Engineers Los Angeles District 915 Wilshire Boulevard., Suite 930 Los Angeles, CA 90017 Phone: (213) 452-3411 Email: Miriam.Yemane@usace.army.mil	If you only have questions regarding the appeal process you may also contact: Thomas J. Cavanaugh Administrative Appeal Review Officer, U.S. Army Corps of Engineers South Pacific Division 1455 Market Street, 2052B San Francisco, California 94103-1399 Phone: (415) 503-6574 Fax: (415) 503-6646 Email: thomas.j.cavanaugh@usace.army.mil

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.	Date:	Telephone number:

Administrative Appeal Process for Approved Jurisdictional Determinations



Appendix C

§ 331.5 Criteria.

(a) *Criteria for appeal* —(1) *Submission of RFA.* The appellant must submit a completed RFA (as defined at §331.2) to the appropriate division office in order to appeal an approved JD, a permit denial, or a declined permit. An individual permit that has been signed by the applicant, and subsequently unilaterally modified by the district engineer pursuant to 33 CFR 325.7, may be appealed under this process, provided that the applicant has not started work in waters of the United States authorized by the permit. The RFA must be received by the division engineer within 60 days of the date of the NAP.

(2) *Reasons for appeal.* The reason(s) for requesting an appeal of an approved JD, a permit denial, or a declined permit must be specifically stated in the RFA and must be more than a simple request for appeal because the affected party did not like the approved JD, permit decision, or the permit conditions. Examples of reasons for appeals include, but are not limited to, the following: A procedural error; an incorrect application of law, regulation or officially promulgated policy; omission of material fact; incorrect application of the current regulatory criteria and associated guidance for identifying and delineating wetlands; incorrect application of the Section 404(b)(1) Guidelines (see 40 CFR Part 230); or use of incorrect data. The reasons for appealing a permit denial or a declined permit may include jurisdiction issues, whether or not a previous approved JD was appealed.

(b) *Actions not appealable.* An action or decision is not subject to an administrative appeal under this part if it falls into one or more of the following categories:

(1) An individual permit decision (including a letter of permission or a standard permit with special conditions), where the permit has been accepted and signed by the permittee. By signing the permit, the applicant waives all rights to appeal the terms and conditions of the permit, unless the authorized work has not started in waters of the United States and that issued permit is subsequently modified by the district engineer pursuant to 33 CFR 325.7;

(2) Any site-specific matter that has been the subject of a final decision of the Federal courts;

(3) A final Corps decision that has resulted from additional analysis and evaluation, as directed by a final appeal decision;

(4) A permit denial without prejudice or a declined permit, where the controlling factor cannot be changed by the Corps decision maker (e.g., the requirements of a binding statute, regulation, state Section 401 water quality certification, state coastal zone management disapproval, etc. (See 33 CFR 320.4(j));

(5) A permit denial case where the applicant has subsequently modified the proposed project, because this would constitute an amended application that would require a new public interest review, rather than an appeal of the existing record and decision;

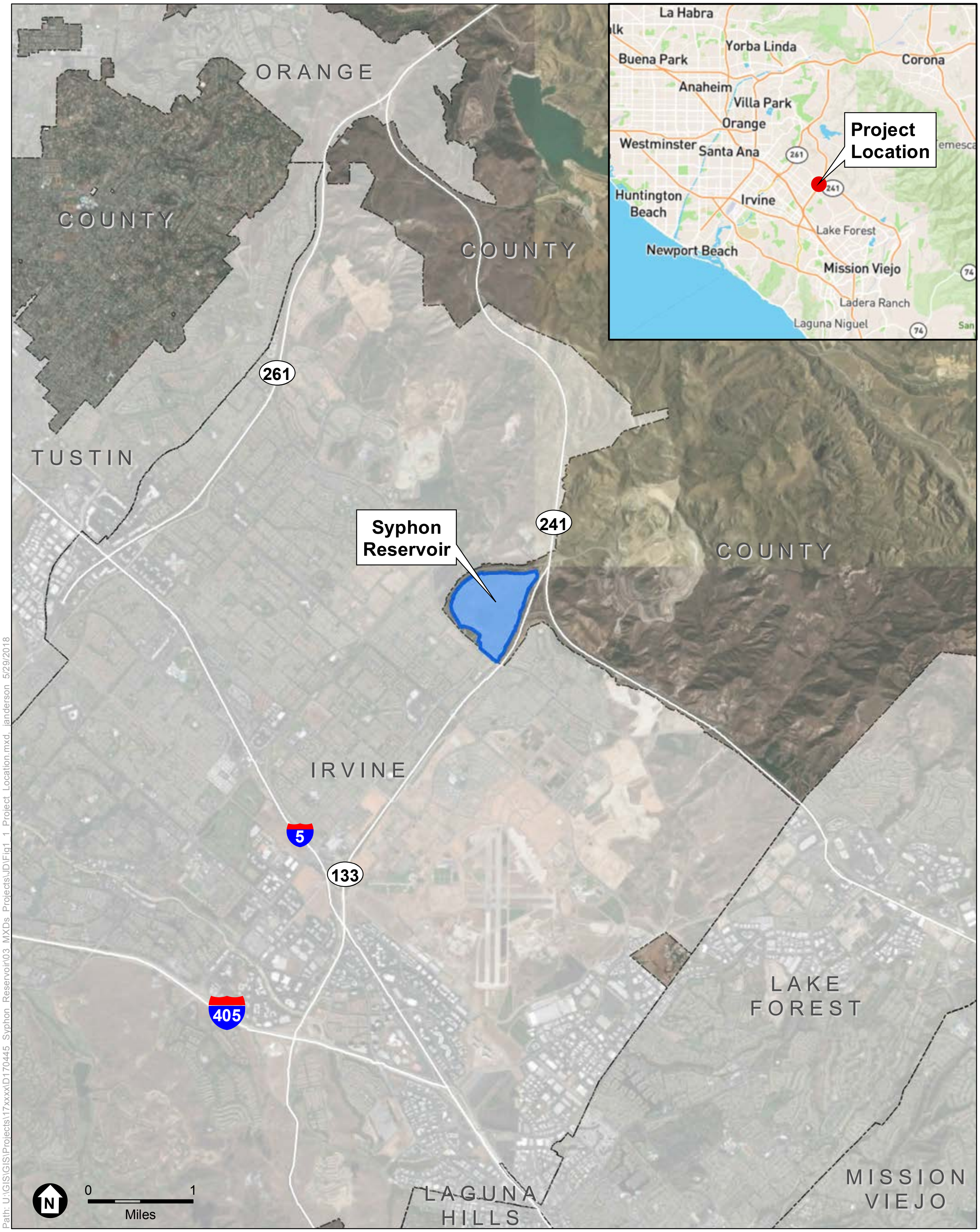
(6) Any request for the appeal of an approved JD, a denied permit, or a declined permit where the RFA has not been received by the division engineer within 60 days of the date of the NAP;

(7) A previously approved JD that has been superceded by another approved JD based on new information or data submitted by the applicant. The new approved JD is an appealable action;

(8) An approved JD associated with an individual permit where the permit has been accepted and signed by the permittee;

(9) A preliminary JD; or

(10) A JD associated with unauthorized activities except as provided in §331.11.

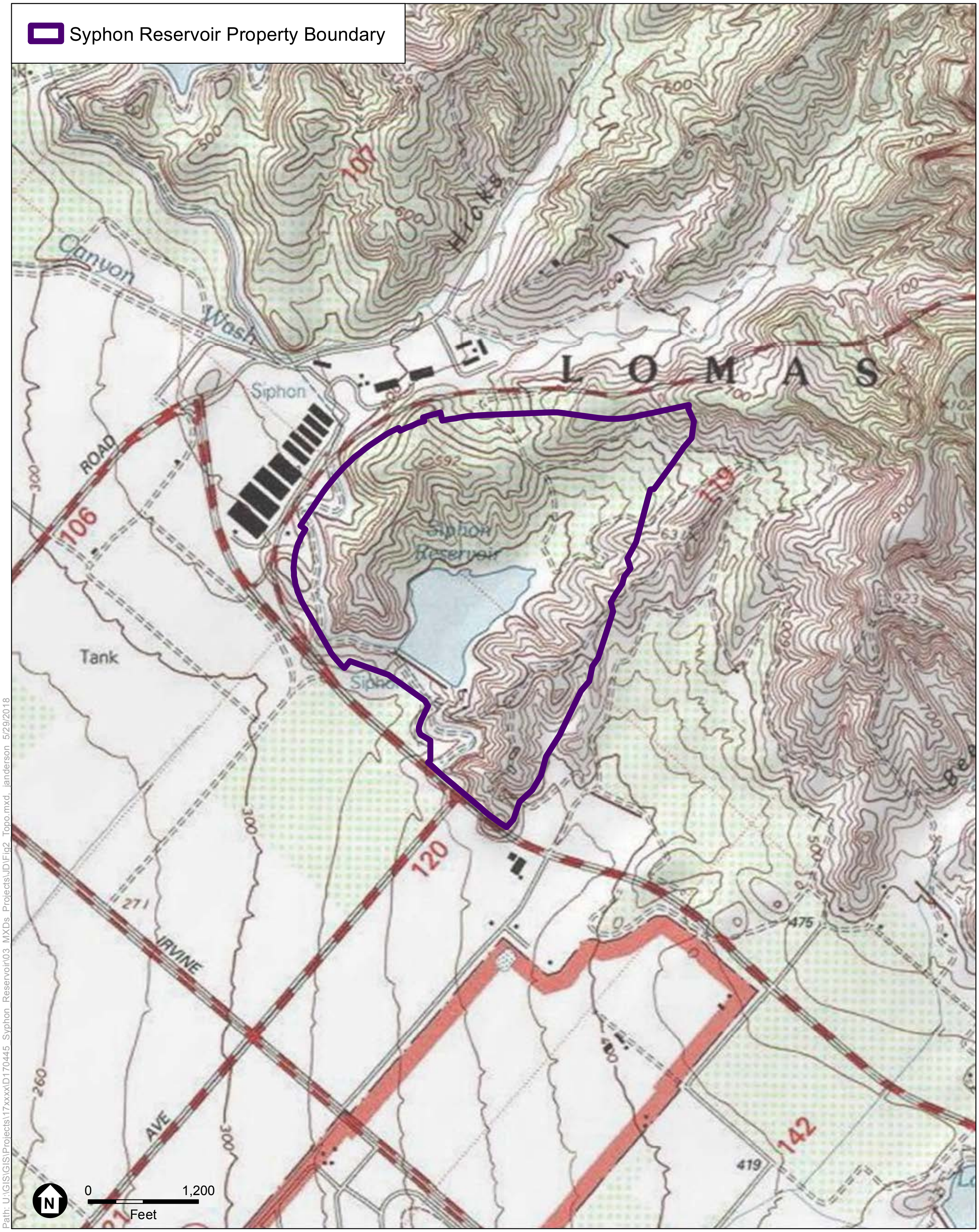


SOURCE: ESRI, 2016; OC LAFCO, 2018

IRWD Syphon Reservoir

Figure 1-1
Project Location

ESA



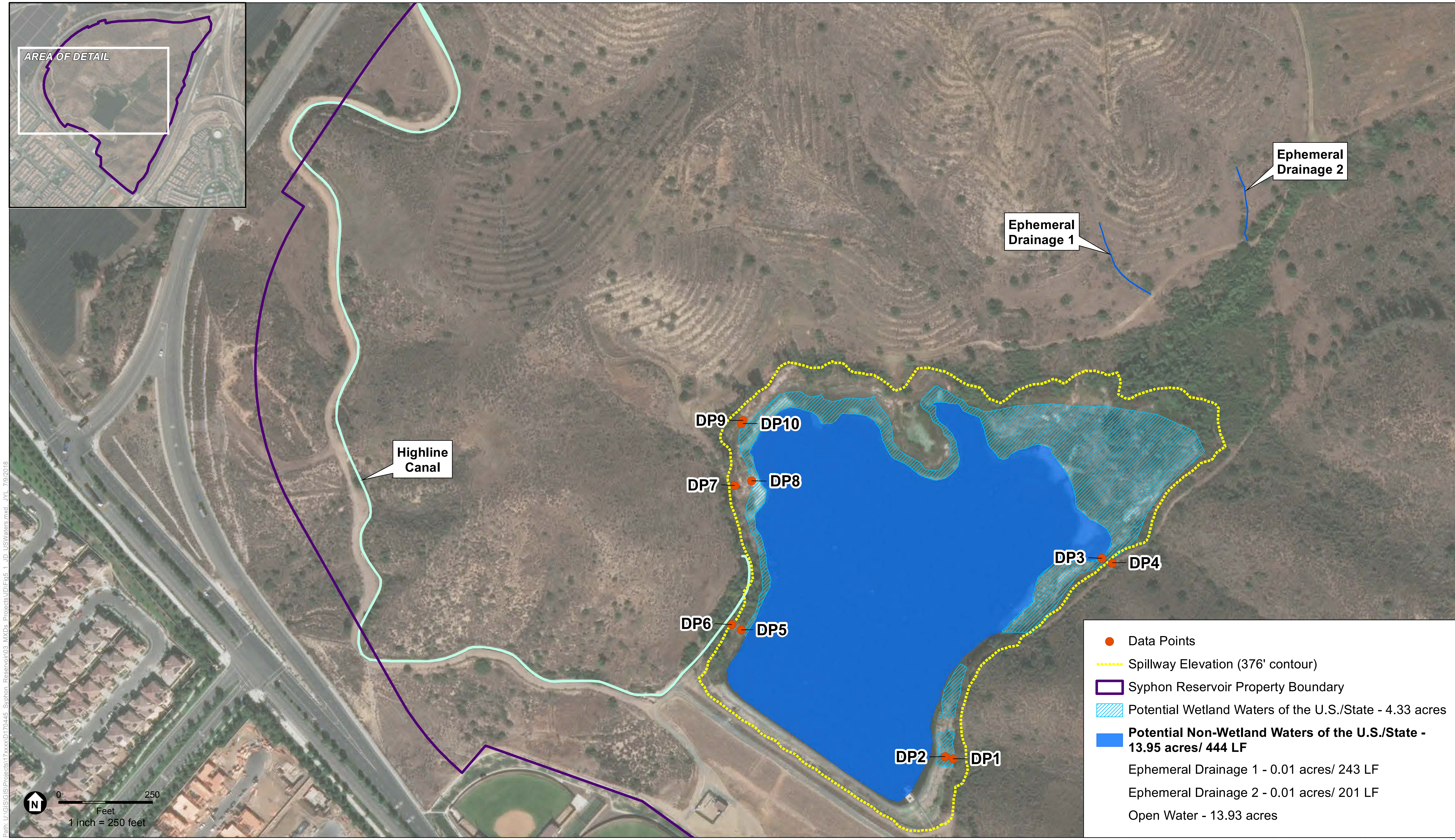
SOURCE: ESRI, 2016; El Toro USGS 7.5 minute Quadrangle

IRWD Syphon Reservoir

Figure 2

USGS Topographic Map

ESA

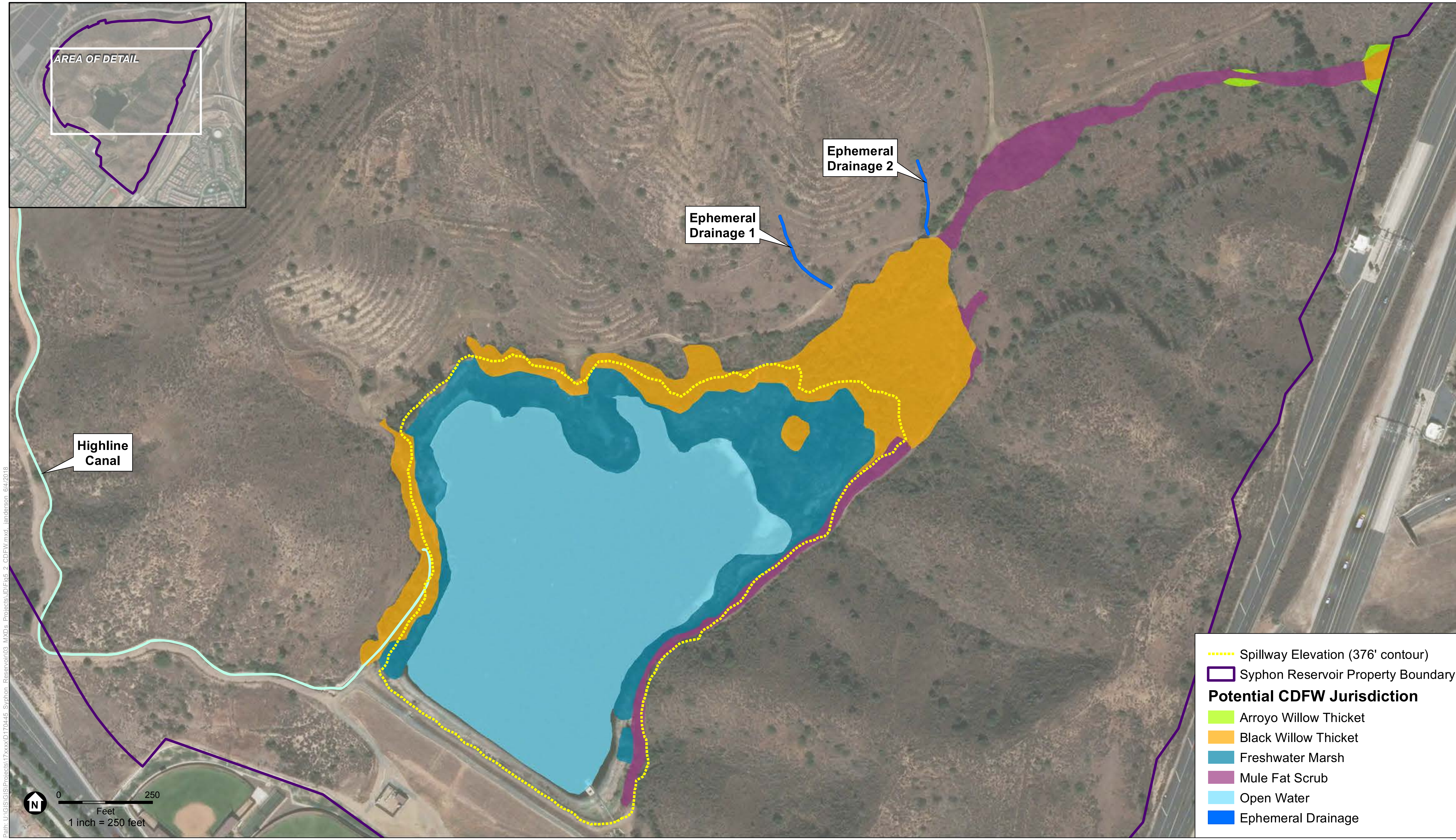


SOURCE: ESRI, 2016

IRWD Syphon Reservoir

Figure 3
Jurisdictional Delineation Map
Potential Waters of the U.S./State

ESA



SOURCE: ESRI, 2016

IRWD Syphon Reservoir

Figure 4

Jurisdictional Delineation Map – Potential CDFW Jurisdiction

ESA

Appendix C
Plant and Wildlife Species Compendia

Appendix C: Plant and Wildlife Species Compendia

Scientific Name	Common Name	Special Status
EUDICOTS		
Adoxaceae - Muskroot Family		
Sambucus nigra ssp. *caerulea*	blue elderberry	
Amaranthaceae - Amaranth Family		
Amaranthus blitoides	procumbent pigweed	
Amaranthus californicus	California amaranth	
Anacardiaceae - Sumac or Cashew Family		
Malosma laurina	laurel sumac	
Rhus integrifolia	lemonadeberry	
* *Schinus molle*	Peruvian pepper	
* *Searsia lancea*	African sumac	
Toxicodendron diversilobum	poison oak	
Apiaceae - Carrot Family		
Daucus pusillus	wild carrot	
Sanicula sp.	sanicle	
Apocynaceae - Dogbane Family		
Funastrum cynanchoides var. *hartwegii*	climbing milkweed	
* *Nerium oleander*	oleander	
Asteraceae - Sunflower Family		
Acourtia microcephala	sacapellote	
Anaphalis margaritacea	western pearly everlasting	
Artemisia californica	California sagebrush	
Baccharis pilularis	coyote brush	
Baccharis salicifolia	mule fat	
Bahiopsis laciniata	San Diego County viguiera	CRPR 4.3
Brickellia californica	California brickellbush	
* *Carduus pycnocephalus*	Italian thistle	
* *Centaurea melitensis*	tocalote	
* *Cynara cardunculus* ssp. *flavescens*	cardoon	
Deinandra fasciculata	fascicled tarweed	
* *Dimorphotheca* sp.	African daisy	
Eclipta prostrata	false daisy	
Encelia californica	California brittlebush	

Scientific Name	Common Name	Special Status
Encelia farinosa	brittlebush	
Ericameria pinifolia	pine-bush	
* *Erigeron bonariensis*	flax-leaved horseweed	
Erigeron canadensis	horseweed	
Erigeron foliosus	leafy fleabane	
Eriophyllum confertiflorum	golden yarrow	
* *Gazania rigens*	African daisy	
Gnaphalium palustre	lowland cudweed	
Gutierrezia californica	California matchweed	
* *Helminthotheca echioides*	bristly ox-tongue	
Heterotheca grandiflora	telegraph weed	
* *Hypochaeris glabra*	smooth cat's ear	
Isocoma menziesii var. *menziesii*	Menzies' goldenbush	
Isocoma menziesii var. *vernonioides*	coastal goldenbush	
* *Lactuca serriola*	prickly lettuce	
Laennecia coulteria	Coulter’s horseweed	
Lagfia gallica	narrowleaf cottonrose	
Lasthenia sp.	goldfields	
* *Oncosiphon piluliferum*	stinknet	
Osmadenia tenella	false rosinweed	
Pseudognaphalium biolettii	two-color rabbit-tobacco	
Pseudognaphalium californicum	Ladies' tobacco	
Pseudognaphalium canescens	Wright’s cudweed	
* *Pulicaria paludosa*	Spanish false fleabane	
Pseudognaphalium luteoalbum	Jersey cudweed	
* *Pulicaria paludosa*	Spanish false fleabane	
* *Senecio vulgaris*	common groundsel	
* *Sonchus asper*	spiny sow thistle	
* *Sonchus oleraceus*	common sow thistle	
Stebbinsoseris heterocarpa	grassland silverpuffs	
Stephanomeria virgata	rod wirelettuce	
Uropappus lindleyi	silver puffs	
Xanthium strumarium	cocklebur	
Boraginaceae - Borage Family		
Amsinckia menziesii	common fiddleneck	

Scientific Name	Common Name	Special Status
Cryptantha sp.	cryptantha	
Heliotropium curassavicum var. *oculatum*	seaside heliotrope, alkali heliotrope	
Phacelia cicutaria	caterpillar phacelia	
Phacelia minor	wild Canterbury bells	
Plagiobothrys sp.	popcornflower	
Brassicaceae - Mustard Family		
* *Brassica nigra*	black mustard	
* *Hirschfeldia incana*	short-podded mustard	
Lepidium lasiocarpum	shaggyfruit pepperweed	
Rorippa curvisiliqua	curvepod yellowcress	
* *Sisymbrium altissimum*	tumble mustard	
* *Sisymbrium irio*	London rocket	
* *Sisymbrium orientale*	Oriental hedge mustard	
Boraginaceae - Borage Family		
Eucrypta chrysanthemifolia	common eucrypta	
Cactaceae - Cactus Family		
Cylindropuntia prolifera	coast cholla	
Opuntia ficus-indica	tuna cactus	
Opuntia littoralis	coastal prickly pear	
Opuntia occidentalis	western prickly pear	
Opuntia vaseyi	Vasey's prickly pear	
Caryophyllaceae - Pink Family		
* *Cerastium glomeratum*.	sticky mouse-ear chickweed	
* *Polycarpon tetraphyllum*	four-leaved allseed	
Silene gallica	small-flower catchfly	
Chenopodiaceae - Goosefoot Family		
* *Atriplex semibaccata*	Australian saltbush	
* *Chenopodium macrospermum*	largeseed goosefoot	
* *Chenopodium murale*	nettle leaf goosefoot	
* *Salsola tragus*	Russian thistle	
Cleomaceae - Spiderflower Family		
Peritoma arborea	bladderpod	
Convolvulaceae - Morning-glory Family		
Calystegia macrostegia	Island false bindweed	

Scientific Name	Common Name	Special Status
* *Convolvulus arvensis*	field bindweed	
Crassulaceae - Stonecrop Family		
Crassula connata	pigmy weed	
Dudleya lanceolata	lance-leaved dudleya	
Dudleya multicaulis	many-stemmed dudleya	
Cucurbitaceae - Gourd Family		
Cucurbita foetidissima	calabazilla	
Marah macrocarpa	chilicothe	
Euphorbiaceae - Spurge Family		
Croton setigerus	turkey-mullein	
Euphorbia albomarginata	rattlesnake weed	
* *Euphorbia maculata*	spotted spurge	
Euphorbia polycarpa	smallseed sandmat	
* *Euphorbia prostrata*	prostrate sandmat	
* *Euphorbia serpens*	matted sandmat	
Euphorbia serpillifolia	thyme-leafed spurge	
* *Ricinus communis*	castor bean	
Fabaceae - Legume Family		
* *Acacia redolens*	bank catclaw	
Acmispon glaber	deerweed	
Acmispon micranthus	small flowered lotus	
Acmispon strigosus	strigose lotus	
Lupinus bicolor	miniature lupine	
Lupinus succulentus	arroyo lupine	
Lupinus truncatus	blunt leaved lupine	
* *Medicago polymorpha*	California burclover	
* *Melilotus indicus*	sourclover	
* *Melilotus officinalis*	yellow sweetclover	
Trifolium sp.	clover	
Fagaceae - Oak Family		
Quercus agrifolia	coast live oak	
Gentianaceae - Gentian Family		
Zeltnera venusta	California centaury	

Scientific Name	Common Name	Special Status
Geraniaceae - Geranium Family		
* *Erodium botrys*	broad leaf filaree	
* *Erodium cicutarium*	red-stemmed filaree	
Lamiaceae - Mint Family		
* *Marrubium vulgare*	horehound	
Salvia apiana	white sage	
Salvia columbariae	chia	
Salvia mellifera	black sage	
Trichostema lanceolata	vinegarweed	
Malvaceae - Mallow Family		
Malacothamnus fasciculatus	chaparral mallow	
* *Malva parviflora*	cheeseweed	
Montiaceae – Miner's Lettuce Family		
Claytonia perfoliata	Miner's lettuce	
Myrsinaceae - Myrsine Family		
* *Lysimachia arvensis*	scarlet pimpernel	
Myrtaceae - Myrtle Family		
* *Eucalyptus camaldulensis*	red gum	
Nyctaginaceae - Four O'clock Family		
Mirabilis laevis var. *crassifolia*	wishbone bush	
Onagraceae - Evening Primrose Family		
Camissoniopsis intermedia	intermediate sun cups	
Epilobium canum	California fuchsia	
Ludwigia repens	creeping primrose-willow	
Orobanchaceae - Broomrape Family		
Castilleja exserta	purple owl's-clover	
Phrymaceae - Lopseed Family		
Diplacus aurantiacus	orange bush monkeyflower	
Plantaginaceae - Plantain Family		
Antirrhinum nuttallianum	Nuttall's snapdragon	
Plantago erecta	California plantain	
Polygonaceae - Buckwheat Family		
Chorizanthe staticoides	Turkish rugging	
Eriogonum fasciculatum	California buckwheat	

Scientific Name	Common Name	Special Status
Persicaria hydropiperoides	false waterpepper	
Persicaria lapathifolia	willow weed	
* *Persicaria maculosa*	lady's thumb	
* *Rumex crispus*	curly dock	
Pterostegia drymarioides	fairy mist	
Portulacaceae - Purslane Family		
* *Portulaca oleracea*	purslane	
Rosaceae - Rose Family		
Heteromeles arbutifolia	toyon	
Rubiaceae - Madder Family		
Galium angustifolium	narrow leaved bedstraw	
Rutaceae - Rue Family		
Heteromeles arbutifolia	wilga	
Salicaceae - Willow Family		
Salix gooddingii	Goodding's black willow	
Salix lasiolepis	arroyo willow	
Saxifragaceae - Saxifrage Family		
Jepsonia parryi	Parry's jepsonia	
Scrophulariaceae - Figwort Family		
Penstemon spectabilis	showy penstemon	
Solanaceae - Nightshade Family		
Datura wrightii	sacred thorn-apple	
* *Nicotiana glauca*	tree tobacco	
Nicotiana quadrivalvis	Indian tobacco	
Solanum americanum	American black nightshade	
Solanum douglasii	greenspot nightshade	
* *Solanum nigrum*	black nightshade	
Tamaricaceae - Tamarisk Family		
* *Tamarix ramosissima*	tamarisk	
Ulmaceae - Elm Family		
Ulmus parvifolia	Chinese elm	
Verbenaceae - Vervain Family		
Verbena bracteata	bigbract verbena	
Verbena lasiostachys	western vervain	

Scientific Name	Common Name	Special Status
Zygophyllaceae - Caltrop Family		
* *Tribulus terrestris*	puncture vine	
MONOCOTS		
Agavaceae - Century Plant Family		
* *Agave americana*	American century plant	
Chlorogalum pomeridianum var. *pomeridianum*	wavyleaf soap plant	
Hesperoyucca whipplei	chaparral yucca	
Yucca gigantea	giant yucca	
Yucca gloriosa	moundlily yucca	
Arecaceae - Palm Family		
* *Phoenix canariensis*	Canary Island palm	
* *Washingtonia robusta*	Mexican fan palm	
Cyperaceae - Sedge Family		
Cyperus eragrostis	tall cyperus	
* *Cyperus involucratus*	umbrella plant	
Schoenoplectus californicus	California bulrush	
Juncaceae - Rush Family		
Juncus bufonius	toad rush	
Liliaceae - Lily Family		
Bloomeria crocea	common goldenstar	
Calochortus catalinae	Catalina mariposa lily	CRPR 4.2
Calochortus splendens	splendid mariposa lily	
Calochortus weedii var. *intermedius*	intermediate mariposa lily	CRPR 1B.2
Poaceae - Grass Family		
* *Avena barbata*	slender oat	
* *Avena fatua*	wild oat	
* *Brachypodium distachyon*	false brome	
* *Bromus diandrus*	ripgut brome	
* *Bromus hordeaceus*	soft chess	
* *Bromus madritensis* ssp. *rubens*	foxtail brome	
Distichlis spicata	salt grass	
Elymus condensatus	giant wild rye	
* *Festuca myuros*	rattail sixweeks grass	
* *Hordeum murinum*	wall barley	

Scientific Name	Common Name	Special Status
Leptochloa fusca ssp. *uninervia*	Mexican sprangletop	
Melica imperfecta	little California melica	
Muhlenbergia microsperma	littleseed muhly	
* *Pennisetum setaceum*	fountain grass	
Poa secunda	Nevada blue grass	
* *Polypogon monspeliensis*	rabbitfoot grass	
Schismus barbatus	Mediterranean grass	
* *Setaria viridis*	green bristle grass	
Stipa coronata	crested needlegrass	
Stipa lepida	foothill needlegrass	
Stipa pulchra	purple needlegrass	
Themidaceae - Brodiaea Family		
Bloomeria crocea	common goldenstar	
Dichelostemma capitatum	blue dicks	
Typhaceae - Cattail Family		
Typha domingensis	narrowleaf cattail	

Legend

*= Non-native or invasive species

Special Status:

Federal:
FE = Endangered
FT = Threatened
State:
SE = Endangered
ST =Threatened

California Rare Plant Rank:

1A: Plants presumed extirpated in California and either rare or extinct elsewhere

1B: Plants rare, threatened, or endangered in California and elsewhere

2A: Plants presumed extirpated in California but common elsewhere

2B: Plants rare, threatened, or endangered in California but more common elsewhere

3: Review List: Plants about which more information is needed

4: Watch List: Plants of limited distribution
Threat Rank:
.1 - Seriously endangered in California
.2 – Fairly endangered in California

Scientific Name	Common Name	Special Status
INVERTEBRATES		
CRUSTACEANS		
Decapoda – Crayfish and Shrimp		
**Procambarus clarkii*	red swamp crayfish	
INSECTS		
Hymenoptera – Ants, Bees, and Wasps		
**Apis mellifera*	European honey bee	
Lepidoptera – Butteflies and Moths		
Nymphalis antiopa	mourning cloak	
Papilio rutulus	western tiger swallowtail	
Vanessa cardui	painted lady	
VERTEBRATES		
AMPHIBIANS		
Bufonidae – True Toads		
Anaxyrus boreas halophilus	California toad	
Hylidae – Treefrogs		
Pseudacris hypochondriaca hypochondriaca	Baja California treefrog	
REPTILES		
Teiidae – Whiptail Lizards		
Aspidoscelis hyperythra	orange-throated whiptail	
Phrynosomatidae – Zebratail, Earless, Horned, Spiny, Fringe-Toed Lizards		
Sceloporus occidentalis	western fence lizard	
Uta stansburiana	side-blotched lizard	
Viperidae – Vipers		
Crotalus oreganus helleri	southern Pacific rattlesnake	
BIRDS		
Anatidae – Waterfowl		
Anas platyrhynchos	mallard	
Aythya americana	redhead	
Branta canadensis	Canada goose	
Oxyura jamaicensis	ruddy duck	
Odontophoridae – Quails		
Callipepla californica	California quail	
Podicipedidae – Grebes		
Aechmophorus occidentalis	western grebe	
Phalacrocoracidae – Cormorants		
Phalacrocorax auritus	double-crested cormorant	

Scientific Name	Common Name	Special Status
Ardeidae – Herons		
Ardea alba	great egret	
Ardea herodias	great blue heron	
Butorides virescens	green heron	
Egretta thula	snowy egret	
Threskiornithidae – Ibises		
Plegadis chihi	white-faced ibis	
Cathartidae – New World Vultures		
Cathartes aura	turkey vulture	
Pandionidae – Ospreys		
Pandion haliaetus	osprey	
Accipitridae – Hawks		
Accipiter cooperii	Cooper's hawk	
Buteo jamaicensis	red-tailed hawk	
Rallidae – Rails and Gallinules		
Fulica americana	American coot	
Charadriidae – Plovers		
Charadrius vociferous	killdeer	
Recurvirostridae – Stilts and Avocets		
Himantopus mexicanus	black-necked stilt	
Scolopacidae – Sandpipers		
Calidris minutilla	least sandpiper	
Tringa melanoleuca	greater yellowlegs	
Laridae – Gulls and Terns		
Hydroprogne caspia	Caspian tern	
Sterna forsteri	Forster's tern	
Columbidae – Pigeons and Doves		
Columba livia	rock pigeon	
Zenaida macroura	mourning dove	
Cuculidae – Cuckoos and Roadrunners		
Geococcyx californianus	greater roadrunner	
Caprimulgidae – Goatsuckers		
Chordeiles acutipennis	lesser nighthawk	
Apodidae – Swifts		
Aeronautes saxatalis	white-throated swift	
Chaetura vauxi	Vaux's swift	SSC
Trochilidae – Hummingbirds		
Calypte anna	Anna's hummingbird	
Selasphorus rufus	rufous hummingbird	
Selasphorus sasin	Allen's hummingbird	

Scientific Name	Common Name	Special Status
Picidae – Woodpeckers		
Colaptes auratus	northern flicker	
Picoides nuttallii	Nuttall's woodpecker	
Tyrannidae – Tyrant Flycatchers		
Empidonax difficilis	Pacific-slope flycatcher	
Myiarchus cinerascens	ash-throated flycatcher	
Sayornis nigricans	black phoebe	
Sayornis saya	Say's phoebe	
Tyrannus vociferans	Cassin's kingbird	
Vireonidae – Vireos		
Vireo bellii pusillus	least Bell's vireo	FE, SE
Corvidae – Jays and Crows		
Corvus brachyrhynchos	American crow	
Corvus corax	common raven	
Alaudidae – Larks		
Eremophila alpestris	horned lark	
Hirundinidae – Swallows		
Hirundo rustica	barn swallow	
Petrochelidon pyrrhonota	cliff swallow	
Stelgidopteryx serripennis	northern rough-winged swallow	
Tachycineta bicolor	tree swallow	
Aegithalidae – Bushtits		
Psaltriparus minimus	bushtit	
Troglodytidae – Wrens		
Thryomanes bewickii	Bewick's wren	
Troglodytes aedon	house wren	
Polioptilidae – Gnatcatchers		
Polioptila caerulea	blue-gray gnatcatcher	
Polioptila californica	California gnatcatcher	FT, SC
Sylviidae – Wrentits		
Chamaea fasciata	wrentit	
Mimidae – Thrashers		
Mimus polyglottos	northern mockingbird	
Toxostoma redivivum	California thrasher	
Bombycillidae – Waxwings		
Bombycilla cedrorum	cedar waxing	
Parulidae – Wood Warblers		
Dendroica petechia	yellow warbler	SSC
Dendroica townsendi	Townsend's warbler	

Scientific Name	Common Name	Special Status
Geothlypis trichas	common yellowthroat	
Icteria virens	yellow-breasted chat	SSC
Oreothlypis celata	orange-crowned warbler	
Wilsonia pusilla	Wilson's warbler	
Emberizidae – Emberizine Sparrows		
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow	
Melospiza melodia	song sparrow	
Melozone crissalis	California towhee	
Pipilo maculatus	spotted towhee	
Cardinalidae – Buntings, Grosbeaks, and Tanagers		
Passerina amoena	Lazuli bunting	
Passerina caerulea	blue grosbeak	
Pheucticus melanocephalus	black-headed grosbeak	
Piranga ludoviciana	western tanager	
Icteridae – Blackbirds		
Icterus bullockii	Bullock’s oriole	
Icterus cucullatus	hooded oriole	
Quiscalus mexicanus	great-tailed grackle	
Sturnella neglecta	western meadowlark	
Fringillidae – Finches		
Carpodacus mexicanus	house finch	
Carduelis psaltria	lesser goldfinch	
Spinus lawrencei	Lawrence’s goldfinch	
Spinus tristis	American goldfinch	
Estrildidae – Mannikins		
**Lonchura punctulata*	scaly-breasted munia	
MAMMALS		
Canidae – Canines		
Canis latrans	coyote	
Didelphidae – Opossums		
Didelphis virginiana	Virginia opossum	
Leporidae – Hares and Rabbits		
Sylvilagus audubonii	desert cottontail	
Procyonidae – Ringtails and Raccoons		
Procyon lotor	raccoon	

Scientific Name	Common Name	Special Status

Legend

*= Non-native or invasive species

Special Status:

Federal:
FE = Endangered
FT = Threatened

State:
SE = Endangered
ST =Threatened
SC = California Species of Special Concern
FP = California Fully Protected Species

Lcota

Appendix D
Special-Status Plant and Wildlife Species with Potential to Occur Within the Study Area

SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR WITHIN THE STUDY AREA

Species	Status[1] Federal/State, CRPR/County	Habitat Requirements	Potential to Occur
chaparral sand-verbena (*Abronia villosa* var. *aurita*)	–/1B.1/Not Covered	Found in sandy areas, chaparral, desert dunes, and coastal scrub habitats from 75 – 1600 m elevation. Blooming period is January to September.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
Munz's onion (*Allium munzii*)	FE/ST,1B.1/Not Covered	Perennial herb found in chaparral, foothill woodlands, pinyon-juniper woodlands, and valley grasslands. Grassy openings in coastal sage scrub. Blooming period is March to May, and this species is found at elevation between 300 and 900m.	**Unlikely.** Although some suitable habitat is present on site, the study area is outside of the known elevation range for this species and suitable soils are not present on-site or within the immediate vicinity. No records or collections of this species has been made within Orange County.
Aphanisma (*Aphanisma blitodes*)	–/1B.2/Not Covered	Annual herb found in coastal bluff scrub, coastal dunes, and coastal scrub; sandy soils. Blooming period is March to June and found at elevations from 1 - 305 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. The project site is not a coastal setting.
Braunton's milk-vetch (*Astragalus brauntonii*)	–/1B.1/Not Covered	A perennial herb found within disturbed areas within chaparral, valley grassland, coastal sage scrub, closed-cone pine forest habitats. Blooming period is January to August. Occurs at elevations less than 650m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
Coulter's saltbush (*Atriplex coulteri*)	–/1B.2/Not Covered	Found on alkaline or clay substrate within coastal bluff scrub, coastal dune, coastal scrub and valley and foothill grassland habitats. Blooming period is March to October. Occurs at elevations from 3 - 460 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
South Coast saltscale (*Atriplex pacifica*)	–/1B.2/Not Covered	Found within chenopod scrub, coastal bluff and coastal scrub habitats. Blooming period is March to October. Occurs at elevations up to 140 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
Parish's brittescale (*Atriplex parishii*)	–/1B.1/Not Covered	Found in alkali meadows, vernal pools, playas and chenopod scrub. Associated with alkaline soils. Blooming period is June to October. Occurs at 25 – 1900 m elevation.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. This species has not been collected in Orange County since 1881.
Davidson's saltscale (*Atriplex serenana* var. *davidsonii*)	–/1B.2/Not Covered	Found on alkaline substrate within coastal bluff scrub and coastal scrub habitats. Blooming period is from April to October and occurs at elevations from 10 - 200 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. The project site is not a coastal setting.
Malibu baccharis (*Baccharis malibuensis*)	–/1B.1/Not Covered	A shrub found within grassy openings of chaparral habitats. Blooming period is in August and occurs at elevations between 50 to 300m.	**Low.** Although some suitable habitat is present on site, suitable sedimentary substrates are absent within the study area. This perennial species was not observed during special-status plant surveys conducted in 2018 and 2019.
thread-leaved brodiaea (*Brodiaea filifolia*)	–/1B.1/Not Covered	A perennial herb found within grasslands and vernal pools in valley grassland, foothill woodland, coastal sage scrub, freshwater wetlands, and wetland-riparian habitats. Blooming period is March to June. Occurs at elevations between 25 to 860m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.

Species	Status[1] Federal/State, CRPR/County	Habitat Requirements	Potential to Occur
Catalina mariposa lily (*Calochortus catalinae*)	–/4.2/Covered	Occurs in heavy soils in chaparral, cismontane woodland, coastal scrub and valley and foothill grassland below 700 m. When occurring on slopes, it is usually associated with coastal scrub vegetation. Blooming period is February to June.	**Present.** This species was observed on-site during special-status plant surveys conducted in 2018 and 2019. Approximately 309 individuals were observed on-site in the western and southeastern portions of the study area. This species was also observed on-site during previous surveys by Harmsworth Associates in 1998 (Dudek 2012).
intermediate mariposa lily (*Calochortus weedii* var. *intermedius*)	–/1B.2/Conditionally Covered	Found in coastal scrub, chaparral, and valley and foothill grassland on dry, rocky open slopes and rock outcrops. Blooming period is May to July, and this species occurs at elevations of 120 - 850 m.	**Present.** This species was observed on-site during special-status plant surveys conducted in 2019. Approximately 19 individuals were observed on-site in the western portion of the study area.
southern tarplant (*Centromadia parryi* ssp. *australis*)	–/1B.1/Not Covered	Found in the margins of marshes and swamps, vernally mesic valley and foothill grasslands, and vernal pool habitats. This species is commonly found in disturbed areas, in relatively close proximity to a seasonal or perennial water source. Blooming period is May to November; and this species occurs at elevations up to 425 m.	**Unlikely.** Suitable alkali/vernal habitat and soils are not present on-site or within the immediate vicinity.
smooth tarplant (*Centromadia pungens* ssp. *laevis*)	–/1B.1/Not Covered	Annual herb found within open, poorly drained flats, depressions, waterway banks and beds, grassland, and disturbed sites in shadscale scrub, alkali sink, and valley grassland habitats. Blooming period is April to September, and this species occurs at elevations between 90 – 500 m.	**Unlikely.** Suitable alkali/vernal habitat and soils are not present on-site or within the immediate vicinity.
small-flowered mountain mahogany (*Cercocarpus minutiflorus*)	–/–/Covered	Found in chaparral, at elevations of less than 1400 m. Blooming period is March to May.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity. Project site is north of the recorded distribution.
Orcutt's pincushion (*Chaenactis glabriuscula* var. *orcuttiana*)	–/1B.1/Not Covered	Found in coastal bluff scrub and coastal dunes, on sandy sites at elevations of 3 -100 m. Blooming period is January to August.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. The project site is not a coastal setting.
salt marsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*	FE/SE,1B.2/Not Covered	Found within coastal dune, salt marsh, and swamp habitats, at elevations up to1400 m. Blooming period is May to October.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. The project site is not a coastal setting.
San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*)	FC/SE,1B.1/Not Covered	Annual herb found within sandy coastal scrub and valley and foothill grassland. Blooming period is April to July; this species occurs at 150 – 1220 m elevation.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. Single collection of species in Orange County is 100 years old and is likely outside of geographic range.
long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*)	–/1B.2/Not Covered	Annual herb found in sandy meadows within chaparral, valley grassland, and coastal sage scrub habitats. Blooming period is April to June within elevations between 30 and 1500 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
white-bracted spineflower (*Chorizanthe xanti* var. *leucotheca*)	–/1B.2/Not Covered	Annual herb found within sandy or gravelly soils in creosote bush scrub or pinyon-juniper woodland habitats. Blooming period is April to June, and this species occurs at elevations of 400 – 1300 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. Elevation constraints further limit suitability.

Species	Status[1] Federal/State, CRPR/County	Habitat Requirements	Potential to Occur
San Miguel savory (*Clinopodium chandleri*)	–/1B.2/Not Covered	Perennial herb found in riparian habitats or rocky slopes of chaparral, foothill woodland, coastal sage scrub, and valley grassland communities. Blooming period in March to July, and this species occurs at elevations less than 1100 m.	**Low.** Low quality habitat is present on-site or within the immediate vicinity. No recent collections made within 5 miles of project area. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*)	–/1B.2/Not Covered	Perennial evergreen shrub found in chaparral and cismontane woodland. Blooming period is April to June, and this species is found at elevations of 30 – 790 m.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity. No recent collections made within 5 miles of project area.
slender-horned spineflower (*Dodecahema leptoceras*)	FE/SE,1B.1/Not Covered	Annual herb found in sandy or gravelly soils of alluvial fans within chaparral and coastal sage scrub communities. Blooming period is May to June, and this species occurs at elevations between 200 – 700 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity, and the study area is outside of known distribution and elevation range for this species.
Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*)	FT/1B.1/Covered	Perennial herb found in shaded rocky outcrops and slopes within chaparral and coastal sage scrub communities. Blooming period is March to June, and this species occurs at elevations between 150 and 500m.	**Unlikely.** No suitable habitat is present on-site or within the immediate vicinity.
many-stemmed dudleya (*Dudleya multicaulis*)	–/1B.2/Not Covered	Found on clay substrate within chaparral, coastal scrub and valley and grassland habitats. Blooming period is April to July; this species occurs at elevations from 15 - 790 m.	**Present.** This species was observed on-site during special-status plant surveys conducted in 2019. Approximately 109 individuals were observed on-site in the western portion of the study area.
Laguna Beach dudleya (*Dudleya stolonifera*)	FT/ST,1B.1/Covered	Found on rocky substrate within chaparral, cismontane woodland, coastal scrub and valley and grassland habitats at elevations from 10 to 260 m. Blooming period is May to July.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
sticky dudleya (*Dudleya viscida*)	–/1B.2/Not Covered	Perennial herb found on bluffs and rocky cliffs on coastal habitat within chaparral and coastal sage scrub communities. Blooming period is May to June and occurs at elevations less than 450 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. The project site is not a coastal setting.
Santa Ana River woollystar (*Eriastrum densifolium* ssp. *sanctorum*)	FE/SE,1B.1/Not Covered	Perennial herb found in chaparral or coastal scrub habitats (alluvial fans); sandy or gravelly soil. Blooming period is April to September; this species occurs at elevations from 90 – 610 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. Plants generally restricted to Santa Ana River.
cliff spurge (*Euphorbia misera*)	–/2B.2/Not Covered	Perennial shrub found in coastal bluff scrub, coastal scrub, and Mojavean desert scrub; rocky soils. Blooming period is December to October, and this species occurs at elevations of 10 – 500 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity. The project site is not a coastal setting.
Los Angeles sunflower (*Helianthus nuttallii* var. *parishii*)	–/1A/Not Covered	Perennial rhizomatous herb occurs in coastal salt and freshwater marshes and swamps. Blooming period is August to October, and this species occurs at 10 – 1675 m elevation.	**Low.** Very limited habitat is present on-site or within the immediate vicinity. Species has not been observed since 1933 and is likely extinct. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
Tecate cypress (*Hesperocyparis forbesii*)	–/1B.1/Covered	Small perennial evergreen tree found in chaparral and closed-cone coniferous forest; clay, gabbroic or metavolcanic, mostly in Santa Ana Mountains and south to Baja California. This species occurs from 80 – 1500 m elevation.	**Low.** Marginally suitable habitat is present on-site. This species is recorded about 6 miles north of the project site but was not observed during special-status plant surveys conducted in 2018 and 2019.

Species	Status[1] Federal/State, CRPR/County	Habitat Requirements	Potential to Occur
mesa horkelia (*Horkelia cuneata* ssp. *puberula*)	–/1B.1/Not Covered	Perennial herb found in chaparral, cismontane woodland and coastal scrub habitats; found in gravelly or sandy sites from 70 – 810 m elevation. Blooming period is February to September.	**Low.** Low quality habitat is present on-site but nearest observations greater than 5 miles from study area. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
California satintail (*Imperata brevifolia*)	–/2B.1/Not Covered	Perennial grass found in chaparral, coastal scrub, Mojavean desert scrub, meadows and seeps (often alkali), or riparian scrub below 500 m elevation. Blooming period is September to May.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
decumbent goldenbush (*Isocoma menziesii* var. *decumbens*)	–/1B.2/Not Covered	Perennial shrub that occurs in chaparral and coastal scrub; sandy soils (often within disturbed areas). Blooming period is April to November, and this species occurs at 10 – 135 m elevation.	**Unlikely.** Low quality habitat is present on-site but species does not grow far from the coast. The nearest observations are in Newport Beach, greater than 5 miles from project area.
Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*)	–/1B.1/Not Covered	Found in wetland habitats. Microhabitats include playas and vernal pools at elevations up to 1220 m. Blooming period is February to June.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
heart-leaved pitcher sage (*Lepechinia cardiophylla*)	–/1B.2/Covered	Shrub found in chaparral, foothill woodland, and closed-cone pine forest communities. Blooming period is April to July, and this species occurs at elevations between 600 – 1200 m.	**Unlikely.** Low quality habitat is present on-site but nearest observations greater than 5 miles from study area. The study area is outside of the known elevation range for this species.
intermediate monardella (*Monardella hypoleuca* ssp. *intermedia*)	–/1B.3/Not Covered	Perennial herb found on dry slopes of chaparral, oak woodland, and occasionally conifer forest at elevations between 200 and 1250m. Blooming period in June to September.	**Unlikely.** No suitable habitat is present on-site or within the immediate vicinity, and the study area is outside of the known elevation range for this species.
felt-leaved monardella (*Monardella hypoleuca* ssp. *lanata*)	–/1B.2/Not Covered	Perennial rhizomatous herb found on rocky or granitic slopes in chaparral and foothill woodland communities. Blooming period is June to August, and this species occurs at elevations of 300 – 1500 m.	**Unlikely.** No suitable habitat is present on-site or within the immediate vicinity, and the study area is outside of the known elevation range for this species.
Hall's monardella (*Monardella macrantha* ssp. *hallii*)	–/1B.3/Not Covered	Perennial rhizomatous herb found in chaparral, foothill woodland communities. Blooming period is June to August, and this species occurs at elevations of 300 – 1500 m.	**Unlikely.** No suitable habitat is present on-site or within the immediate vicinity, and the study area is outside of the known elevation range for this species.
mud nama (*Nama stenocarpum*)	–/2B.2/Not Covered	Found along freshwater lake margins, riverbanks, marshes and swamps. Blooming period is January to July; this species occurs at elevations from 5 - 500 m.	**Low.** Marginal habitat is present on-site or within the immediate vicinity. Collected within adjacent Lambert reservoir. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
Gambel's water cress (*Nasturtium gambelii*)	FE/ST,1B.1/Not Covered	Perennial rhizomatous herb found in marshes and swamps (freshwater or brackish). Blooming period is April to October; this species is found at elevations of 5 - 330 m.	**Low.** Very limited habitat is present on-site or within the immediate vicinity. Species likely extirpated from county. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
prostrate navarretia (*Navarretia prostrata*)	–/1B.1/Not Covered	Annual herb associated with coastal scrub, valley and foothill grassland, vernal pools from 15 – 1210 m elevation. Blooming period is from April to July.	**Unlikely.** Not expected due to lack of suitable vernal pool habitat on-site or within the immediate vicinity.

Species	Status[1] Federal/State, CRPR/County	Habitat Requirements	Potential to Occur
chaparral nolina (*Nolina cismontana*)	–/1B.2/Not Covered	Shrub found in dry chaparral of coastal mountains. Blooming period lasts from May to July, and this species occurs from 200 - 1200 m elevation.	**Low.** Marginal habitat is present on-site or within the immediate vicinity. Nearest observation of species 4 miles to east in Foothill Ranch area. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
California beardtongue (*Penstemon californicus*)	–/1B.2/Not Covered	Perennial herb found in sandy soils within chaparral, yellow pine forest and pinyon-juniper woodland communities located in elevations between 1200 and 2300 m. Blooming period is May to June.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity, and the study area is outside of known elevation range for this species.
Allen's pentachaeta (*Pentachaeta aurea* ssp. *allenii*)	–/1B.1/Not Covered	Annual herb found in coastal scrub openings and valley and foothill grasslands; often on clay. Blooming period is March to June; this species occurs at 75 – 520 m elevation.	**Low.** Low quality habitat is present on-site or within the immediate vicinity; suitable soils not present. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
Santiago Peak phacelia (*Phacelia keckii*)	–/1B.3/Not Covered	Annual herb found in open areas of chaparral and closed-cone pine forest. Blooming period is May to September, and this species grows at elevations of 500 – 1600 m.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity and nearest observations greater than 5 miles from study area. The study area is outside of the known elevation range for this species.
white rabbit-tobacco (*Pseudognaphalium leucocephalum*)	–/2B.2/Not Covered	Perennial herb found in sandy or gravelly benches, dry stream bottoms, and canyon bottoms within coastal sage scrub and chaparral communities. Blooming period is August to November, and this species occurs at elevations below 500 m.	**Low.** Limited, low quality habitat is present on-site or within the immediate vicinity. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
Nuttall's scrub oak (*Quercus dumosa*)	–/1B.1/Covered	Perennial evergreen shrub found in close-cone coniferous forest, chaparral, and coastal sage scrub; sandy, clay loam soil. Blooming period is February to August, and this species occurs at 15 – 400 m elevation.	**Low.** Limited, low quality habitat is present on-site or within the immediate vicinity. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
Coulter's matilija poppy (*Romneya coulteri*)	–/4.2/Covered	Perennial rhizomatous herb found near dry washes and canyons in chaparral and coastal sage scrub communities. This species occurs at elevations under 1200 m; blooming period is March to July.	**Low.** Marginal habitat is present on-site or within the immediate vicinity. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
chaparral ragwort (*Senecio aphanactis*)	–/2B.2/Not Covered	Annual herb found in chaparral, cismontane woodland, and coastal scrub; soil is sometimes alkaline. Blooming period is January to April, and this species occurs at 15 – 800 m elevation.	**Low.** Limited, low quality habitat is present on-site or within the immediate vicinity; heavy clay soils largely absent. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
Salt Spring checkerbloom (*Sidalcea neomexicana*)	–/2B.2/Not Covered	Perennial herb found in chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub, and playas; alkaline, mesic soils. Blooming period is March to June, and this species occurs at 15 - 1530 m elevation.	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.
estuary seablite (*Suaeda esteroa*)	–/1B.2/Not Covered	Perennial herb found in coastal salt marshes and swamps with tidal flows. Blooming period is May to January; this species occurs at sea level (up to 5 m elevation).	**Unlikely.** Suitable habitat and soils are not present on-site or within the immediate vicinity.

Species	Status[1] Federal/State, CRPR/County	Habitat Requirements	Potential to Occur
San Bernardino aster (*Symphyotrichum defoliatum*)	–/1B.2/Not Covered	Perennial rhizomatous herb found near ditches, streams, and springs in cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, and valley and foothill grassland. This species occurs from 2 – 2040 m elevation; blooming period is July to November.	**Low.** Marginally suitable habitat and moist soils are present on-site. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
Parry's tetracoccus (*Tetracoccus dioicus*)	–/1B.2/Not Covered	Shrub found on dry slopes in chaparral and coastal sage scrub communities. Blooming period is April to May, and this species occurs in elevations less than 1000 m.	**Low.** Limited, low quality habitat is present on-site or within the immediate vicinity. Single county record observed in 1948 with poor locational accuracy. At the northern limit of its recorded distribution. This species was not observed during special-status plant surveys conducted in 2018 and 2019.
big-leaved crownbeard (*Verbesina dissita*)	–/1B.2/Not Covered	Found within chaparral and coastal scrub habitats. Blooming period is April to July, and this species occurs at elevations from 145 - 205 m.	**Unlikely.** Limited, low quality habitat is present on-site or within the immediate vicinity but project site is outside the recorded distribution for this species. Species records restricted to coastal bluffs near Laguna Niguel.
San Diego County viguiera (*Bahiopsis laciniata*)	–/4.3/Not Covered	Perennial shrub found on chaparral and coastal scrub. Blooming period is February to June (August), and this species occurs at elevations from 60 - 750 m.	**Present.** This species was observed on-site during special-status plant surveys conducted in 2018 and 2019. One individual was observed on-site in the easternmost portion of the study area.

[1] Description of status codes:
FE = Listed as endangered under the FESA
FT = Listed as threatened under the FESA
SE = Listed as endangered under the CESA
ST= Listed as threatened under the CESA
CRPR = California Rare Plant Rank (CNPS 2018)
CRPR 1A = Presumed extinct
CRPR 1B = Plants rare, threatened or endangered in California and elsewhere
CRPR 2B = Plants rare, threatened or endangered in California, but more common elsewhere
CRPR 3 = Plants about which more information is needed
CRPR 4 = Watch-list: Plants of limited distribution
.1 = Seriously threatened in California
.2 = Moderately threatened in California
.3 = Not very threatened in California
Covered = Covered under the Orange County NCCP/HCP
Conditionally Covered = Conditionally Covered under the Orange County NCCP/HCP
Not Covered = Not Covered under the Orange County NCCP/HCP

SPECIAL-STATUS WILDLIFE SPECIES WITH POTENTIAL TO OCCUR WITHIN THE STUDY AREA

Species	Status[1] Federal/State/County	Habitat Requirements	Potential to Occur
INSECTS			
Quino checkerspot butterfly (*Euphydryas editha quino*)	FE/–/Conditionally Covered	Sunny openings within chaparral & coastal sage shrublands in parts of Riverside & San Diego counties. Hills and mesas near the coast. Need high densities of food plants *Plantago erecta*, *Plantago insularis*, and *Orthocarpus purpurescens*.	**Unlikely.** The study area is outside of the currently known range for this species, and outside of the protocol survey area (USFWS 2014). Nearest known occurrences documented by the UFWS are 3-4 miles to the north from 1928 and 1937.
CRUSTACEANS			
San Diego fairy shrimp (*Branchinecta sandiegonensis*)	FE/–/Conditionally Covered	Known to occur in areas of swales/earth slump basins in grassland, chaparral and coastal sage scrub. Inhabit seasonally wet pools filled by winter/spring rains. Hatch in warm water later in the season.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
Riverside fairy shrimp (*Streptocephalus woottoni*)	FE/–/Conditionally Covered	Generally restricted to vernal pools and other non-vegetated ephemeral pools greater than 12 inches in depth in Riverside, Orange, and San Diego Counties. Typically observed January through March.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
FISH			
Santa Ana sucker (*Catostomus santaanae*)	FT/–/Not Covered	Habitat generalists, but prefer sand-rubble-boulder bottoms, cool, clear water, & algae.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
tidewater goby (*Eucyclogobius newberryi*)	FE/SC/Not Covered	Found in shallow brackish water habitats, lagoons and lower stream reaches. Require fairly still but not stagnant water & high oxygen levels.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
arroyo chub (*Gila orcuttii*)	–/SC/Not Covered	Los Angeles Basin south coastal streams. Slow water stream sections with mud or sand bottoms.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
steelhead - southern California DPS (*Oncorhynchus mykiss irideus* pop. 10)	FE/–/Not Covered	Found in streams and rivers with at least 7 inches minimum depth	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
Santa Ana speckled dace (*Rhinichthys osculus* ssp. 3)	–/SC/Not Covered	Prefers south coast flowing waters	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
AMPHIBIANS			
arroyo toad (*Anaxyrus californicus*)	FE/SC/Conditionally Covered	Prefers streams and river with fine sediments and where flow rates are great enough to keep silt and clay suspended. Shallow sandy pools bordered sand and gravel flood terraces are needed for breeding	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
arboreal salamander (*Aneides lugubris*)	–/–/Covered	Occurs primarily in valley-foothill hardwood, valley-foothill hardwood-conifer, and mixed conifer habitats, but is also known from Douglas fir and redwood habitat types. May be found in chaparral in southern California. This species is only found on the surface during moist periods, when it can be common. Elevation range extends from sea level to 1520 m (5000 ft).	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.

Species	Status[1] Federal/State/County	Habitat Requirements	Potential to Occur
black-bellied slender salamander (*Batrachoseps nigriventris*)	–/–/Covered	Found primarily near drainages associated with open oak, mixed conifer forests, and mixed chaparral.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
western spadefoot (*Spea hammondii*)	–/SC/Covered	Prefers open areas with sandy or gravelly soils, in a variety of habitats including mixed woodlands, grasslands, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, alkali flats, foothills, and mountains. Rain pools or shallow temporary pools, which do not contain bullfrogs, fish, or crayfish are necessary for breeding.	**Low.** Some suitable habitat is present on-site or within the immediate vicinity. This species was not observed during surveys conducted in 2019.
Coast Range newt (*Taricha torosa*)	–/SC/Not Covered	Found in drier chaparral, oak woodland, and grasslands.	**Low.** Suitable but low quality habitat is present on-site or within the immediate vicinity.
REPTILES			
southern California legless lizard (*Anniella stebbinsi*)	–/SC/Not Covered	Occurs in moist warm loose soil with plant cover. Moisture is essential. Occurs in sparsely vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks. Leaf litter under trees and bushes in sunny areas and dunes stabilized with bush lupine and mock heather often indicate suitable habitat. Often can be found under surface objects such as rocks, boards, driftwood, and logs. Can also be found by gently raking leaf litter under bushes and trees. Sometimes found in suburban gardens in Southern California.	**Low.** Suitable but low quality habitat is present on-site or within the immediate vicinity.
California glossy snake (*Arizona elegans occidentalis*)	–/SC/Not Covered	Inhabits arid scrub, rocky washes, grasslands, and chaparral. Appears to prefer microhabitats of open areas with friable soils for burrowing.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
orange-throated whiptail (*Aspidoscelis hyperythra*)	–/–/Covered	Species requires intact habitat within chaparral, cismontane woodland and coastal scrub plant communities. Prefers washes & other sandy areas with patches of brush & rocks. Perennial plants necessary for its major food-termites.	**Present.** This species was observed within the study area during 2018 biological surveys, and was documented on-site in CNDDB in 1990.
coastal whiptail (*Aspidoscelis tigris stejnegeri*)	–/SC/Covered	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland and riparian areas. Ground may be firm soil, sandy, or rocky.	**Moderate.** Suitable habitat is present on-site or within the immediate vicinity. This species was documented in CNDDB 2 miles to the northeast in Limestone Canyon in 1999.
red-diamond rattlesnake (*Crotalus ruber*)	–/SC/Covered	Known to occur in chaparral, Mojavean desert scrub and Sonoran Desert scrub communities. Occurs in rocky areas & dense vegetation. Needs rodent burrows, cracks in rocks or surface cover objects.	**Low.** Suitable habitat is present on-site or within the immediate vicinity. This species was documented in CNDDB 2 miles to the northeast in Limestone Canyon in 1999.
San Bernardino ringneck snake (*Diadophis punctatus modestus*)	–/–/Covered	Most common in open, relatively rocky areas within valley-foothill, mixed chaparral, and annual grass habitats. Often in somewhat moist microhabitats near intermittent streams. Avoids moving through open or barren areas by restricting movements to areas of surface litter or herbaceous vegetation.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity. Nearest documented occurrences in CNDDB are from Los Angeles and Riverside Counties.

Species	Status[1] Federal/State/County	Habitat Requirements	Potential to Occur
western pond turtle (*Emys marmorata*)	–/SC/Not Covered	Known to occur in slow-moving permanent or intermittent streams, ponds, small lakes, reservoirs with emergent basking sites; adjacent uplands used during winter.	**Unlikely.** Suitable but low quality habitat is present on-site or within the immediate vicinity. No basking sites available within the study area, and no observation of submerged vegetation.
coastal rosy boa (*Lichanura trivirgata rosafusca*)	–/–/Covered	Rocky areas of chaparral and coastal sage scrub habitats. Attracted to water sources such as permanent and intermittent streams, but does not require permanent water.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
Coronado skink (*Plestiodon skiltonianus interparietalis*)	–/–/Covered	Grassland, chaparral, pinon-juniper and juniper sage woodland, pine-oak and pine forests in Coast Ranges of Southern California. Prefers early successional stages or open areas. Found in rocky areas close to streams and on dry hillsides.	**Unlikely.** Suitable habitat is not present on-site. Nearest known occurrences documented in CNDDB are in Camp Pendleton in San Diego County from 1999; no CNDDB occurrences of this species are documented in Orange County.
coast horned lizard (*Phrynosoma blainvillii*)	–/SC/Covered	Known to occur in sandy washes with within chaparral or coastal scrub habitat. Requires loose soil for burial and abundant supply of harvester ants.	**Low.** Suitable but low quality habitat is present on-site or within the immediate vicinity.
coast patch-nosed snake (*Salvadora hexalepis virgultea*)	–/SC/Not Covered	Known to inhabit semi-arid brushy areas and chaparral in canyons, rocky hillsides, and plains.	**Low.** Suitable but low quality habitat is present on-site or within the immediate vicinity.
two-striped garter snake (*Thamnophis hammondii*)	–/SC/Not Covered	Habitat includes marsh and swamp, riparian scrub, riparian woodland, and wetland. Highly aquatic, found in or near permanent fresh water. Often along streams with rocky beds and riparian growth.	**Unlikely.** Suitable but low quality habitat is present on-site or within the immediate vicinity.
BIRDS			
sharp-shinned hawk (*Accipiter striatus*)	–/–/Covered	Most commonly associated with woodlands and brushlands. A wide variety of habitat types are used by wintering birds.	**High.** Suitable habitat is present on-site.
tricolored blackbird (*Agelaius tricolor*)	–/SC/Not Covered	Known to occur in freshwater marsh, marsh, swamp, and wetland; highly colonial species, most numerous in Central Valley & vicinity. Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	**Low.** Limited, low quality habitat is present on-site or within the immediate vicinity.
Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)	–/–/Covered	Known to frequent relatively steep, often rocky hillsides with grass and forb species. Resident in southern California coastal sage scrub and mixed chaparral.	**Present.** Suitable habitat is present on-site or within the immediate vicinity. This species was observed on-site in 2019 and during previous surveys (Dudek 2012).
grasshopper sparrow (*Ammodramus savannarum*)	–/SC/Not Covered	Known to occur in dense grasslands on rolling hills, lowland plains, in valleys & on hillsides on lower mountain slopes. Favors native grasslands with a mix of grasses, forbs, and scattered shrubs.	**Present.** Limited, low quality habitat is present on-site or within the immediate vicinity. One migrant species was observed on-site during previous surveys by LSA in 1999 (Dudek 2012).

Species	Status[1] Federal/State/County	Habitat Requirements	Potential to Occur
golden eagle (*Aquila chrysaetos*)	–/FP/Conditionally Covered	Known to live in open and semi-open country featuring native vegetation across most of the Northern Hemisphere. They avoid developed areas and uninterrupted stretches of forest. They are found primarily in mountains up to 12,000 feet, canyonlands, rimrock terrain, and riverside cliffs and bluffs. Golden Eagles nest on cliffs and steep escarpments in grassland, chaparral, shrubland, forest, and other vegetated areas.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
long-eared owl (*Asio otus*)	–/SC/Not Covered	Roosts in dense vegetation and forage in open grasslands or shrublands; also open coniferous or deciduous woodlands. They occur at elevations ranging from near sea level to above 6,500 feet.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
burrowing owl (*Athene cunicularia*)	–/SC/Not Covered	Known to occur within open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. A subterranean nester dependent upon burrowing mammals, particularly the California ground squirrel.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity. No suitable burrows observed within the site.
rough-legged hawk (*Buteo lagopus*)	–/–/Covered	Occurs in California only during the winter months, from October through March. Occurs in prairies, semi-deserts, grassland, pastures, and marshlands that are distant from extensive woodlands and densely developed areas.	**Unlikely.** Suitable habitat is not present on-site.
red-shouldered hawk (*Buteo lineatus*)	–/–/Covered	Prefers mature lowland forests with open water and clearings nearby. Can sometimes nest in eucalyptus groves.	**Present.** Suitable habitat is present on-site. This species was observed on-site during previous surveys (Dudek 2012).
coastal cactus wren (*Campylorhynchus brunneicapillus cousei*)	–/SC/Covered	Known to occur in coastal scrub habitats; requires stands of prickly pear or cholla cactus for nesting and roosting.	**Low (Previously Present).** This species was previously documented on-site in 1990 in CNDDB. Cactus wren were also documented on-site around 2000, prior to the 2007 Santiago Fire (Dudek 2012). There is currently very limited, isolated cactus on-site so this species has a low potential to occur due to limited suitable habitat on-site or within the immediate vicinity.
Vaux's swift (*Chaetura vauxi*)	–/SC/Not Covered	A summer resident of northern California, this species breeds in the Coast Ranges, Sierra Nevada, and possibly the Cascade Ranges. Prefers redwood and Douglas-fir habitats with nest-sites in large hollow trees and snags, especially tall, burned-out stubs. This bird is a fairly common migrant throughout most of the state in April and May, and August and September. Feeds exclusively on flying insects taken in long, continuous foraging flights; feeds high in the air over most terrains and habitats, and also commonly at lower levels in forest openings, above burns, and especially above rivers and lakes.	**Present.** This species was observed flying over the site during a May 2019 survey, and was likely a migrant.

Species	Status[1] Federal/State/County	Habitat Requirements	Potential to Occur
northern harrier (*Circus cyaneus*)	–/SC/Covered	Coastal salt & fresh-water marsh. Nest & forage in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	**Present.** Suitable habitat is present on-site or within the immediate vicinity. This species was observed on-site during previous surveys (Dudek 2012).
western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	FT/SE/Not Covered	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems. Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
yellow rail (*Coturnicops noveboracensis*)	–/SC/Not Covered	Known to occur within freshwater marshlands, meadows and seeps.	**Unlikely.** Limited suitable habitat is present on-site or within the immediate vicinity. Nearest occurrences in CNDDB are in Newport Back Bay in 1896 and Corona in 1914.
white-tailed kite (*Elanus leucurus*)	–/FP/Not Covered	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Present.** Suitable habitat is present on-site or within the immediate vicinity. This species was observed on-site during previous surveys by LSA in 1999 (Dudek 2012).
southwestern willow flycatcher (*Empidonax traillii extimus*)	FE/SE/Conditionally Covered	Breeds in dense willow-dominated riparian habitat near open water.	**Low.** Suitable but limited habitat is present on-site or within the immediate vicinity. This species was not observed during focused surveys conducted in 2019.
prairie falcon (*Falco mexicanus*)	–/–/Conditionally Covered	Grasslands and other open habitats. Foraging occurs of wide areas, but cliffs are generally required for nest sites.	**Present.** Suitable foraging habitat is present on-site. No suitable nesting habitat occurs on-site, and this species is currently not known to nest within Orange County, and have not occurred within the county for over a decade (CDFW 2020, Catino-Davenport 2019). This species was observed on-site during previous surveys (Dudek 2012).
American peregrine falcon (*Falco peregrinus anatum*)	–/FP/Covered	Known to occur near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape or a depression or ledge in an open site.	**Present.** Suitable foraging habitat is present on-site or within the immediate vicinity. No suitable nesting habitat occurs within the study area or immediate vicinity. This species was observed on-site during previous surveys (Dudek 2012).
bald eagle (*Haliaeetus leucocephalus*)	–/SE,FP/Not Covered	Typically nest in forested areas adjacent to large bodies of water, staying away from heavily developed areas when possible. Tolerant of human activity when feeding, and may congregate around fish processing plants, dumps, and below dams where fish concentrate. For perching, bald eagles prefer tall, mature coniferous or deciduous trees that afford a wide view of the surroundings. In winter, bald eagles can also be seen in dry, open uplands if there is access to open water for fishing.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.

Species	Status[1] Federal/State/County	Habitat Requirements	Potential to Occur
yellow-breasted chat (*Icteria virens*)	–/SC/Not Covered	Known to occur within riparian forest, scrub and woodland habitats.	**Present.** This species was observed within the study area during 2018 and 2019 biological surveys.
California black rail (*Laterallus jamaicensis coturniculus*)	–/ST,FP/Not Covered	Known to occur in brackish and freshwater marshes. Inhabits riparian thickets of willow & other brushy tangles near watercourses. Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	**Unlikely.** Limited suitable habitat is present on-site or within the immediate vicinity. Nearest occurrences in CNDDB are in Newport Back Bay in 1983 and near Orange in 1986.
Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)	–/SE/Not Covered	Inhabits coastal salt marshes. Nests in pickleweed on and about margins of tidal flats.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
coastal California gnatcatcher (*Polioptila californica californica*)	FT/SC/Covered	Species is an obligate, permanent resident of coastal sage scrub in southern California. Low, coastal sage scrub in arid washes, on mesas and slopes.	**Present.** This species was observed within the study area during 2018 and 2019 biological surveys.
light-footed Ridgway's rail (*Rallus obsoletus levipes*)	FE/SE,FP/Not Covered	Found in salt marshes traversed by tidal sloughs, where cordgrass and pickleweed are the dominant vegetation. Requires dense growth of either pickleweed or cordgrass for nesting or escape cover; feeds on molluscs and crustaceans.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
yellow warbler (*Setophaga petechia*)	–/SC/Not Covered	Riparian plant associations in close proximity to water. Frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders.	**Present.** This species was observed within the study area during 2018 and 2019 biological surveys.
California least tern (*Sternula antillarum browni*)	FE/SE,FP/Not Covered	Known to occur in alkali playas and coastal dune and beach habitats. Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, landfills, or paved areas.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
least Bell's vireo (*Vireo bellii pusillus*)	FE/SE/Conditionally Covered	Known to occur in riparian forest, scrub, and woodland habitats. Nests primarily in willow, baccharis, or mesquite habitats.	**Present.** This species was observed within the study area during 2018 and 2019 biological surveys, including focused surveys conducted in 2019.
MAMMALS			
Coyote (*Canis latrans*)	–/–/Covered	Occur in all wildland habitat types in the subregion, and are adaptable enough to use agricultural and developed lands.	**Present.** This species was observed within the study area during 2018 and 2019 biological surveys, and previous surveys (Dudek 2012).
gray fox (*Urocyon cinereoargenteus*)	–/–/Covered	Found in many habitat types, with preference for woodlands, chaparral, and coastal scrub.	**Low.** Suitable habitat is present on-site or within the immediate vicinity.
pallid bat (*Antrozous pallidus*)	–/SC/Not Covered	Known to occur in a wide variety of habitats including deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting; particularly associated with buildings and bridges.	**Low.** Suitable habitat is present on-site or within the immediate vicinity.

Species	Status[1] Federal/State/County	Habitat Requirements	Potential to Occur
northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*)	–/SC/Not Covered	Moderate canopy coverage of arid shrubland or pinyon-juniper habitats on or near rocky slopes and sandy areas.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
Mexican long-tongued bat (*Choeronycteris mexicana*)	–/SC/Not Covered	Known to occur at altitudes of 300-2,400 meters in deciduous, semi-arid thorn scrub and mixed oak-conifer forests	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity. The study area is outside of the typical range for this species.
Stephen's kangaroo rat (*Dipodomys stephensi*)	FE/SE/Not Covered	Known to occur in sparse perennial vegetation with firm soil, "neither hard nor sandy".	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity. The study area is outside of the typical range for this species.
western mastiff bat (*Eumops perotis californicus*)	–/SC/Not Covered	Known to occur in habitat consisting of extensive open areas with abundant roost locations provided by crevices in rock outcrops and buildings.	**Low.** Limited suitable habitat is present on-site or within the immediate vicinity. Nearest CNDDB occurrence is an anecdotal observation from Limestone Canyon (date unknown) 2.8 miles to the northeast.
western red bat (*Lasiurus blossevillii*)	–/SC/Not Covered	Prefers edges or habitat mosaics that have trees for roosting and open areas for foraging. Requires nearby water source. Roosting habitat includes forests and woodlands from sea level up through mixed conifer forests. Feeds over a wide variety of habitats including grasslands, shrublands, open woodlands and forests, and croplands. Not found in desert areas.	**Low.** Limited habitat is present on-site or within the immediate vicinity. Nearest CNDDB occurrence is from Bell Canyon (near Starr Ranch) 11 miles to the southeast in 1997.
western yellow bat (*Lasiurus xanthinus*)	–/SC/Not Covered	Known only in Los Angeles and San Bernardino Cos. south to the Mexican border. This species has been recorded below 600 m (2000 ft) in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
San Diego desert woodrat (*Neotoma lepida intermedia*)	–/SC/Covered	Known to occur in coastal scrub, desert scrub, chaparral, cactus, and rocky habitats.	**Moderate.** Some suitable habitat is present on-site or within the immediate vicinity.
pocketed free-tailed bat (*Nyctinomops femorosaccus*)	–/SC/Not Covered	Habitats used include pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. Prefers rocky desert areas with high cliffs and rock outcrops.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
big free-tailed bat (*Nyctinomops macrotis*)	–/SC/Not Covered	Prefers rugged, rocky canyons.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
southern grasshopper mouse (*Onychomys torridus ramona*)	–/SC/Not Covered	Alkali desert scrub and desert scrub habitats are preferred, with somewhat lower densities expected in other desert habitats, including succulent shrub, wash, and riparian areas. Also occurs in coastal scrub, mixed chaparral, sagebrush, low sage, and bitterbrush habitats. Uncommon in valley foothill and montane riparian, and in a variety of other habitats.	**Low.** Suitable habitat is present on-site or within the immediate vicinity.

Species	Status[1] Federal/State/County	Habitat Requirements	Potential to Occur
Pacific pocket mouse (*Perognathus longimembris pacificus*)	FE/SC/Conditionally Covered	Known to occur in coastal scrub habitats. Seems to prefer soils of fine alluvial sands of coastal plains near the ocean.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
Southern California saltmarsh shrew (*Sorex ornatus salicornicus*)	–/SC/Not Covered	Known to occur in salt marsh habitat within Southern California. Requires dense vegetation and woody debris for cover.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.
American badger (*Taxidea taxus*)	–/SC/Not Covered	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	**Unlikely.** Suitable habitat is not present on-site or within the immediate vicinity.

[1] Description of status codes:
FE = Listed as endangered under the FESA
FT = Listed as threatened under the FESA
SE = Listed as endangered under the CESA
ST = Listed as threatened under the CESA
FP = Listed as fully protected under CDFW code
SC = Species of Special Concern
Covered = Covered under the County of Orange NCCP/HCP
Conditionally Covered = Conditionally Covered under the County of Orange NCCP/HCP
Not Covered = Not covered under the County of Orange NCCP/HCP

Appendix E

Results of 2019 Focused Western Spadefoot Toad Surveys

ESA 50 YEARS 1969-2019

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001 phone
949.753.7002 fax

esassoc.com

March 29, 2019

Jo Ann Corey, MPA
Environmental Compliance Specialist
Water Resources and Policy Department
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92619

Subject: Results of Focused Western Spadefoot Toad Surveys for the Syphon Reservoir Improvement Project, Unincorporated Orange County, California

Dear Ms. Corey:

This letter report presents the results of focused surveys for western spadefoot toad (*Spea hammondii*) at the Syphon Reservoir Improvement Project site within unincorporated Orange County, California. ESA biologists conducted the surveys to determine the presence or absence of the species within the approximately 265-acre study area ("study area"). The species background, project location and description, methodology used during the survey, and survey results are described below.

Background

The western spadefoot toad is currently considered by the California Department of Fish and Wildlife (CDFW) as a California Species of Special Concern, and is an "Identified Species" for which conservation and management is provided for under the County of Orange Central & Coastal Subregion Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The western spadefoot toad is a small greenish, brown, cream, or gray toad that has a distinct glossy black spade (i.e., shaped like a wedge or teardrop) on each hind foot. This species' range extends from northern California south into Baja and they may occur from sea level up to 4,500' (1365m). Western spadefoot toad adults generally only enter aquatic habitats for breeding and they spend the majority of their time in upland communities near seasonally wet pools or shallow ponds, burrowed into friable soils or small mammal burrows. This species requires seasonal rain pools that can contain water for a minimum of three to four weeks. Breeding and egg laying typically occurs in late winter until the end of March and males can be heard calling during this period. Spadefoot toad eggs require 1 to 6 days to hatch and 3 to 11 weeks to complete metamorphosis.

Based on a query of the California Natural Diversity Database (CNDDB)[1], the nearest reported occurrence of the western spadefoot toad to the study area is located approximately a mile to the east from Bee Canyon.[2]

1 CDFW. 2019. California Natural Diversity Database (CNDDB) Commercial version, Information dated February 8, 2019.
2 Exact date of occurrence was not recorded, but was documented in a source from 1985.

Project Location and Description

The study area is located in central Orange County (**Figure 1**). Specifically, the study area is located on the northeast side of Portola Parkway between the Bee Canyon Landfill Access Road and State Route 133 (SR-133) (**Figure 2**). Irvine Ranch Water District (IRWD) owns the majority of the property bounded by these roadways. The Crean Lutheran High School maintains recreation facilities located between Portola Parkway and the toe of the existing dam slope. Residential neighborhoods are located on the southwest side of Portola Parkway. The ground surrounding the reservoir, which dominates the study area, is hilly with ridgelines and terraced slopes. Ground surface elevations within the study area range from approximately 319 feet above sea level at Portola Parkway immediately below the existing reservoir to approximately 675 feet above sea level in the northeast corner of the study area.

The Syphon Reservoir Improvement Project is intended to store additional recycled water to meet the seasonal demand of recycled water customers and to enhance IRWD's water supply reliability by increasing the existing recycled water seasonal storage capacity at Syphon Reservoir, which will allow the storage of additional recycled water produced at the water recycling plants during periods of low demand (winter months) for use during periods of high demand (summer months). A preliminary geotechnical investigations project would evaluate geologic and seismic conditions at the embankment dam, spillway, outlet, and borrow sites.[3]

Methodology

Prior to the site visit, ESA biologist Lily Sam reviewed topographic maps and a recently created vegetation map (**Figure 3**) of the study area, and noted the areas with relatively flat topography where potential breeding pools may have the opportunity to form. ESA also reviewed a report detailing the habitat assessment and baseline surveys conducted by United States Geological Survey (USGS) for the western spadefoot toad and the western pond turtle within the Irvine Ranch Land Reserve[4]. Upon review of the report, although USGS surveyed the Syphon Reservoir area for western pond turtle, they did not survey for the western spadefoot toad and it is assumed that the area was ruled out for the lack of suitable habitat or the presence of thick vegetation that would not provide suitable friable soils for the creation of burrows.

Since western spadefoot toad is an upland species that requires water for breeding purposes only, surveys included two diurnal surveys of water margins to search for egg clusters, and two nocturnal surveys immediately after rain events to search for individuals detectable by calls or eye-shine and visual identification. On January 18, 2019, ESA biologists Lily Sam and Robert Sweet conducted a diurnal and nocturnal survey between the hours of

3 An embankment dam is an earthen dam built by compacting successive layers of earth, using the most impervious materials to form a core and placing more permeable substances on the inner and outer sides. A spillway is a structure provided to control the release of flows from behind a dam such that the dam does not overtop. An outlet is a device used to regulate flow from a dam. A borrow site is an excavated area where material has been dug for use as fill material at another location.

4 Fisher, R. N., P. C. Trenham, S. L. Compton, A. R. Backlin, S. A. Hathaway, and T. A. Touré. 2004. *Habitat Assessment and Baseline Surveys for the Western Spadefoot (*Spea hammondii*) and the Western Pond Turtle (*Emys marmorata*) on the Irvine Ranch Land Reserve*. U. S. Geological Survey technical report. 50 pp.

12:00 pm to 8:00 pm, after substantial rainfall occurred with nearly 1” of precipitation recorded in the area over the preceding 3 days. Weather conditions were overcast, the temperatures ranged between 56.5 to 65 degrees Fahrenheit (F) and the winds ranged from 0 to 5 miles per hour (mph). A second diurnal and nocturnal survey was conducted on March 7, 2019 by ESA biologists Lily Sam and Douglas Gordon-Blackwood between the hours of 1:00 pm and 8:00 pm, after another rain event with at least 0.4” of rain on March 6. Weather conditions were overcast with very brief light drizzle, the temperatures ranged between 56 to 59° F and the winds ranged from 0 to 3 mph. For both diurnal surveys, the study area was walked to assess the locations of standing pools of water. All locations of standing water or puddles were recorded with a GPS unit and mapped. Each of the puddles were visually inspected for eggs and larvae or the presence of western spadefoot toads. Both night surveys were conducted using eye-shine detection techniques, which involve using appropriately powered lights with the aid of binoculars to sweep the study area in order to detect eye-shine from amphibious species, as well as auditory detection of potential males calling. Water was present in the reservoir at the time of the survey and the banks were surveyed for toads, it should be noted that it is not considered likely for any spadefoot toads to be found within the open water portion of the reservoir. Western spadefoot toads do not prefer deep water, rather, they prefer shallow, turbid pools containing some vegetative matter. Therefore, the reservoir itself is not considered preferred breeding habitat for this species.

Results

A total of eight potential breeding pools were detected within the study area, but no western spadefoot toads were detected by sight or calls during either survey (**Figure 4**). Although some suitable pools were present on site, nearly all of the flat areas within the study area were densely vegetated with grasses and annual herbs, which make it difficult for adult toads to move around. Furthermore, there are very limited areas of the site that are flat. The majority of the study area is sloped, excluding the access roads and the margins or marshy areas located adjacent to the open water habitat. Furthermore, the reservoir itself is a man-made feature created in the 1940s following construction of the dam that impounded water to provide irrigation for agricultural uses for the Irvine Ranch; thus, the study area has been subject to previous disturbance and likely did not historically support suitable habitat or populations of this species. As such, it is concluded that there are currently no western spadefoot toads within the Syphon Reservoir study area. Two California toads (*Anaxyrus boreas halophilus*) were visually detected during the second survey and Baja California treefrogs (*Pseudacris hypochondriaca hypochondriaca*) calls were detected during both surveys. See **Attachment A** for photos depicting the pools/puddles found.

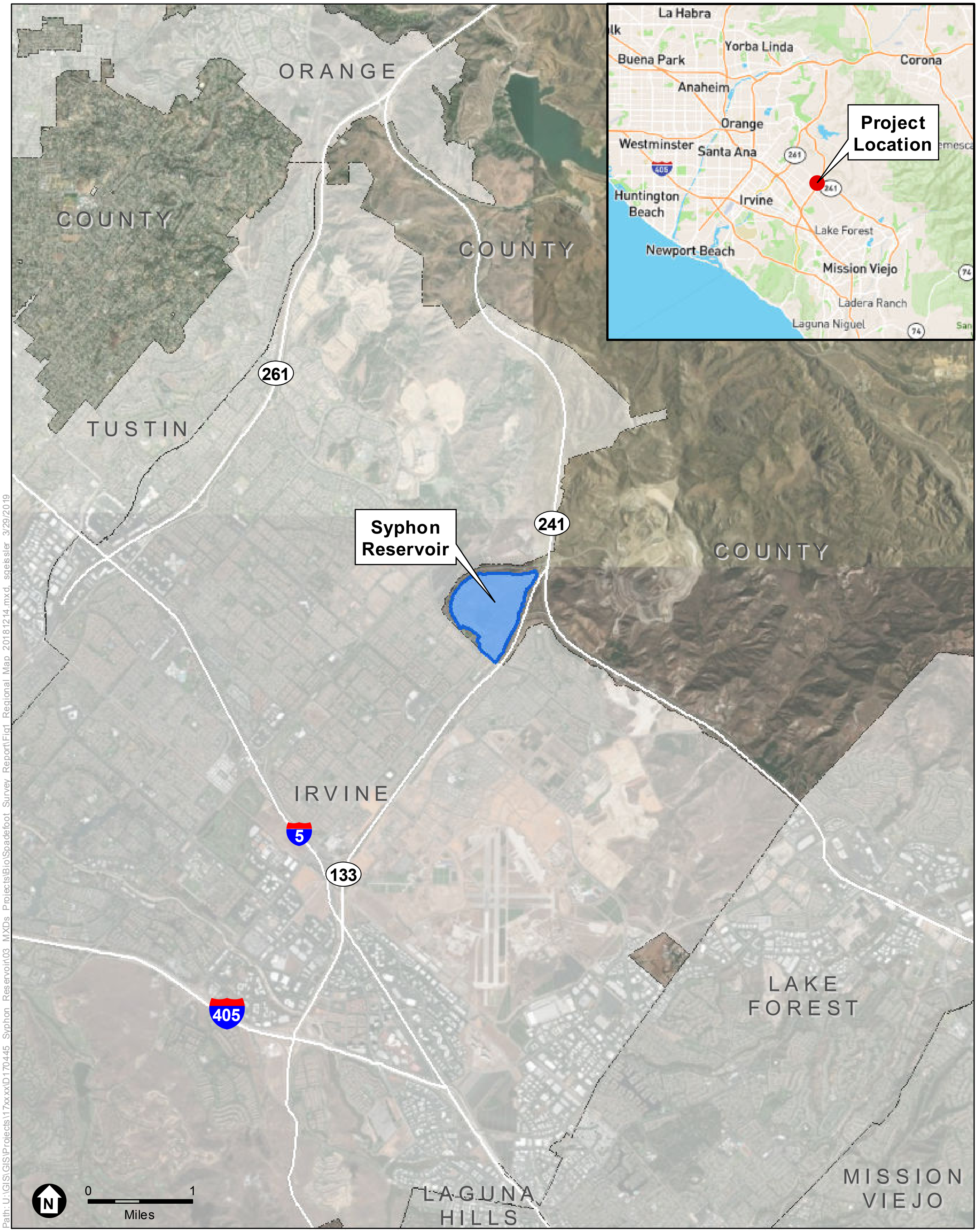
If there are any questions regarding this report or the results, please feel free to reach out to Maile Tanaka at 949-870-1501 or mtanaka@esassoc.com.

Sincerely,

Lily Sam
Senior Associate Biologist

Maile Tanaka
Managing Associate Biologist

Attachments:
Figure 1: Regional Map
Figure 2: Vicinity Map
Figure 3: Natural Communities Map
Figure 4: Potential Breeding Pool Locations
Attachment A: Representative Site Photographs

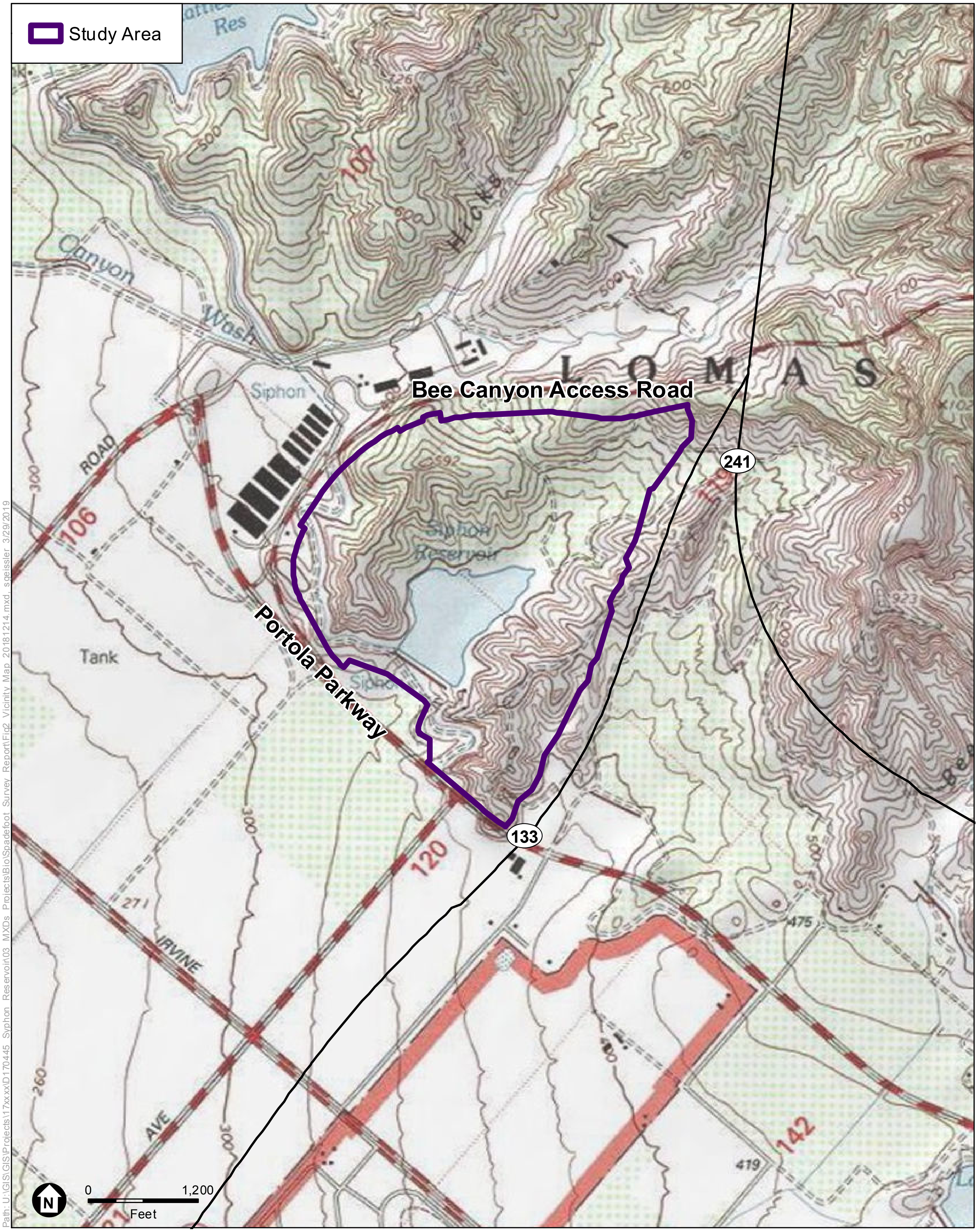


SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservoir Improvement Project

Figure 1
Regional Map

ESA



SOURCE: ESRI, 2016; El Toro USGS 7.5 minute Quadrangle

Syphon Reservoir Improvement Project

Figure 2
Vicinity Map

ESA

SOURCE: ESRI, 2016.

Syphon Reservoir Improvement Project

Figure 3
Natural Communities

ESA

SOURCE: ESRI, 2016.

Syphon Reservoir Improvement Project

Figure 4
Potential Breeding Pool Locations

ESA

Attachment A
Representative Site Photographs

Photo 1: Puddle within the access road on east side of reservoir (facing northeast).

Photo 2: Overall view of sloped upland habitat with very dense vegetation (facing west).

Photo 3: View of road rut puddle in access road on the west side of the reservoir (facing south).

Photo 4: View of puddle on southern access road of reservoir (facing west).

Photo 5: View of puddles near athletic fields (facing south).

Photo 6: View of puddle in cemented area near southeast corner of the reservoir (facing south).

Photo 7: View of ponded area with weir near the center of the reservoir (facing west).

Photo 7: California toad found during second survey in southwest portion of reservoir within cattails.

Photo 7: View of California toad in drain located on the southwestern corner of the reservoir (facing west).

Appendix F
Results of 2019 Focused Least Bell's Vireo Surveys

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001 phone
949.753.7002 fax

esassoc.com

August 1, 2019

Stacey Love
Carlsbad Fish and Wildlife Service Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

Esther Burkett
California Department of Fish and Wildlife
1416 Ninth Street, 12th Floor
Sacramento, California 95814

Subject: Results of 2019 Focused Least Bell's Vireo Surveys for the Syphon Reservoir Improvement Project, Unincorporated Orange County, California

Dear Ms. Love and Ms. Burkett:

This letter report presents the methodology and results of focused surveys conducted for least Bell's vireo (*Vireo bellii pusillus*; LBV) at the Syphon Reservoir Improvement Project site within unincorporated Orange County, California. **Environmental Science Associates (ESA)** biologists Maile Tanaka, Jaclyn Catino-Davenport, and Karl Fairchild conducted the surveys to determine the presence or absence of the species within the approximately 265-acre study area ("study area").

Project Location and Description

The study area is located in central Orange County (**Figure 1**). Specifically, the study area is located on the northeast side of Portola Parkway between the Bee Canyon Landfill Access Road and State Route 133 (SR-133) (**Figure 2**). Irvine Ranch Water District (IRWD) owns the majority of the property bounded by these roadways. The Crean Lutheran High School maintains recreation facilities located between Portola Parkway and the toe of the existing dam slope. Residential neighborhoods are located on the southwest side of Portola Parkway. The ground surrounding the reservoir, which dominates the study area, is hilly with ridgelines and terraced slopes. Ground surface elevations within the study area range from approximately 319 feet above sea level at Portola Parkway immediately below the existing reservoir to approximately 675 feet above sea level in the northeast corner of the study area.

The Syphon Reservoir Improvement Project is intended to store additional recycled water to meet the seasonal demand of recycled water customers and to enhance IRWD's water supply reliability by increasing the existing recycled water seasonal storage capacity at Syphon Reservoir, which will allow the storage of additional recycled water produced at the water recycling plants during periods of low demand (winter months) for use during periods of high demand (summer months). A preliminary geotechnical investigations project would evaluate geologic and seismic conditions at the embankment dam, spillway, outlet, and borrow sites.[1]

Natural Communities

Natural communities found within the study area include arroyo willow thicket, black willow thicket, mule fat scrub, freshwater marsh, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/coyote brush scrub, chaparral bushmallow scrub/non-native herbaceous cover, sumac chaparral, California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coast prickly pear scrub, eucalyptus woodland, non-native grassland, non-native herbaceous cover, non-native herbaceous cover/California sagebrush scrub, open water, and disturbed areas. Vegetation communities and cover types within the study area are described below. California sagebrush alliance and non-native herbaceous cover/California sagebrush alliance are the dominant vegetation covers in the upland areas, and arroyo willow thicket is the dominant vegetation cover within the riparian areas of the study area. **Figure 3** depicts the natural communities found within the study area. A description of the potentially suitable habitat surveyed for LBV within the study area is presented below.

Arroyo Willow Thicket

Arroyo willow thicket (i.e., *Salix lasiolepis* Shrubland Alliance or Arroyo Willow Riparian Forest) is characterized by a canopy cover dominated by mature arroyo willow (*Salix lasiolepis*) with an understory of smaller willows, and variable herbaceous layer. This alliance is typically found within stream banks and benches, slope seeps, and stringers along drainages.[2] A total of 0.24 acre of arroyo willow thicket occurs primarily within the northern and northeastern portions of the study area.

Black Willow Thicket

Black willow thicket (i.e., *Salix gooddingii* Woodland Alliance or Black Willow Riparian Forest) is characterized by a canopy cover dominated by mature black willow (*Salix gooddingii*) with an understory of smaller willows, mule fat (*Baccharis salicifolia*), and variable herbaceous layer. This alliance is typically found on terraces along large rivers, canyons, and along rocky floodplains of small, intermittent streams, seeps, and springs.[3] Species associated with this alliance include native arroyo willow and non-native tamarisk (*Tamarix ramosissima*) and red gum (*Eucalyptus camaldulensis*). A total of 4.13 acres of black willow thicket were mapped around the northern and northeastern perimeter of the reservoir within the center of the study area.

---

1 An embankment dam is an earthen dam built by compacting successive layers of earth, using the most impervious materials to form a core and placing more permeable substances on the inner and outer sides. A spillway is a structure provided to control the release of flows from behind a dam such that the dam does not overtop. An outlet is a device used to regulate flow from a dam. A borrow site is an excavated area where material has been dug for use as fill material at another location.

2 Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. *A Manual of California Vegetation, Second Edition.* California Native Plant Society, Sacramento, CA

3 Ibid.

Mule Fat Scrub

Mule fat scrub (i.e., mulefat thickets [*Baccharis salicifolia* Shrubland Alliance]) is characterized by large shrub cover dominated by mule fat and variable herbaceous layer. This alliance is typically found within canyon bottoms, floodplains, lake margins, and stream channels with soils of mixed alluvium.[4] Species associated with this alliance include native black willow, California sagebrush (*Artemisia californica*), laurel sumac (*Malosma laurina*), cocklebur (*Xanthium strumarium*), and non-native Spanish false fleabane (*Pulicaria paludosa*), and black mustard (*Brassica nigra*). A total of 2.25 acres of mule fat scrub were mapped around the northern and northeastern perimeter of the reservoir within the center of the study area.

Methodology

Surveys for LBV were conducted by ESA biologists Maile Tanaka, Jaclyn Catino-Davenport, and Karl Fairchild. Methods employed were in conformance with U.S. Fish and Wildlife Service (USFWS) *Least Bell's Vireo Survey Guidelines* issued January 19, 2001. [5] Eight surveys were conducted between April 10 and July 8, 2019 within all portions of the study area containing potentially suitable habitat and adjacent habitat potentially used for foraging. Surveys were conducted no less than ten days apart between 6:10 AM and 11:00 AM. Weather conditions were suitable for surveys, with overcast to clear skies, winds of 9 miles per hour or less, and temperatures between 51 and 74 degrees Fahrenheit.

Results

Survey results are summarized in **Table 1** below and depicted on **Figure 4**. LBV were detected during all 2019 focused surveys. No brown-headed cowbirds (*Molothrus ater*), which are brood parasites, were detected within the study area during protocol LBV surveys; however, multiple brown-headed cowbird traps, installed and maintained by Leatherman BioConsulting Inc., were observed on-site with captive decoy birds inside. A complete list of avian species detected within the study area is included in **Attachment A**.

California Natural Diversity Database (CNDDB) reporting forms for all incidental special-status species are included as **Attachment B**.

4 Ibid.

5 U.S. Department of the Interior, Fish and Wildlife Service. January 19, 2001. *Least Bell's Vireo Survey Guidelines.* Ecological Services. Carlsbad Fish and Wildlife Office.

TABLE 1
LBV SURVEY RESULTS

Date	Time	Wind (mph) (start/end)	Temperature (F) (start-end)	Weather (start/end)	Results	Surveyors
04/10/19	0710–1100	0-7/0-9	57°–71°	0% Cloud Cover/ 0% Cloud Cover	8 LBV Detected	Maile Tanaka
04/22/19	0700–1100	2/9	51°–66°	5% Cloud Cover/ 5% Cloud Cover	11 LBV Detected	Maile Tanaka
05/03/19	0610–1010	2/3	60°–68°	100% Cloud Cover/ 60% Cloud Cover	14 LBV Detected	Jaclyn Catino-Davenport
05/15/19	0645–1040	3/7	62°–64°	100% Cloud Cover/ 100% Cloud Cover	14 LBV Detected	Maile Tanaka
06/05/19	0803–1018	1/2	65°–71°	100% Cloud Cover/ 95% Cloud Cover	16 LBV Detected	Karl Fairchild
06/17/19	0728–1034	2/3	68°–66°	100% Cloud Cover; misting/ 100% Cloud Cover; misting	14 LBV Detected	Karl Fairchild
06/27/19	0727–1039	1/3	70°–74°	80% Cloud Cover/ 15% Cloud Cover	15 LBV Detected	Karl Fairchild
07/08/19	0721–1009	1/1	70°–73°	100% Cloud Cover/ 100% Cloud Cover	12 LBV Detected	Karl Fairchild

SOURCE: ESA 2019.

Incidentally-observed avian special-status species included the coastal California gnatcatcher (*Polioptila californica californica*), yellow warbler (*Setophaga petechia*), yellow-breasted chat (*Icteria virens*), and southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*). Coastal California gnatcatcher is a federally threatened species, southern California rufous-crowned sparrow is a California Department of Fish and Wildlife (CDFW) watch list species, and yellow warbler and yellow-breasted chat are both CDFW species of special concern. These species were detected during multiple surveys.

Conclusion

Based on the results of the protocol-level LBV surveys, the study area contains LBV vireo habitat that was occupied by up to 16 LBV. Coastal California gnatcatcher, southern California rufous-crowned sparrow, yellow warbler, and yellow-breasted chat were also observed on-site, as well as brown-headed cowbirds only within the traps on-site.

If there are any questions regarding this report or the results, please feel free to reach out to Maile Tanaka at 949-870-1501 or mtanaka@esassoc.com.

Sincerely,

Maile Tanaka
Managing Associate Biologist

Karl Fairchild
Associate Biologist III

Attachments:
Figure 1: Regional Map
Figure 2: Vicinity Map
Figure 3: Natural Communities
Figure 4: Least Bell's Vireo Territory Map
Attachment A: Avian Compendium
Attachment B: CNDDB Forms

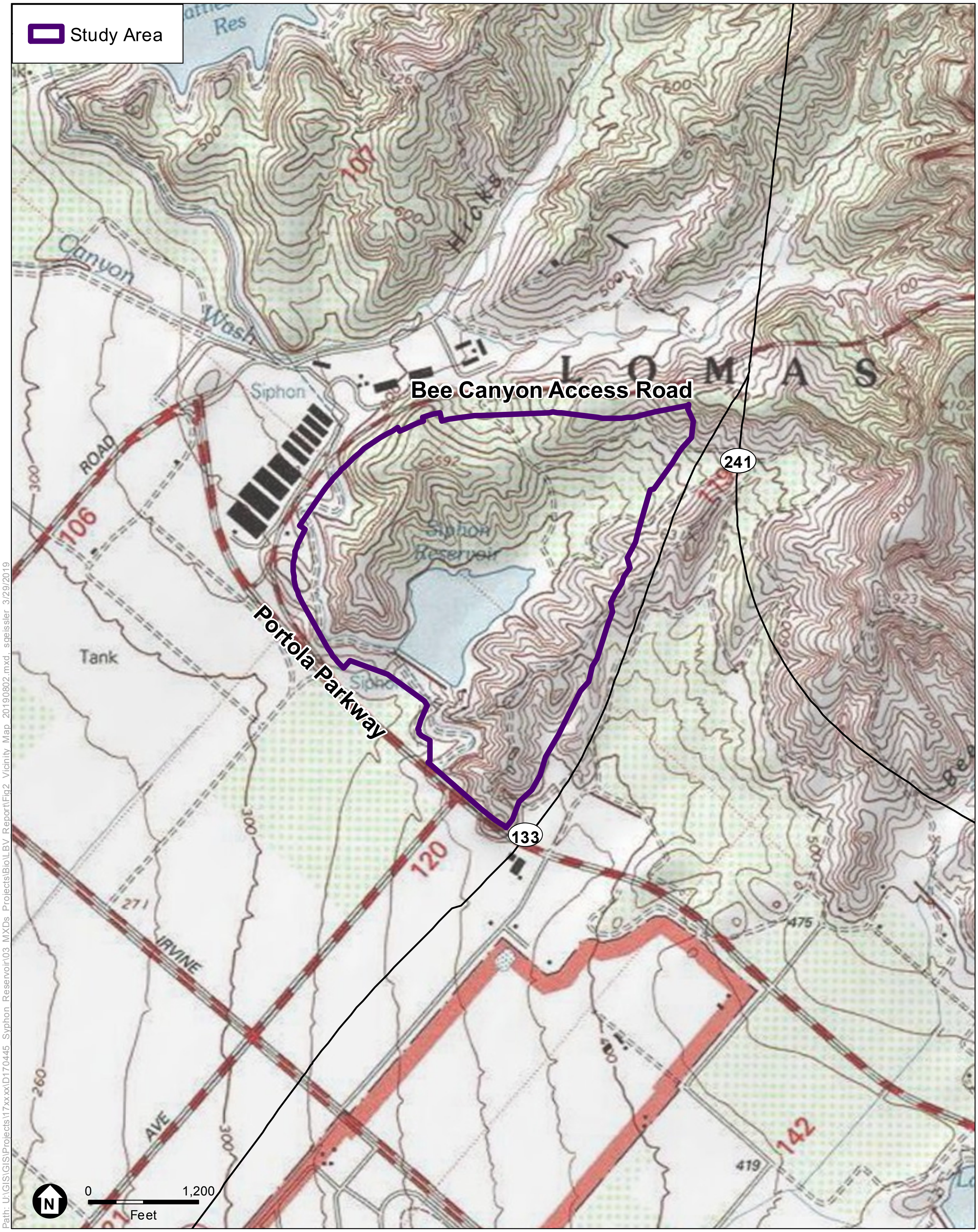
Path: U:\GIS\GIS\Projects\17xxxx\D170445_Syphon Reservoir\03_MXDs_Projects\Bio\LBV_Report\Fig1_Regional_Map_20190802.mxd, sgeissler 3/29/2019

SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservoir Improvement Project

Figure 1
Regional Map

ESA



Path: U:\GIS\GIS\Projects\17xxxx\D170445_Syphon Reservoir\03_MXDs_Projects\Bio\LBV_Report\Fig2_Vicinity_Map_20190802.mxd, sgeissler 3/29/2019

SOURCE: ESRI, 2016; El Toro USGS 7.5 minute Quadrangle

Syphon Reservoir Improvement Project

Figure 2
Vicinity Map

ESA

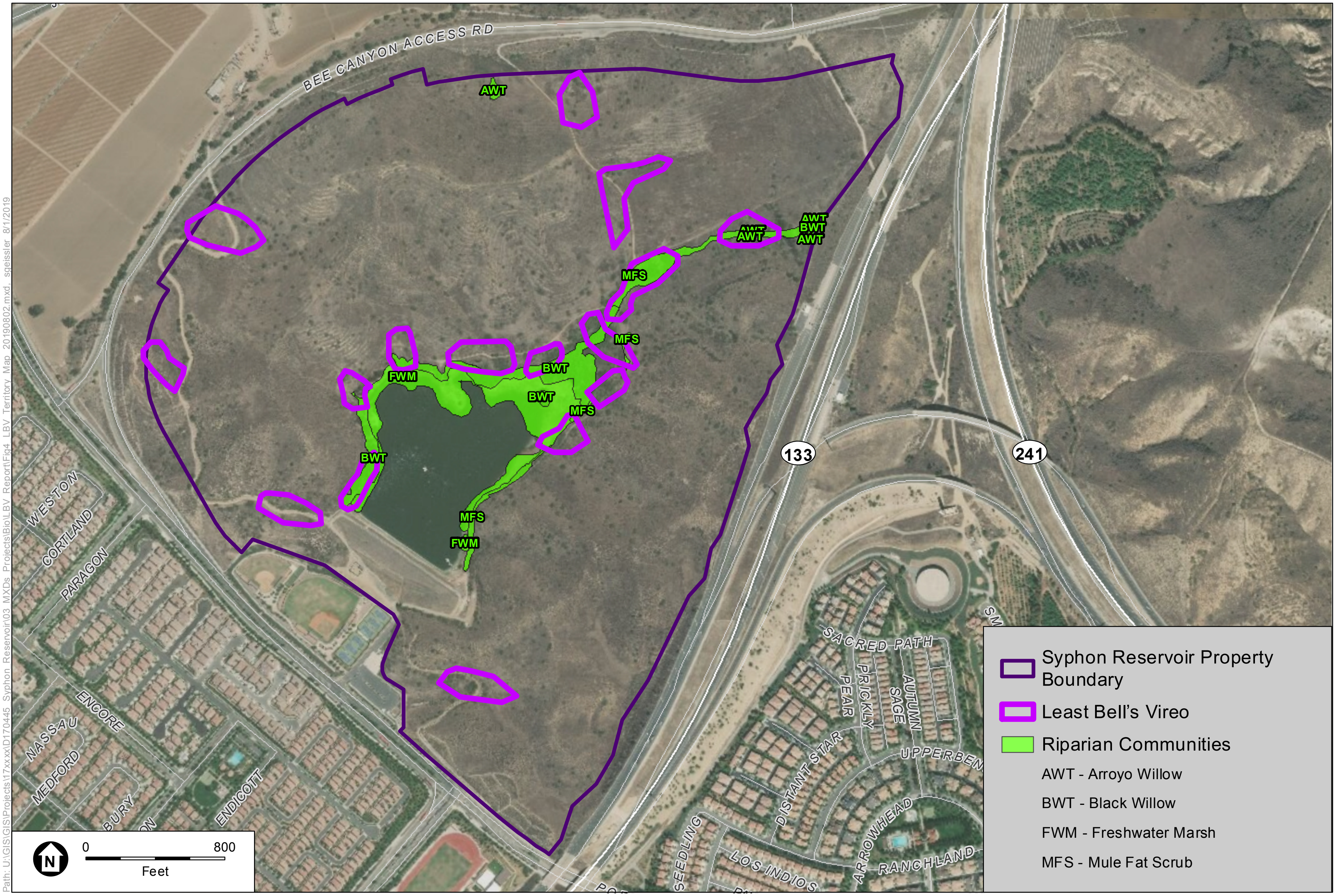
SOURCE: ESRI, 2016.

Syphon Reservoir Improvement Project

Figure 3

Natural Communities

ESA



SOURCE: ESRI, 2016.

Syphon Reservoir Improvement Project

Figure 4

Least Bell's Vireo Territory Map

ESA

ESA

ATTACHMENT A – AVIAN COMPENDIUM

Common Name	Scientific Name	4/10/19	4/22/19	5/3/19	5/15/19	6/5/19	6/17/19	6/27/19	7/8/19	Special Status[b]
Allen's Hummingbird	*Selasphorus sasin*		X	X	X	X	X	X	X	
American Coot	*Fulica americana*	X		X						
American Crow	*Corvus brachyrhynchos*	X	X	X	X	X	X	X		
American Goldfinch	*Spinus tristis*							X	X	
Anna's Hummingbird	*Calypte anna*			X			X	X	X	
Ash-throated Flycatcher	*Myiarchus cinerascens*		X				X		X	
Barn Swallow	*Hirundo rustica*			X		X	X	X	X	
Bewick's Wren	*Thryomanes bewickii*			X		X	X	X	X	
Black Phoebe	*Sayornis nigricans*	X		X		X	X	X	X	
Black-headed Grosbeak	*Pheucticus melanocephalus*		X	X		X	X			
Black-necked Stilt	*Himantopus mexicanus*						X			
Blue-gray Gnatcatcher	*Polioptila caerulea*	X	X	X	X	X	X	X	X	
Blue Grosbeak	*Passerina caerulea*			X				X	X	
Bullock's Oriole	*Icterus bullockii*		X	X				X		
Bushtit	*Psaltriparus minimus*	X	X	X	X	X	X	X	X	
Coastal California Gnatcatcher	*Polioptila californica californica*			X		X	X	X	X	FESA Threatened; CDFW: SSC
California Quail	*Callipepla californica*	X	X	X	X	X	X	X	X	
California Thrasher	*Toxostoma redivivum*	X	X	X	X	X	X	X	X	
California Towhee	*Melozone crissalis*		X	X	X	X	X	X		
Caspian Tern	*Hydroprogne caspia*			X			X			
Cassin's Kingbird	*Tyrannus vociferans*	X	X	X	X	X	X	X	X	
Cedar Waxwing	*Bombycilla cedrorum*			X						
Cliff Swallow	*Petrochelidon pyrrhonota*		X	X	X		X	X	X	
Common Raven	*Corvus corax*			X		X	X	X	X	
Common Yellowthroat	*Geothlypis trichas*	X	X	X	X	X	X	X	X	
Cooper's Hawk	*Accipiter cooperii*			X						
Double-crested Cormorant	*Phalacrocorax auritus*			X						
Forster's Tern	*Sterna forsteri*					X				
Great Blue Heron	*Ardea herodias*								X	
Great Egret	*Ardea alba*	X		X						
Greater Roadrunner	*Geococcyx californianus*	X	X	X				X		
Greater Yellowlegs	*Tringa melanoleuca*					X				
Great-tailed Grackle	*Quiscalus mexicanus*			X						
Hooded Oriole	*Icterus cucullatus*	X	X	X	X	X	X	X	X	
Horned Lark	*Eremophila alpestris*							X		
House Finch	*Haemorhous mexicanus*	X	X	X	X	X	X	X	X	
House Wren	*Troglodytes aedon*					X	X	X	X	
Killdeer	*Charadrius vociferous*	X	X	X	X	X	X	X	X	
Lawrence's Goldfinch	*Spinus lawrencei*							X		
Lazuli Bunting	*Passerina amoena*			X						
Least Bell's Vireo	*Vireo bellii pusillus*	X	X	X	X	X	X	X	X	CESA Endangered; FESA Endangered
Lesser Goldfinch	*Spinus psaltria*	X	X	X	X	X	X	X	X	
Lesser Nighthawk	*Chordeiles acutipennis*		X							
Mallard	*Anas platyrhynchos*	X		X		X	X	X	X	

ESA

ATTACHMENT A – AVIAN COMPENDIUM

Common Name	Scientific Name	4/10/19	4/22/19	5/3/19	5/15/19	6/5/19	6/17/19	6/27/19	7/8/19	Special Status[b]
Mourning Dove	*Zenaida macroura*	X	X	X			X	X	X	
Northern Flicker	*Colaptes auratus*						X			
Northern Mockingbird	*Mimus polyglottos*	X	X	X	X	X	X	X	X	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		X			X	X			
Nuttall's Woodpecker	*Dryobates nuttallii*							X	X	
Orange-crowned Warbler	*Oreothlypis celata*			X						
Pacific-slope Flycatcher	*Empidonax difficilis*			X						
Redhead	*Aythya americana*					X	X	X		
Red-tailed Hawk	*Buteo jamaicensis*		X	X	X	X	X	X	X	
Rock Pigeon[a]	*Columba livia*								X	
Ruddy Duck	*Oxyura jamaicensis*		X	X		X	X	X		
Rufous Hummingbird	*Selasphorus rufus*	X	X							
Say's Phoebe	*Sayornis saya*						X	X		
Scaly-breasted Munia[a]	*Lonchura punctulata*			X	X	X	X	X	X	
Snowy Egret	*Egretta thula*			X		X	X	X	X	
Song Sparrow	*Melospiza melodia*	X	X	X	X	X	X	X	X	
Southern California Rufous-crowned Sparrow	*Aimophila ruficeps canescens*							X		CDFW: WL
Spotted Towhee	*Pipilo maculatus*	X	X	X	X		X	X	X	
Tree Swallow	*Tachycineta bicolor*			X						
Turkey Vulture	*Cathartes aura*			X	X	X	X	X		
Vaux's Swift	*Chaetura vauxi*			X						
Western Grebe	*Aechmophorus occidentalis*			X						
Western Meadowlark	*Sturnella neglecta*			X						
Western Tanager	*Piranga ludoviciana*			X						
White-faced Ibis	*Plegadis chihi*						X	X		
White-throated Swift	*Aeronautes saxatalis*			X		X	X	X	X	
Wilson's Warbler	*Cardellina pusilla*	X		X						
Wrentit	*Chamaea fasciata*	X	X	X	X	X	X	X	X	
Yellow Warbler	*Setophaga petechia*					X	X	X	X	CDFW: SSC
Yellow-breasted Chat	*Icteria virens*		X		X		X	X	X	CDFW: SSC

[a] Exotic species

[b] CESA = California Endangered Species Act; FESA = Federal Endangered Species Act; CDFW = California Department of Fish and Wildlife; WL = Watch List; SSC = Species of Special Concern.

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 05/03/2019

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Polioptila californica californica*

Common Name: coastal California gnatcatcher

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: 7 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 283 (Yes, Occ. #) ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: Maile Tanaka, ESA
Address: 2121 Alton Parkway, Suite 100
Irvine, CA 92606
E-mail Address: mtanaka@esassoc.com
Phone: 949-753-7001

Plant Information
Phenology: ______ % vegetative ______ % flowering ______ % fruiting

Animal Information
7 # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☒ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Orange Landowner / Mgr: Irvine Ranch Water District

Quad Name: El Toro Elevation: ______

T___ R___ Sec___, ___1/4 of ___ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___1/4 of ___ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ______

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)

Coordinates: 33.71573842, -117.72854097
33.71318457, -117.72793069
33.71411233, -117.73430724
33.71187830, -117.73267864
33.71188568, -117.73564123
33.70975627, -117.73310024
33.70863200, -117.72975805

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

California sagebrush scrub and disturbed California sagebrush scrub.
Singing males most of which were likely pairs and breeding.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Undeveloped reservoir surrounded by open space, agriculture, and development.

Visible disturbances: None

Threats: ______

Comments: Incidental observations of at least 7 singing males heard calling during surveys conducted from April-July 2019.

Determination: *(check one or more, and fill in blanks)*
☐ Keyed (cite reference): ______
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☒ By another person (name): Maile Tanaka, Jaclyn Catino-Davenport, Karl Fairchild
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 06/27/2019

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Aimophila ruficeps canescens*

Common Name: Southern California rufous-crowned sparrow

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: 2   Subsequent Visit? ( ) Yes (●) No

Is this an existing NDDB occurrence? ______ Yes, Occ. #   [X] No   [ ] Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: Maile Tanaka, ESA
Address: 2121 Alton Parkway, Suite 100
Irvine, CA 92606
E-mail Address: mtanaka@esassoc.com
Phone: 949-753-7001

Plant Information
Phenology: ______ % vegetative ______ % flowering ______ % fruiting

Animal Information
1 # adults   1 # juveniles   ______ # larvae   ______ # egg masses   ______ # unknown

[ ] wintering   [X] breeding   [X] nesting   [ ] rookery   [ ] burrow site   [ ] lek   [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Orange   Landowner / Mgr: Irvine Ranch Water District
Quad Name: El Toro   Elevation: 490 ft amsl
T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( )   Source of Coordinates (GPS, topo. map & type): GPS
T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( )   GPS Make & Model: ______
DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( )   Horizontal Accuracy: ______ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: 33.715496000, -117.72805096

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Disturbed California sagebrush scrub and ruderal vegetation along ridge/saddle of hill north of reservoir.
Adult observed feeding fledgling.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Undeveloped reservoir surrounded by open space, agriculture, and development.
Visible disturbances: None.
Threats: ______
Comments:

Determination: *(check one or more, and fill in blanks)*
[ ] Keyed (cite reference): ______
[ ] Compared with specimen housed at: ______
[ ] Compared with photo / drawing in: ______
[X] By another person (name): Karl Fairchild
[ ] Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[X]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 04/22/2019

For Office Use Only
Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Icteria virens*

Common Name: yellow-breasted chat

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: 5 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: Maile Tanaka, ESA
Address: 2121 Alton Parkway, Suite 100
Irvine, CA 92606
E-mail Address: mtanaka@esassoc.com
Phone: 949-753-7001

Plant Information
Phenology: ______ % vegetative ______ % flowering ______ % fruiting

Animal Information
5 # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

[ ] wintering [X] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Orange Landowner / Mgr: Irvine Ranch Water District
Quad Name: El Toro Elevation: ______
T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS
T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ______
DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ______ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: 33.71433324, -117.72496433
33.71407166, -117.72729259
33.71218457, -117.73023584
33.71256261, -117.72748380
33.70994554, -117.72976378

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Riparian arroyo and black willow thickets, mule fat scrub.
Singing males most of which were likely pairs and breeding.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Undeveloped reservoir surrounded by open space, agriculture, and development.
Visible disturbances: None.
Threats: ______
Comments: Incidental observations of at least 5 singing males heard calling during surveys conducted from April-July 2019.

Determination: *(check one or more, and fill in blanks)*
[ ] Keyed (cite reference): ______
[ ] Compared with specimen housed at: ______
[ ] Compared with photo / drawing in: ______
[X] By another person (name): Maile Tanaka, Karl Fairchild
[ ] Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[X]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ______ Quad Code: ______

Elm Code: ______ Occ No.: ______

EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 06/05/2019

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: Setophaga petechia

Common Name: yellow warbler

Species Found? (•) Yes ( ) No ______ If not found, why?

Total No. Individuals: 5 Subsequent Visit? (•) Yes ( ) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: Maile Tanaka, ESA

Address: 2121 Alton Parkway, Suite 100
Irvine, CA 92606

E-mail Address: mtanaka@esassoc.com

Phone: 949-753-7001

Plant Information

Phenology: ______ % vegetative ______ % flowering ______ % fruiting

Animal Information

5 # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

[ ] wintering [X] breeding [X] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Orange Landowner / Mgr: Irvine Ranch Water District

Quad Name: El Toro Elevation: ______

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ______

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (•)

Coordinates: 33.71351648, -117.72724222
33.71179387, -117.72798946
33.71203387, -117.73142631
33.71036455, -117.73201018
33.71012740, -117.72967475

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Riparian arroyo and black willow thickets, mule fat scrub.
Singing males most of which were likely pairs and breeding; in addition, one family group of adults feeding fledgling.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (•) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Undeveloped reservoir surrounded by open space, agriculture, and development.

Visible disturbances: None.

Threats: ______

Comments: Incidental observations of at least 5 singing males heard calling during surveys conducted from April-July 2019.

Determination: *(check one or more, and fill in blanks)*
- [ ] Keyed (cite reference): ______
- [ ] Compared with specimen housed at: ______
- [ ] Compared with photo / drawing in: ______
- [X] By another person (name): Karl Fairchild
- [ ] Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[X]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (•) yes ( ) no

Appendix G
Results of 2019 Focused Southwestern Willow Flycatcher Surveys

ESA 50 YEARS 1969-2019

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001 phone
949.753.7002 fax

esassoc.com

August 1, 2019

Stacey Love
Carlsbad Fish and Wildlife Service Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

Esther Burkett
California Department of Fish and Wildlife
1416 Ninth Street, 12th Floor
Sacramento, California 95814

Subject: Results of 2019 Focused Southwestern Willow Flycatcher Surveys for the Syphon Reservoir Improvement Project, Unincorporated Orange County, California

Dear Ms. Love and Ms. Burkett:

This letter report presents the methodology and results of focused surveys conducted for southwestern willow flycatcher (*Empidonax traillii extimus*; SWFL) at the Syphon Reservoir Improvement Project site within unincorporated Orange County, California. **Environmental Science Associates (ESA)** biologist Karl Fairchild (TE-92799B-2) conducted the surveys to determine the presence or absence of the species within the approximately 265-acre study area ("study area").

Project Location and Description

The study area is located in central Orange County (**Figure 1**). Specifically, the study area is located on the northeast side of Portola Parkway between the Bee Canyon Landfill Access Road and State Route 133 (SR-133) (**Figure 2**). Irvine Ranch Water District (IRWD) owns the majority of the property bounded by these roadways. The Crean Lutheran High School maintains recreation facilities located between Portola Parkway and the toe of the existing dam slope. Residential neighborhoods are located on the southwest side of Portola Parkway. The ground surrounding the reservoir, which dominates the study area, is hilly with ridgelines and terraced slopes. Ground surface elevations within the study area range from approximately 319 feet above sea level at Portola Parkway immediately below the existing reservoir to approximately 675 feet above sea level in the northeast corner of the study area.

The Syphon Reservoir Improvement Project is intended to store additional recycled water to meet the seasonal demand of recycled water customers and to enhance IRWD's water supply reliability by increasing the existing recycled water seasonal storage capacity at Syphon Reservoir, which will allow the storage of additional recycled water produced at the water recycling plants during periods of low demand (winter months) for use during periods of high demand (summer months). A preliminary geotechnical investigations project would evaluate geologic and seismic conditions at the embankment dam, spillway, outlet, and borrow sites.[1]

Natural Communities

Natural communities found within the study area include arroyo willow thicket, black willow thicket, mule fat scrub, freshwater marsh, coyote brush scrub, chaparral bushmallow scrub, chaparral bushmallow scrub/coyote brush scrub, chaparral bushmallow scrub/non-native herbaceous cover, sumac chaparral, California sagebrush scrub, California sagebrush scrub/non-native herbaceous cover, coast prickly pear scrub, eucalyptus woodland, non-native grassland, non-native herbaceous cover, non-native herbaceous cover/California sagebrush scrub, open water, and disturbed areas. Vegetation communities and cover types within the study area are described below. California sagebrush alliance and non-native herbaceous cover/California sagebrush alliance are the dominant vegetation covers in the upland areas, and arroyo willow thicket is the dominant vegetation cover within the riparian areas of the study area. **Figure 3** depicts the natural communities found within the study area. A description of the potentially suitable habitat surveyed for SWFL within the study area is presented below.

Arroyo Willow Thicket

Arroyo willow thicket (i.e., *Salix lasiolepis* Shrubland Alliance or Arroyo Willow Riparian Forest) is characterized by a canopy cover dominated by mature arroyo willow (*Salix lasiolepis*) with an understory of smaller willows, and variable herbaceous layer. This alliance is typically found within stream banks and benches, slope seeps, and stringers along drainages (Sawyer et al. 2009)[2]. A total of 0.24 acre of arroyo willow thicket occurs primarily within the northern and northeastern portions of the study area.

Black Willow Thicket

Black willow thicket (i.e., *Salix gooddingii* Woodland Alliance or Black Willow Riparian Forest) is characterized by a canopy cover dominated by mature black willow (*Salix gooddingii*) with an understory of smaller willows, mule fat (*Baccharis salicifolia*), and variable herbaceous layer. This alliance is typically found on terraces along large rivers, canyons, and along rocky floodplains of small, intermittent streams, seeps, and springs (Sawyer et al. 2009)[3]. Species associated with this alliance include native arroyo willow and non-native tamarisk (*Tamarix ramosissima*) and red gum (*Eucalyptus camaldulensis*). A total of 4.13 acres of black willow thicket were mapped around the northern and northeastern perimeter of the reservoir within the center of the study area.

---

1 An embankment dam is an earthen dam built by compacting successive layers of earth, using the most impervious materials to form a core and placing more permeable substances on the inner and outer sides. A spillway is a structure provided to control the release of flows from behind a dam such that the dam does not overtop. An outlet is a device used to regulate flow from a dam. A borrow site is an excavated area where material has been dug for use as fill material at another location.

2 Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. *A Manual of California Vegetation, Second Edition.* California Native Plant Society, Sacramento, CA

3 Ibid.

Mule Fat Scrub

Mule fat scrub (i.e., mulefat thickets [*Baccharis salicifolia* Shrubland Alliance]) is characterized by large shrub cover dominated by mule fat and variable herbaceous layer. This alliance is typically found within canyon bottoms, floodplains, lake margins, and stream channels with soils of mixed alluvium (Sawyer et al. 2009) [4]. Species associated with this alliance include native black willow, California sagebrush (*Artemisia californica*), laurel sumac (*Malosma laurina*), cocklebur (*Xanthium strumarium*), and non-native Spanish false fleabane (*Pulicaria paludosa*), and black mustard (*Brassica nigra*). A total of 2.25 acres of mule fat scrub were mapped around the northern and northeastern perimeter of the reservoir within the center of the study area.

Methodology

Surveys for SWFL were conducted by ESA biologist Karl Fairchild (TE-92799B-2). Methods employed were in conformance with U.S. Fish and Wildlife Service (USFWS) *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher* issued in 2010. [5] Five surveys were conducted, with one survey during Period 1 (May 29), two surveys during Period 2 (June 5 and June 17), and two surveys during Period 3 (June 27 and July 8). All portions of the study area containing potentially suitable habitat and adjacent habitat potentially used for foraging were surveyed using playback of taped vocalizations. Surveys were conducted between 5:56 AM and 8:30 AM, during suitable weather conditions (overcast to clear skies, winds of 3 miles per hour or less, and temperatures between 63 and 74 degrees Fahrenheit). The permitted biologist played a 15-second recording of SWFL vocalizations (including *fitz-bew* and *britt* notes). The recording was played twice before the biologist moved approximately 100 feet and repeated the procedure. Due to the patchy nature of the habitat present at this site, the biologist frequently moved greater distances between patches of suitable habitat between playbacks.

Results

Survey results are summarized in **Table 1** below. No willow flycatchers were detected during any of the 2019 focused surveys. No brown-headed cowbirds (*Molothrus ater*), which are brood parasites, were detected within the study area during protocol SWFL surveys; however, multiple brown-headed cowbird traps, installed and maintained by Leatherman BioConsulting Inc., were observed on-site with captive decoy birds inside. A complete list of avian species detected within the study area is included in **Attachment A**.

California Natural Diversity Database (CNDDB) reporting forms for all incidental special-status species are included as **Attachment B**. The Willow Flycatcher Survey and Detection Form is included as **Appendix C**.

4 Ibid.

5 Sogge, M. K., D. Ahlers, and S. J. Sferra. 2010. *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher*. U.S. Geological Survey Techniques and Methods 2A-10, 38 p.

TABLE 1
SWFL SURVEY RESULTS

Date	Time	Wind (mph) (start/end)	Temperature (F) (start-end)	Weather (start/end)	Results	Surveyors
05/29/19	0655–0830	0/3	67°–68°	2% Cloud Cover/ 0% Cloud Cover	No willow flycatchers detected	Karl Fairchild
06/05/19	0625–0802	3/1	63°–65°	100% Cloud Cover/ 100% Cloud Cover	No willow flycatchers detected	Karl Fairchild
06/17/19	0600–0727	0/2	67°–68°	100% Cloud Cover; misting/ 100% Cloud Cover; misting	No willow flycatchers detected	Karl Fairchild
06/27/19	0558–0726	0/1	68°–70°	99% Cloud Cover/ 80% Cloud Cover	No willow flycatchers detected	Karl Fairchild
07/08/19	0556–0720	1/1	69°–70°	100% Cloud Cover/ 100% Cloud Cover	No willow flycatchers detected	Karl Fairchild

SOURCE: ESA 2019.

Incidentally-observed avian special-status species included the coastal California gnatcatcher (*Polioptila californica californica*), least Bell's vireo (*Vireo bellii pusillus*), yellow warbler (*Setophaga petechia*), and yellow-breasted chat (*Icteria virens*). Coastal California gnatcatcher is a federally threatened species, least Bell's vireo is a State and federally endangered species, southern California rufous-crowned sparrow is a California Department of Fish and Wildlife (CDFW) watch list species, and yellow warbler and yellow-breasted chat are both CDFW species of special concern. These species were detected during multiple surveys.

Conclusion

Based on the results of the protocol-level SWFL surveys, the study area is not occupied by SWFL. Coastal California gnatcatcher, least Bell's vireo, southern California rufous-crowned sparrow, yellow warbler, and yellow-breasted chat were also observed on-site, as well as brown-headed cowbirds only within the traps on-site.

If there are any questions regarding this report or the results, please feel free to reach out to Maile Tanaka at 949-870-1501 or mtanaka@esassoc.com.

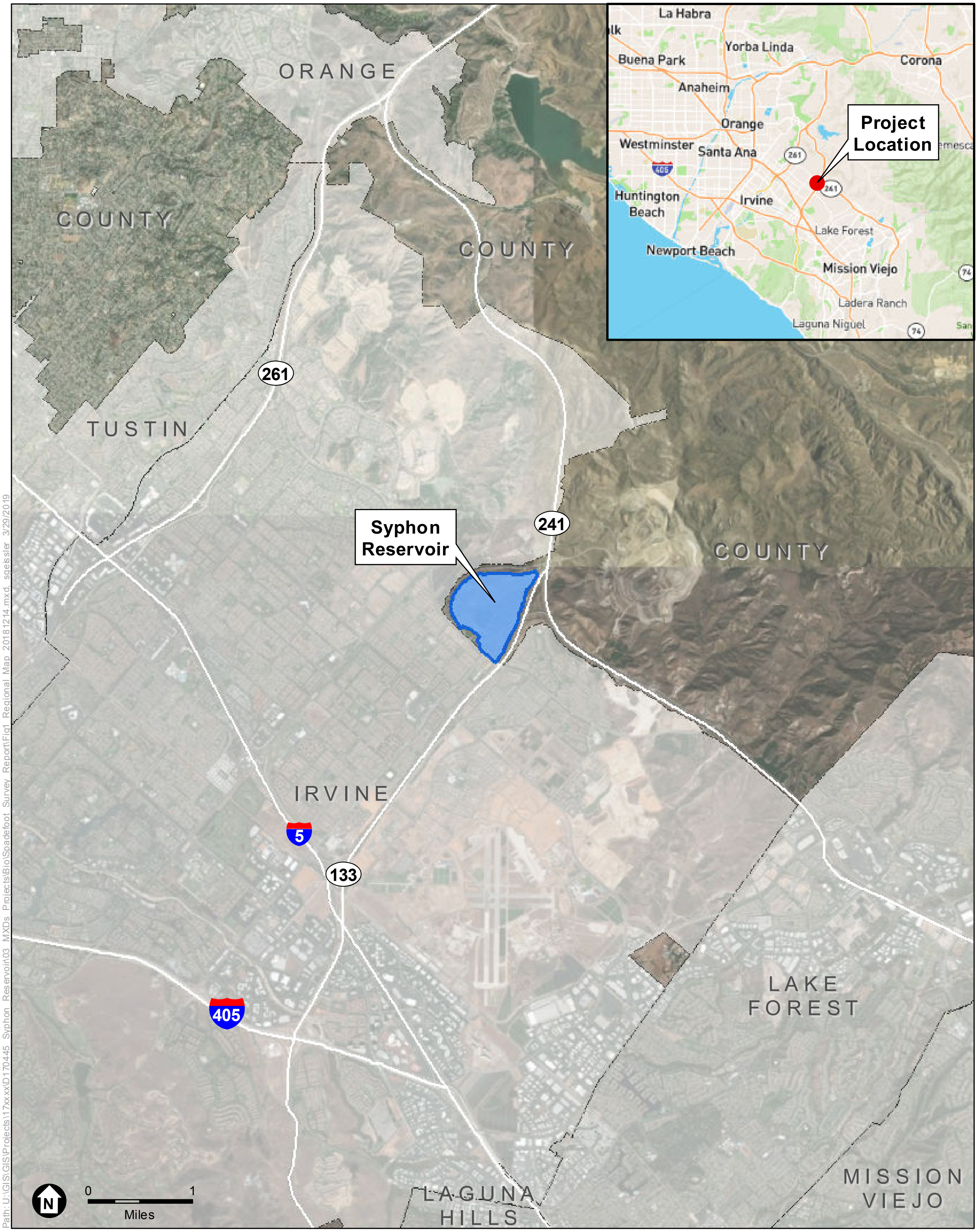
Ms. Love and Ms. Burkett
August 1, 2019
Page 5

Sincerely,

Maile Tanaka
Managing Associate Biologist

Karl Fairchild
Associate Biologist III

Attachments:
Figure 1: Regional Map
Figure 2: Vicinity Map
Figure 3: Natural Communities
Attachment A: Avian Compendium
Attachment B: CNDDB Forms
Attachment C: Willow Flycatcher Survey and Detection Form

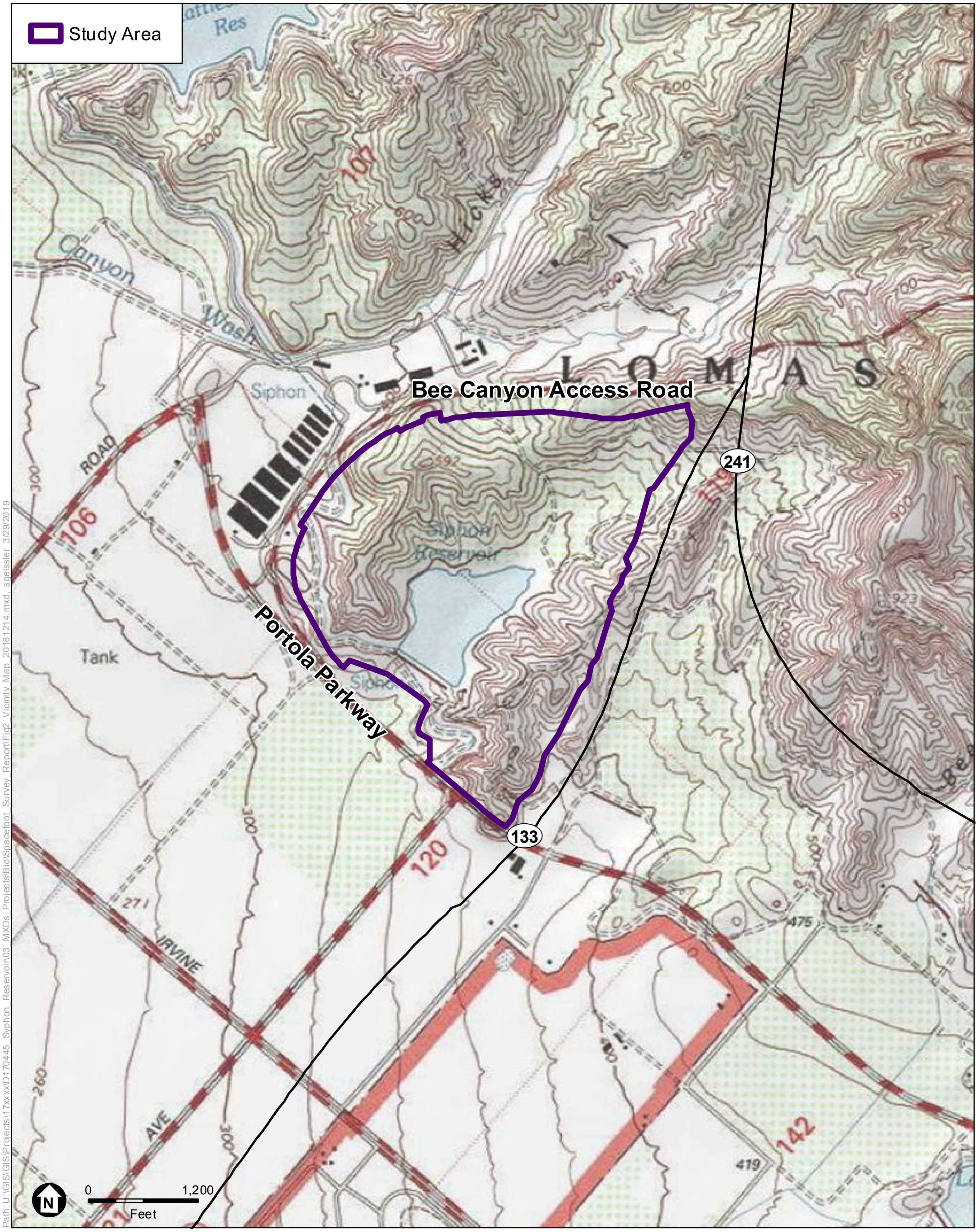


SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservoir Improvement Project

Figure 1
Regional Map

ESA



SOURCE: ESRI, 2016; El Toro USGS 7.5 minute Quadrangle

Syphon Reservoir Improvement Project

Figure 2
Vicinity Map

ESA

SOURCE: ESRI, 2016.

Syphon Reservoir Improvement Project

Figure 3

Natural Communities

ESA

ESA

ATTACHMENT A – AVIAN COMPENDIUM

Common Name	Scientific Name	5/29/19	6/5/19	6/17/19	6/27/19	7/8/19	Special Status[b]
Allen's Hummingbird	*Selasphorus sasin*	X	X	X	X	X	
American Crow	*Corvus brachyrhynchos*		X	X	X		
American Goldfinch	*Spinus tristis*				X	X	
Anna's Hummingbird	*Calypte anna*	X		X	X	X	
Ash-throated Flycatcher	*Myiarchus cinerascens*			X		X	
Barn Swallow	*Hirundo rustica*		X	X	X	X	
Bewick's Wren	*Thryomanes bewickii*	X	X	X	X	X	
Black Phoebe	*Sayornis nigricans*	X	X	X	X	X	
Black-headed Grosbeak	*Pheucticus melanocephalus*	X	X	X			
Black-necked Stilt	*Himantopus mexicanus*	X		X			
Blue-gray Gnatcatcher	*Polioptila caerulea*	X	X	X	X	X	
Blue Grosbeak	*Passerina caerulea*				X	X	
Bullock's Oriole	*Icterus bullockii*	X			X		
Bushtit	*Psaltriparus minimus*	X	X	X	X	X	
Coastal California Gnatcatcher	*Polioptila californica californica*		X	X	X	X	FESA Threatened; CDFW: SSC
California Quail	*Callipepla californica*	X	X	X	X	X	
California Thrasher	*Toxostoma redivivum*		X	X	X	X	
California Towhee	*Melozone crissalis*		X	X	X		
Caspian Tern	*Hydroprogne caspia*			X			
Cassin's Kingbird	*Tyrannus vociferans*	X	X	X	X	X	
Cliff Swallow	*Petrochelidon pyrrhonota*	X		X	X	X	
Common Raven	*Corvus corax*	X	X	X	X	X	
Common Yellowthroat	*Geothlypis trichas*	X	X	X	X	X	
Forster's Tern	*Sterna forsteri*		X				
Great Blue Heron	*Ardea herodias*	X				X	
Greater Roadrunner	*Geococcyx californianus*				X		
Greater Yellowlegs	*Tringa melanoleuca*		X				
Great-tailed Grackle	*Quiscalus mexicanus*	X					
Green Heron	*Butorides virescens*	X					
Hooded Oriole	*Icterus cucullatus*	X	X	X	X	X	
Horned Lark	*Eremophila alpestris*				X		
House Finch	*Haemorhous mexicanus*	X	X	X	X	X	
House Wren	*Troglodytes aedon*		X	X	X	X	
Killdeer	*Charadrius vociferous*	X	X	X	X	X	
Lawrence's Goldfinch	*Spinus lawrencei*				X		
Least Bell's Vireo	*Vireo bellii pusillus*	X	X	X	X	X	CESA Endangered; FESA Endangered
Lesser Goldfinch	*Spinus psaltria*	X	X	X	X	X	
Mallard	*Anas platyrhynchos*	X	X	X	X	X	
Mourning Dove	*Zenaida macroura*	X		X	X	X	
Northern Flicker	*Colaptes auratus*			X			
Northern Mockingbird	*Mimus polyglottos*	X	X	X	X	X	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	X	X	X			
Nuttall's Woodpecker	*Dryobates nuttallii*				X	X	
Pacific-slope Flycatcher	*Empidonax difficilus*	X					
Redhead	*Aythya americana*	X	X	X	X		

ESA

ATTACHMENT A – AVIAN COMPENDIUM

Common Name	Scientific Name	5/29/19	6/5/19	6/17/19	6/27/19	7/8/19	Special Status[b]
Red-tailed Hawk	*Buteo jamaicensis*	X	X	X	X	X	
Rock Pigeon[a]	*Columba livia*					X	
Ruddy Duck	*Oxyura jamaicensis*		X	X	X		
Say's Phoebe	*Sayornis saya*			X	X		
Scaly-breasted Munia[a]	*Lonchura punctulata*	X	X	X	X	X	
Snowy Egret	*Egretta thula*	X	X	X	X	X	
Song Sparrow	*Melospiza melodia*	X	X	X	X	X	
Southern California Rufous-crowned Sparrow	*Aimophila ruficeps canescens*				X		CDFW: WL
Spotted Towhee	*Pipilo maculatus*	X		X	X	X	
Turkey Vulture	*Cathartes aura*		X	X	X		
Western Grebe	*Aechmophorus occidentalis*	X					
White-faced Ibis	*Plegadis chihi*			X	X		
White-throated Swift	*Aeronautes saxatalis*	X	X	X	X	X	
Wrentit	*Chamaea fasciata*	X	X	X	X	X	
Yellow Warbler	*Setophaga petechia*	X	X	X	X	X	CDFW: SSC
Yellow-breasted Chat	*Icteria virens*	X		X	X	X	CDFW: SSC

[a] Exotic species
[b] CESA = California Endangered Species Act; FESA = Federal Endangered Species Act; CDFW = California Department of Fish and Wildlife; WL = Watch List; SSC = Species of Special Concern.

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Date of Field Work (mm/dd/yyyy): 05/03/2019

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Polioptila californica californica*

Common Name: coastal California gnatcatcher

Species Found? (●) Yes ( ) No ______ If not found, why?

Total No. Individuals: 7 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 283 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: Maile Tanaka, ESA
Address: 2121 Alton Parkway, Suite 100
Irvine, CA 92606
E-mail Address: mtanaka@esassoc.com
Phone: 949-753-7001

Plant Information
Phenology:
______ % vegetative ______ % flowering ______ % fruiting

Animal Information
7 # adults ______ # juveniles ______ # larvae ______ # egg masses ______ # unknown

☐ wintering ☒ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Orange Landowner / Mgr: Irvine Ranch Water District

Quad Name: El Toro Elevation: ______

T___ R___ Sec___, ___1/4 of ___ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___1/4 of ___ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ______

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)

Coordinates: 33.71573842, -117.72854097
33.71318457, -117.72793069
33.71411233, -117.73430724
33.71187830, -117.73267864
33.71188568, -117.73564123
33.70975627, -117.73310024
33.70863200, -117.72975805

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

California sagebrush scrub and disturbed California sagebrush scrub.
Singing males most of which were likely pairs and breeding.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Undeveloped reservoir surrounded by open space, agriculture, and development.

Visible disturbances: None

Threats: ______

Comments: Incidental observations of at least 7 singing males heard calling during surveys conducted from April-July 2019.

Determination: *(check one or more, and fill in blanks)*
☐ Keyed (cite reference): ______
☐ Compared with specimen housed at: ______
☐ Compared with photo / drawing in: ______
☒ By another person (name): Maile Tanaka, Jaclyn Catino-Davenport, Karl Fairchild
☐ Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 06/27/2019

For Office Use Only

Source Code: ______ Quad Code: ______
Elm Code: ______ Occ No.: ______
EO Index: ______ Map Index: ______

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Aimophila ruficeps canescens*

Common Name: Southern California rufous-crowned sparrow

Species Found? (•) Yes ( ) No ______ If not found, why?

Total No. Individuals: 2 Subsequent Visit? ( ) Yes (•) No

Is this an existing NDDB occurrence? ______ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: ______ Number ______ Museum / Herbarium

Reporter: Maile Tanaka, ESA
Address: 2121 Alton Parkway, Suite 100
Irvine, CA 92606
E-mail Address: mtanaka@esassoc.com
Phone: 949-753-7001

Plant Information

Phenology:

______ % vegetative ______ % flowering ______ % fruiting

Animal Information

1	1			
# adults	# juveniles	# larvae	# egg masses	# unknown

[ ] wintering [X] breeding [X] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Orange Landowner / Mgr: Irvine Ranch Water District

Quad Name: El Toro Elevation: 490 ft amsl

T____ R____ Sec____, ____$^1/_4$ of ____ $^1/_4$, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____$^1/_4$ of ____ $^1/_4$, Meridian: H( ) M( ) S( ) GPS Make & Model: ______

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ______ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (•)

Coordinates: 33.715496000, -117.72805096

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Disturbed California sagebrush scrub and ruderal vegetation along ridge/saddle of hill north of reservoir.
Adult observed feeding fledgling.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): (•) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Undeveloped reservoir surrounded by open space, agriculture, and development.

Visible disturbances: None.

Threats: ______

Comments:

Determination: *(check one or more, and fill in blanks)*

- [ ] Keyed (cite reference): ______
- [ ] Compared with specimen housed at: ______
- [ ] Compared with photo / drawing in: ______
- [X] By another person (name): Karl Fairchild
- [ ] Other: ______

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[X]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (•) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only

Source Code: ________ Quad Code: ________
Elm Code: ________ Occ No.: ________
EO Index: ________ Map Index: ________

Date of Field Work (mm/dd/yyyy): 04/22/2019

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Icteria virens*

Common Name: yellow-breasted chat

Species Found? (●) Yes ( ) No ________ If not found, why?

Total No. Individuals: 5 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? ________ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: ________ Number ________ Museum / Herbarium

Reporter: Maile Tanaka, ESA

Address: 2121 Alton Parkway, Suite 100
Irvine, CA 92606

E-mail Address: mtanaka@esassoc.com

Phone: 949-753-7001

Plant Information

Phenology: ____ % vegetative ____ % flowering ____ % fruiting

Animal Information

5 # adults, ____ # juveniles, ____ # larvae, ____ # egg masses, ____ # unknown

[ ] wintering [X] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Orange Landowner / Mgr: Irvine Ranch Water District

Quad Name: El Toro Elevation: ________

T____ R____ Sec____, ____$^1/_4$ of ____ $^1/_4$, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____$^1/_4$ of ____ $^1/_4$, Meridian: H( ) M( ) S( ) GPS Make & Model: ________

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ________ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)

Coordinates: 33.71433324, -117.72496433
33.71407166, -117.72729259
33.71218457, -117.73023584
33.71256261, -117.72748380
33.70994554, -117.72976378

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Riparian arroyo and black willow thickets, mule fat scrub.
Singing males most of which were likely pairs and breeding.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Undeveloped reservoir surrounded by open space, agriculture, and development.

Visible disturbances: None.

Threats: ________

Comments: Incidental observations of at least 5 singing males heard calling during surveys conducted from April-July 2019.

Determination: *(check one or more, and fill in blanks)*

[ ] Keyed (cite reference): ________
[ ] Compared with specimen housed at: ________
[ ] Compared with photo / drawing in: ________
[X] By another person (name): Maile Tanaka, Karl Fairchild
[ ] Other: ________

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[X]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 06/05/2019

For Office Use Only
Source Code: ____ Quad Code: ____
Elm Code: ____ Occ No.: ____
EO Index: ____ Map Index: ____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: Setophaga petechia

Common Name: yellow warbler

Species Found? (●) Yes ( ) No ____ If not found, why?

Total No. Individuals: 5 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? ____ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: ____ Number ____ Museum / Herbarium

Reporter: Maile Tanaka, ESA
Address: 2121 Alton Parkway, Suite 100
Irvine, CA 92606
E-mail Address: mtanaka@esassoc.com
Phone: 949-753-7001

Plant Information
Phenology: ____ % vegetative ____ % flowering ____ % fruiting

Animal Information
5 # adults ____ # juveniles ____ # larvae ____ # egg masses ____ # unknown

[ ] wintering [X] breeding [X] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Orange Landowner / Mgr: Irvine Ranch Water District

Quad Name: El Toro Elevation: ____

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec____, ____1/4 of ____ 1/4, Meridian: H( ) M( ) S( ) GPS Make & Model: ____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: ____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)

Coordinates: 33.71351648, -117.72724222
33.71179387, -117.72798946
33.71203387, -117.73142631
33.71036455, -117.73201018
33.71012740, -117.72967475

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Riparian arroyo and black willow thickets, mule fat scrub.
Singing males most of which were likely pairs and breeding; in addition, one family group of adults feeding fledgling.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Undeveloped reservoir surrounded by open space, agriculture, and development.

Visible disturbances: None.

Threats: ____

Comments: Incidental observations of at least 5 singing males heard calling during surveys conducted from April-July 2019.

Determination: *(check one or more, and fill in blanks)*
[ ] Keyed (cite reference): ____
[ ] Compared with specimen housed at: ____
[ ] Compared with photo / drawing in: ____
[X] By another person (name): Karl Fairchild
[ ] Other: ____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[X]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (●) yes ( ) no

Appendix 1. Willow Flycatcher Survey and Detection Form

Always check the U.S. Fish and Wildlife Service Arizona Ecological Services Field Office web site http://www.fws.gov/southwest/es/arizona/) for the most up-to-date version.

Willow Flycatcher (WIFL) Survey and Detection Form (revised April 2010)

Site Name Syphon Reservoir State CA County Orange
USGS Quad Name El Toro Elevation 113 (meters)
Creek, River, Wetland, or Lake Name Syphon Reservoir

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** X ***No***____

Survey Coordinates: Start: E 432341 N 3730110 UTM Datum NAD 1983 (See instructions)
Stop: E 432147 N 3730231 UTM Zone 11S

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

***** Fill in additional site information on back of this page *****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding; potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.
Survey # 1 Observer(s) K. Fairchild	Date 05/21/2019 Start 0655 Stop 0830 Total hrs 1.6	0	0	0	N	Habitat marginal, no willow flycatchers detected	# Birds / Sex / UTM E / UTM N
Survey # 2 Observer(s) K. Fairchild	Date 06/05/2019 Start 0625 Stop 0802 Total hrs 1.6	0	0	0	N	Habitat marginal, no willow flycatchers detected	# Birds / Sex / UTM E / UTM N
Survey # 3 Observer(s) K. Fairchild	Date 06/17/2019 Start 0600 Stop 0727 Total hrs 1.4	0	0	0	N	Habitat marginal, no willow flycatchers detected	# Birds / Sex / UTM E / UTM N
Survey # 4 Observer(s) K. Fairchild	Date 06/27/2019 Start 0558 Stop 0726 Total hrs 1.5	0	0	0	N	Habitat marginal, no willow flycatchers detected	# Birds / Sex / UTM E / UTM N
Survey # 5 Observer(s) K. Fairchild	Date 07/08/2019 Start 0556 Stop 0720 Total hrs 1.4	0	0	0	N	Habitat marginal, no willow flycatchers detected	# Birds / Sex / UTM E / UTM N

Overall Site Summary	Total Adult Residents	Total Pairs	Total Territories	Total Nests	
Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total Survey Hrs 7.5	0	0	0	0	Were any Willow Flycatchers color-banded? Yes___ No X. If yes, report color combination(s) in the comments section on back of form and report to USFWS.

Reporting Individual Karl Fairchild Date Report Completed July 31, 2019
US Fish and Wildlife Service Permit # TE-92799B-2 State Wildlife Agency Permit # SC-11720

***Submit** form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.*

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual Karl Fairchild Phone # 541-609-1038
Affiliation Environmental Science Assoicates E-mail kfairchild@esassoc.com
Site Name Syphon Reservoir Date Report Completed July 31, 2019

Did you verify that this site name is consistent with that used in previous years? Yes ____ No _____ Not Applicable X
If site name is different, what name(s) was used in the past?____________________
If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.
Did you survey the same general area during each visit to this site this year? Yes X No ____ If no, summarize below.

Management Authority for Survey Area : Federal____ Municipal/County X State ____ Tribal ____ Private ____
Name of Management Entity or Owner (e.g., Tonto National Forest) Irvine Ranch Water District

Length of area surveyed: ___________ (meters)

Vegetation Characteristics: Mark the category that best describes the predominant tree/shrub foliar layer at this site (check one):

_____ Native broadleaf plants (entirely or almost entirely, > 90% native, includes high-elevation willow)

_____ Mixed native and exotic plants (mostly native, 50 - 90% native)

X Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

_____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.
Salix goodingii, Baccharis salicifolia, Salix lasiolepis

Average height of canopy (Do not include a range): 5 (meters)

Attach copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections.
Attach sketch or aerial photo showing site location, patch shape, survey route, location of any WIFLs or WIFL nests detected.
Attach photos of the interior of the patch, exterior of the patch, and overall site; describe any unique habitat features.

Comments (attach additional sheets if necessary)

Habitat is very patchy with disjunct thickets of black willow and arroyo willow. The single large thicket of black willow is partially intermixed with mulefat and eucalyptus.

Latitude/Longitude:
Start: 33.709N 117.730W
End: 33.709N 117.732W

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM N	UTM E	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)

Attach additional sheets if necessary

Appendix D
Noise and Vibration Technical Report

ESA

SYPHON RESERVOIR IMPROVEMENT PROJECT

Noise and Vibration Technical Report

March 2021

Prepared for
Irvine Ranch Water District
15600 Sand Canyon Ave.
Irvine, CA 92618

SYPHON RESERVOIR IMPROVEMENT PROJECT

Noise and Vibration Technical Report

Prepared for
Irvine Ranch Water District
15600 Sand Canyon Ave.
Irvine, CA 92618

March 2021

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001
esassoc.com

Bend
Camarillo
Delray Beach
Destin
Irvine
Los Angeles
Oakland
Orlando
Pasadena
Petaluma
Portland
Sacramento
San Diego
San Francisco
Santa Monica
Sarasota
Seattle
Tampa

D201700445.00

TABLE OF CONTENTS

Noise and Vibration Technical Report

Appendices

List of Figures

Page

List of Tables

ACRONYMS AND ABBREVIATIONS

Acronym	Description
amsl	above mean sea level
ANSI	American National Standard Institute
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of Irvine
CNEL	Community Noise Equivalent Level
COG	Council of Governments
dB	decibel
dBA	A-weighted dB scale
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I	Interstate
IRWD	Irvine Ranch Water District
L_{eq}	Equivalent Sound Level
L_{max}	Maximum Noise Level
L_{min}	Minimum Noise Level
NB	northbound
PPV	peak particle velocity
Project	Syphon Reservoir Improvement Project
ROW	Right-of-way
SR	State Route
TeNS	Technical Noise Supplement
USEPA	U.S. Environmental Protection Agency
WRP	Water Recycling Plant

This page intentionally left blank.

EXECUTIVE SUMMARY

The purpose of this Noise and Vibration Technical Report is to assess and discuss the impacts of potential noise and vibration impacts that may occur with the implementation of the proposed Syphon Reservoir Improvement Project (proposed project) located in unincorporated County of Orange and within the City of Irvine's (City) sphere of influence. The Syphon Reservoir is an existing recycled water storage reservoir in Irvine Ranch Water District's (IRWD's) service area. The proposed project would increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam. The proposed project would allow the storage of additional recycled water produced at the Michelson Water Recycling Plant (WRP) during periods of low demand (winter months) for use during periods of high demand (summer months).

The analysis describes the existing noise environment in the vicinity of the project limits, estimates future noise and vibration levels at surrounding land uses resulting from construction and operation of the project, and identifies the potential for significant noise impacts based on applicable noise and vibration threshold of significance. Noise worksheets and technical data used in this analysis are provided in Appendices A and B of this report. The findings of the analyses are as follows:

- Construction activities would be required to comply with the City's allowable construction hours of between the hours of 7:00 A.M. to 7:00 P.M. Mondays through Fridays, and 9:00 A.M. to 6:00 P.M. on Saturdays. Therefore, construction noise impacts generated by the proposed project would be less than significant and would not require mitigation measures.
- Off-site haul truck trips and vendor deliveries would occur only during daytime hours within the allowable hours specified in the City's Municipal Code. Therefore, noise impacts from off-site construction traffic would be less than significant, and no mitigation measures are required.
- Project operational traffic would not increase from existing conditions; therefore, noise levels at off-site noise-sensitive uses in the project area would not increase with the operation of the project. Operational traffic-related noise impacts would be less than significant.
- Temporary construction-related vibration would not exceed the established threshold for building damage and human annoyance to the adjacent residential uses adjacent to the project area. Vibration generated by on-site construction activities would have a less than significant impact.
- The project area is not located within the vicinity of a private airstrip. The project is also not located within an airport land use plan or within 2 miles of a public airport or public use airport. Therefore, the project would have no impact related to public or private airport/airstrip noise levels.

This page intentionally left blank.

SECTION 1
Introduction

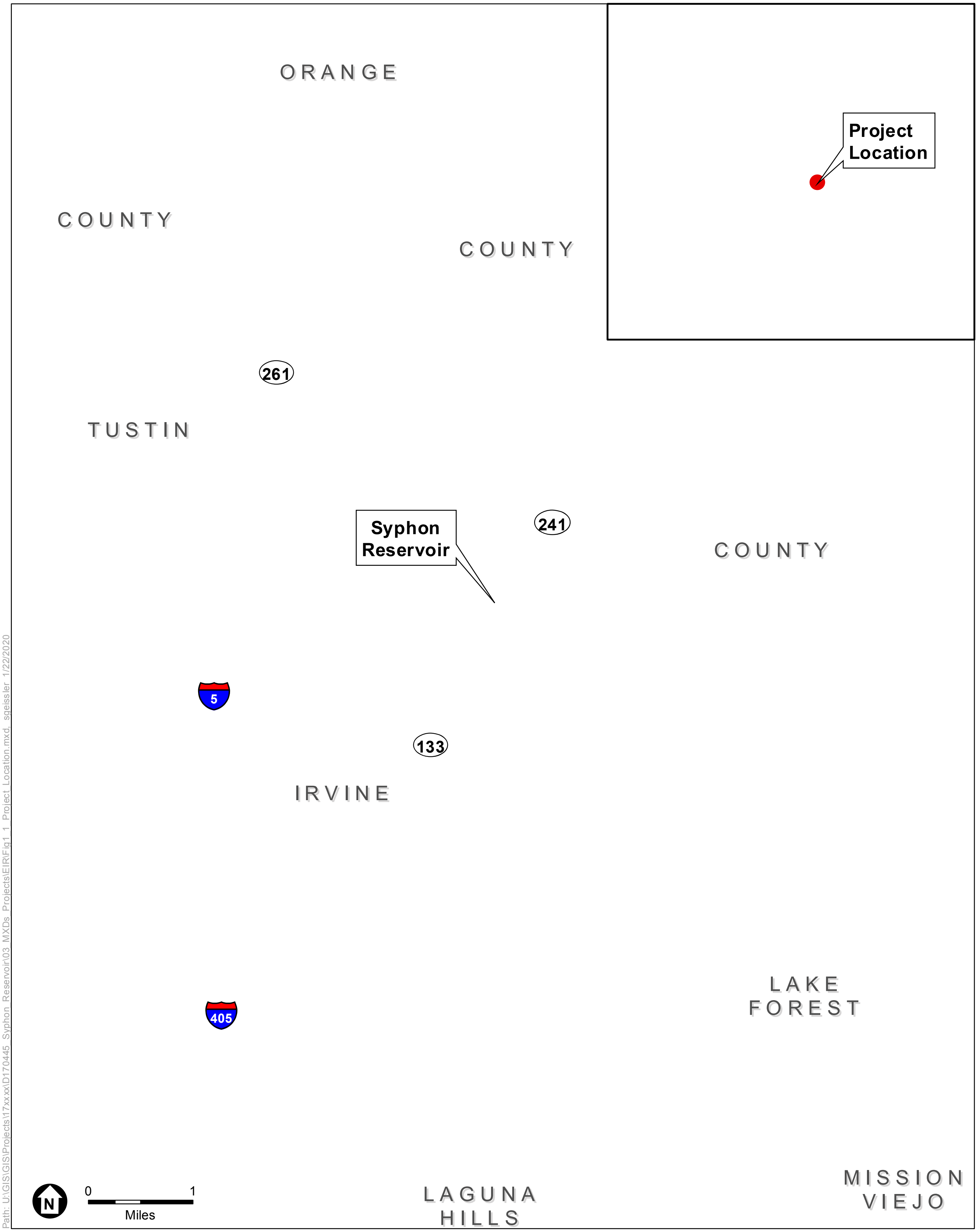
IRWD is proposing to implement the proposed project. The Syphon Reservoir is an existing recycled water storage reservoir in IRWD's service area. The proposed project would increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam. The proposed project would allow the storage of additional recycled water produced at the Michelson WRP during periods of low demand (winter months) for use during periods of high demand (summer months).

An acoustical study has been conducted with respect to potential noise and vibration impacts from construction activities, surface transportation, and other aspects of Project operations that are noise and vibration intensive and that have the potential to impact existing off-site noise sensitive land uses and existing on- and off-site vibration-sensitive land uses. The objectives of this noise study are to:

1. Evaluate construction-related noise and vibration impacts and the traffic and operational noise and vibration impacts to noise sensitive receptors;
2. Provide noise mitigation measures, as required, to meet applicable noise regulations and standards including interior sound level standards as specified by the City or the County.

1.1 Project Location

The proposed project would be implemented within IRWD's service area at the location of the existing Syphon Reservoir, northeast of Portola Parkway between Bee Canyon Access Road and State Route 133 (SR-133) in the County of Orange (see **Figure 1**). The Crean Lutheran High School Athletic Complex is located between Portola Parkway and the toe of the existing dam. Residential neighborhoods are located on the southwest side of Portola Parkway. A single-family residence is also located north of the project site, on the north side of Bee Canyon Access Road. The ground surrounding the reservoir is hilly with ridgelines and terraced slopes.



SOURCE: ESRI, 2016; OC LAFCO, 2018

Syphon Reservior Improvement Project

Figure 1
Project Location

1.2 Existing Site Conditions

The existing engineered dam is comprised of compacted on-site geologic materials, approximately 59 feet high, with a crest length of 843 feet and width of 10 to 12 feet. The surface area of the existing reservoir is approximately 28 acres when filled to capacity, and the current capacity of the reservoir below the existing spillway crest is approximately 535 acre-feet (AF). The 2011 topography survey of the dam indicates its crest is at an elevation of 387.7 feet above mean sea level (amsl).

The existing dam spillway was constructed as a 12-foot wide, broad-crested weir, located at the left abutment of the dam with a crest at 380 feet amsl. The reservoir does not receive water from rivers or streams. The reservoir includes a small watershed that is approximately 205 acres and not capable of generating significant amounts of runoff that need to be managed through the use of the spillway.

1.3 Project Description

The proposed project primarily involves the expansion of three on-site facilities: Syphon Reservoir Dam, Syphon Reservoir, and the Syphon Treatment Facilities. Other operational design features would include an internal seepage control system within the new engineered dam; a circulation/aeration system for the reservoir; new onsite access and maintenance roads; a wetland mitigation area; and potential recreational facilities.

The delivery of recycled water to and from Syphon Reservoir would be accomplished with existing offsite facilities. Modifications to offsite facilities would be limited to the addition of pumps within the existing structures as further described below. Existing offsite conveyance facilities would be used to deliver tertiary-treated recycled water from the Michelson WRP to the Eastwood Recycled Water Pump Station, and then to Syphon Reservoir via an existing 36-inch recycled water pipeline. The pump station structure is currently under construction. When completed, the Eastwood Recycled Water Pump Station can accommodate the Syphon Reservoir Improvement Project with additional pump equipment. Installation of the additional pump equipment would be coordinated as a separate “equipping project” in parallel to the construction of the proposed Syphon Reservoir improvements. The existing Highline Canal would be abandoned in place and no longer used to deliver water to Syphon Reservoir from IRWD’s Rattlesnake Reservoir. Under normal operating conditions, all flow out of Syphon Reservoir would be conveyed back to Eastwood Recycled Water Pump Station through the same 36-inch recycled water pipeline, for connection to IRWD’s recycled water distribution system.

1.3.1 Dam Replacement

The proposed project would replace the existing engineered dam with a new engineered dam, which would be an earthfill embankment with upstream and downstream slopes. Onsite materials would be obtained from excavation of the existing earthen embankment dam and spillway, excavation below the new dam footprint and borrow excavations within the existing and proposed reservoir area. The proposed project would require an estimated 2.3 million cubic yards of fill, of which approximately 2.2 million cubic yards would be available onsite. Approximately 0.1

million (100,000) cubic yards of material would be imported from offsite sources, including rock, gravel and other materials required to construct portions of the dam. Similar to the existing dam, it is a requirement of the California Department of Water Resources (DWR), Division of Safety of Dams requirements (DSOD) that a spillway be included with the new dam to protect the reservoir from overtopping. The new spillway would be constructed and lined with reinforced concrete to prevent erosion of the abutment and embankment materials.

1.3.2 Reservoir Enlargement

The replacement dam would increase the reservoir's capacity from approximately 500 AF to approximately 5,000 AF. The existing reservoir ground surface would be excavated non-uniformly to obtain approximately 2.2 million cubic yards of material to construct the new engineered dam.

A new approximately 42-inch inlet/outlet conduit would be constructed to connect two proposed inlet/outlet ports along the north-facing reservoir slope to the existing onsite 36-inch inlet/outlet pipeline that ends near the toe of the existing dam. Similar to the existing reservoir, the proposed project would require a water circulation/aeration system to maintain water quality within the reservoir. The water circulation/aeration system will be detailed during final design, but would likely consist of a compressed air distribution system or surface mixer/aeration system.

1.3.3 Treatment Facilities

The existing strainer and disinfection facilities would be demolished, reconstructed and expanded at the toe of the new dam to provide filtration, chlorination and de-chlorination facilities (treatment facilities). The treatment facilities could be constructed at one of two locations, both of which are located close to the toe of the existing dam. The layout would consist of an enclosed masonry building. The footprint of the proposed treatment facilities would be determined during the detailed design, but is anticipated to be approximately 40 feet by 160 feet. A masonry block wall building would house the storage tanks, metering pumps, and control system.

1.3.4 Access and Maintenance Roads

The primary access point for construction traffic and future IRWD operation and maintenance is anticipated to be from the intersection at Portola Parkway and Sand Canyon Avenue. As part of the proposed project, the existing intersection and associated traffic lights would be modified to allow construction and future IRWD access through the intersection into the District's property. Construction vehicles and IRWD vehicles would also leave the site through the same intersection. Cross walks and associated pedestrian signals would also be modified to allow safe pedestrian crossing in both directions.

An unpaved road currently exists on the District's property in the vicinity of the intersection at Portola Parkway and Sand Canyon Avenue, which was used to access and maintain the existing Highline Canal. As part of the proposed project, this dirt road would be utilized and improved to allow two lanes (one in each direction) for ingress and egress for the construction and IRWD operation traffic. As part of the access road improvements, it is anticipated that excavation into the existing slope and construction of a retaining wall may be necessary to allow trucks to make the left turn onto the existing highline canal road after passing through the intersection. Potential secondary construction access may be considered through existing IRWD maintenance roads off of Bee Canyon Access Road. If used, these roads would be considered as one-way access points and limited to specific construction activities as further determined during the detailed design phase.

1.3.5 On-Site Wetland and Riparian Mitigation Areas

At least 12.3 acres of riparian/wetland habitat consisting of native woody riparian vegetation and freshwater marsh habitat is proposed to be established onsite to replace habitat displaced by construction. Both freshwater marsh and woody riparian vegetation are proposed to be placed within a large patch at the northeast end of the proposed reservoir. Also, much of the woody riparian replacement habitat would be situated within a strip that would extend around the proposed reservoir at the same elevation as the planned water surface elevation when the reservoir is full. A shallow trough would be constructed around the reservoir perimeter (excluding the dam face), which would support native trees and shrubs (e.g., willows, mulefat, etc.) forming a belt of riparian vegetation around the upper edge of the artificial lake. In addition to reserving a strip around the edge of the expanded reservoir for woody riparian habitat, an approximately 6- to 8-acre wetland area would also be established within a flat area extending northeast of the expanded reservoir.

1.3.6 Recreational Facilities

During project design, IRWD would consider passive recreational facilities compatible with the project site. Recreational facilities could include a walking trail along existing access roads at the project site. This proposed walking trail could be located in the south and west portions of the project site, beginning at the new permanent access road at Portola Parkway and Sand Canyon Avenue and traveling along that route, across the dam crest, and following the alignment of the existing Highline Canal, which would be abandoned with implementation of the proposed project. Offsite recreational facilities are not part of this project and would be analyzed under separate environmental review if/when future offsite recreational facilities are established. Final design would determine the appropriateness and location of the proposed walking trail on existing access roads and any other optional recreational facilities.

1.3.7 Additional Geotechnical Investigations

IRWD previously completed a comprehensive geotechnical investigation of the site from which the resulting data would be used during final design to develop the detailed construction documents. During the design phase, additional geotechnical investigations may need to be performed. If additional investigations are deemed necessary, the investigations may include the performance of exploratory test pits, soil borings, packer testing, and/or non-intrusive geologic investigations and observations. The additional geotechnical investigations, if needed, would remain within the proposed limits of disturbance defined by the project and would be mitigated as part of the overall project.

1.3.8 Technical Advisory Group

During the design phase, IRWD intends to establish an independent Technical Advisory Group (TAG) comprised of nationally recognized industry experts in the disciplines of dam geology/site characterization, seismic analysis, hydrology/hydraulics, dam construction, and potential failure mode analysis and RIDM. The purpose of the TAG is to provide an independent assessment of the design development including, but not limited to, review of design criteria, design details, technical approach, and other aspects of the design engineer's work to confirm the project design is in full compliance with governing standards and requirements.

1.4 Project Construction

Construction of the proposed project is estimated to require a total of 41 months. The preconstruction activities would begin in the fall of 2022 and would involve approximately 5 months of access road improvements. Preconstruction would be followed by approximately 36 months for construction of the new dam, reservoir, and associated facilities, depending on weather conditions and other variables. Construction is currently anticipated to begin in 2023. Most construction activities would be limited to 7:00 a.m. to 7:00 p.m. Monday through Friday and 9:00 am to 6:00 p.m. on Saturday. If construction work is conducted outside of these hours, IRWD would secure a variance/waiver from the appropriate entity. Construction of the proposed project would include activities implemented in phases as outlined below, which may involve overlap. Construction of the proposed project would include activities implemented in phases as outlined below in **Table 1**, which may involve overlap.

TABLE 1
CONSTRUCTION SCHEDULE

Phases	Start Date	End Date
Preconstruction Activities		
Drain Reservoir[a]	9/12/2022	2/24/2023
Vegetation Clearing	9/12/2022	11/4/2022
Access Routes/Intersection Improvements	9/12/2022	1/27/2023
Excavation of Sediment/Existing Dam		
Mobilization, site prep/Staging Areas	1/30/2023	3/24/2023
Upstream Excavation and Foundation Treatment	3/27/2023	8/11/2023
Dam Excavation and Foundation Treatment	8/14/2023	11/3/2023
Construction of Dam/Spillway/Reservoir		
Install Inlet/Outlet	9/25/2023	11/10/2023
Install Embankment to Bottom of Blanket Drain	11/13/2023	1/5/2024
Install Blanket Drain	1/8/2024	3/29/2024
Install Chimney/Remaining Embankment	4/1/2024	2/28/2025
Spillway Construction	12/9/2024	4/25/2025
Construction of Filtration/Chlor/Dechlor Facility	3/3/2025	1/30/2026

Phases	Start Date	End Date
Wetlands/Riparian Installation	3/3/2025	5/23/2025
Installation of Recreation Facilities	4/2/2025	7/18/2025
Demobilization	2/2/2026	3/13/2026

NOTES:
[a] This phase was not modeled as it is remote activity that requires no on-site work.
SOURCE: IRWD 2020

1.5 Noise and Vibration Fundamentals

1.5.1 Noise

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air). Noise is generally defined as unwanted sound (i.e., loud, unexpected, or annoying sound). Acoustics is defined as the physics of sound. In acoustics, the fundamental scientific model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. Acoustics primarily addresses the propagation and control of sound.

Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), which is the standard unit of sound amplitude measurement. The dB scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound, with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of feeling and pain, respectively. Pressure waves traveling through air exert a force registered by the human ear as sound.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude, with audible frequencies of the sound spectrum ranging from 20 to 20,000 Hz. The typical human ear is not equally sensitive to this frequency range. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to these extremely low and extremely high frequencies. This method of frequency filtering or weighting is referred to as A-weighting, expressed in units of A-weighted decibels (dBA), which is typically applied to community noise measurements. Some representative common outdoor and indoor noise sources and their corresponding A-weighted noise levels are shown in **Figure 2**.

Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time; a noise level is a measure of noise at a given instant in time. However, noise levels rarely persist at that level over a long period of time. Rather, community noise varies continuously over a period of time with respect to the sound sources contributing to the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with many of the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources, such as changes in traffic volume. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

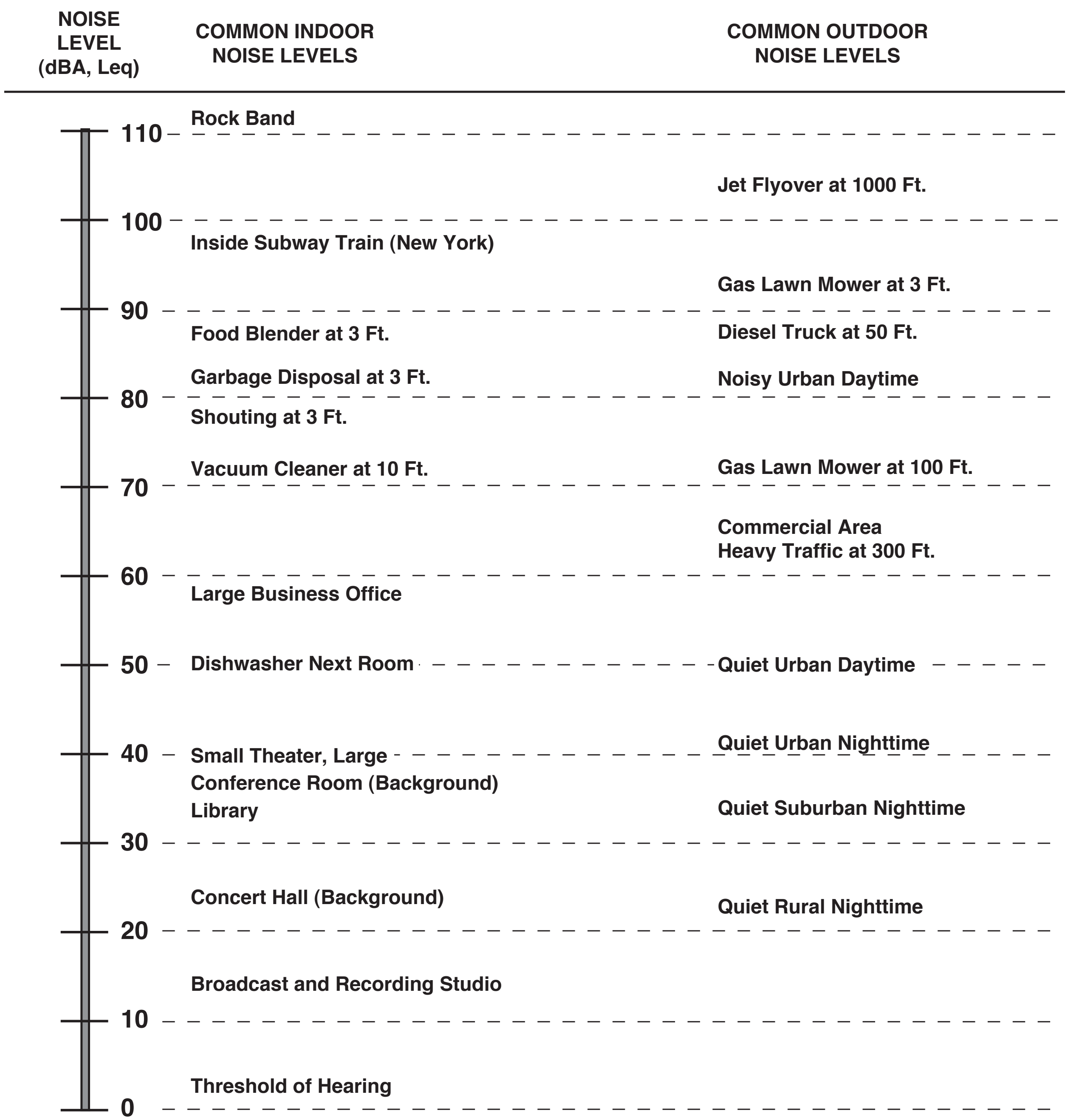
These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the noise exposure to be measured over periods of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. The following noise descriptors are used to characterize environmental noise levels over time, which are applicable to the proposed project.

L_{eq}: The equivalent sound level over a specified period of time, typically, 1 hour (L_{eq}(1)). The Leq may also be referred to as the average sound level.

L_{max}: The maximum, instantaneous noise level experienced during a given period of time.

L_{min}: The minimum, instantaneous noise level experienced during a given period of time.

CNEL: The Community Noise Equivalent Level (CNEL) is the average A-weighted noise level during a 24-hour day that includes an addition of 5 dB to measured noise levels between the hours of 7:00 a.m. to 10:00 p.m. and an addition of 10 dB to noise levels between the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively.



D170230.00

SOURCE: State of California, Department of Transportation (Caltrans), Technical Noise Supplement (TeNS). October 1998. Available: http://www.dot.ca.gov/hq/env/noise/pub/Technical Noise Supplement.pdf

Syphon Reservoir Improvement Project

Figure 2
Decibel Scale and Common Noise Sources

ESA

Effects of Noise on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance)
- Interference effects (e.g., communication, sleep, and learning interference)
- Physiological effects (e.g., startle response)
- Physical effects (e.g., hearing loss)

Although exposure to high noise levels has been demonstrated to cause physical, psychological, and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects interrupt daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can include both awakening and arousal to a lesser state of sleep.

With regard to the subjective effects, the responses of individuals to similar noise events are diverse and influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity. Overall, there is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction on people. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur[1]:

- Except in carefully controlled laboratory experiments, a change of 1 dBA in ambient noise levels cannot be perceived.
- Outside of the laboratory, a 3 dBA change in ambient noise levels is considered to be a barely perceivable difference.
- A change in ambient noise levels of 5 dBA is considered to be a readily perceivable difference.
- A change in ambient noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

[1] California Department of Transportation (Caltrans), Technical Noise Supplement (TeNS), Section 2.2.1, September, 2013.

These relationships occur in part because of the logarithmic nature of sound and the decibel scale. The human ear perceives sound in a non-linear fashion; therefore, the dBA scale was developed. Because the dBA scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. Under the dBA scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dBA higher than one of the sources under the same conditions. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA. Under the dBA scale, three sources of equal loudness together produce a sound level of approximately 5 dBA louder than one source, and ten sources of equal loudness together produce a sound level of approximately 10 dBA louder than the single source.[2]

Noise Attenuation

When noise propagates over a distance, the noise level reduces with distance depending on the type of noise source and the propagation path. Noise from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern, referred to as "spherical spreading." Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (i.e., reduce) at a rate of between 6 dBA for acoustically "hard" sites and 7.5 dBA for "soft" sites for each doubling of distance from the reference measurement, as their energy is continuously spread out over a spherical surface (e.g., for hard surfaces, 80 dBA at 50 feet attenuates to 74 at 100 feet, 68 dBA at 200 feet, etc.). Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the reduction in noise levels with distance (i.e., distance loss) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, which in addition to geometric spreading, provides an excess ground attenuation value of 1.5 dBA (per doubling distance).[3] Most sites are a combination of both hard and soft surfaces; therefore, using the hard site criteria of 6 dBA is the more conservative approach.

Roadways and highways consist of several localized noise sources on a defined path, and hence are treated as "line" sources, which approximate the effect of several point sources. Noise from a line source propagates over a cylindrical surface, often referred to as "cylindrical spreading." Line sources (e.g., traffic noise from vehicles) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement.[4] Therefore, noise due to a line source attenuates less with distance than that of a point source with increased distance.

Additionally, receptors located downwind from a noise source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Atmospheric temperature inversion (i.e., increasing temperature with elevation) can increase

2 Caltrans, Technical Noise Supplement (TeNS), Section 2.2.1.1, September, 2013.
3 Caltrans, Technical Noise Supplement (TeNS), Section 2.1.4.2, September, 2013.
4 Caltrans, Technical Noise Supplement (TeNS), Section 2.1.4.1, September, 2013.

sound levels at long distances (e.g., more than 500 feet). Other factors such as air temperature, humidity, and turbulence can also have significant effects on noise levels. [5]

1.5.2 Vibration

Vibration can be interpreted as energy transmitted in waves through the ground or man-made structures, which generally dissipate with distance from the vibration source. Because energy is lost during the transfer of energy from one particle to another, vibration becomes less perceptible with increasing distance from the source.

As described in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment*, groundborne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard.[6] In contrast to airborne noise, groundborne vibration is not a common environmental problem, as it is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, heavy trucks traveling on rough roads, and construction activities, such as blasting, pile-driving, and operation of heavy earth-moving equipment.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal in inches per second (in/sec), and is most frequently used to describe vibration impacts to buildings.

Groundborne noise is a result of groundborne vibration and specifically refers to the rumbling noise emanating from the motion of building room surfaces due to the vibration of floors and walls; it is perceptible only inside buildings.[7] The relationship between groundborne vibration and groundborne noise depends on the frequency content of the vibration and the acoustical absorption characteristics of the receiving room. For typical buildings, groundborne vibration that causes low frequency noise (i.e., the vibration spectrum peak is less than 30 Hz) results in a groundborne noise level that is approximately 50 decibels lower than the velocity level. For groundborne vibration that causes mid-frequency noise (i.e., the vibration spectrum peak is 30 to 60 Hz), the groundborne noise level will be approximately 35 to 37 decibels lower than the velocity level.[8] Therefore, for typical buildings, the groundborne noise decibel level is lower than the groundborne vibration velocity level.

1.6 Regulatory Framework

Many government agencies have established noise standards and guidelines to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise and groundborne vibration. Federal and local policies and/or standards such as those of FTA, U.S. Environmental Protection Agency (USEPA), and regulations in the City

---

5 Caltrans, Technical Noise Supplement (TeNS), Section 2.1.4.3 September, 2013.
6 FTA, Transit Noise and Vibration Impact Assessment, Section 7.1.3, 2018.
7 FTA, Transit Noise and Vibration Impact Assessment Manual, Section 5.4, 2018.
8 FTA, Transit Noise and Vibration Impact Assessment Manual, Table 6-3 and Table 6-14, pages 126 and 146, 2018.

General Plan Noise Element, and the Irvine Municipal Code would be applicable to the project, as summarized below.

1.6.1 City of Irvine General Plan Noise Element (2015)

As shown in **Table 2**, the City has established noise guidelines in the Noise Element of the City's General Plan that are used for planning purposes. These guidelines are based, in part, on the community noise compatibility guidelines established by the California State Governor's Office of Planning and Research and are intended for use in assessing the compatibility of various land use types with a range of noise levels. Page F-11 of the Noise Element provides the guidelines of land use compatibility for community noise sources. The CNEL noise levels for specific land uses are classified into four categories: (Zone A) "clearly compatible" (Zone B) "normally compatible" (Zone C) "normally incompatible" and (Zone D) "clearly incompatible." A CNEL value of 70 dBA is considered the dividing line between a "normally compatible" and "normally incompatible" noise environment for noise sensitive land uses, including residences, transient lodgings, schools, and libraries.

Additionally, the Proposed Project is subject to the following policies provided in the Noise Element of the General Plan:

<u>Mobile Noise:</u>

- *Policy (c):* Ensure that all proposed development projects are compatible with the existing and projected noise level by using the Land Use Noise Compatibility Matrix (see Table 2).
- *Policy (d):* Require noise studies to be prepared in accordance with the City's environmental review procedure for all projects that are not "clearly compatible" with the future noise level at the site.
- *Policy (f):* Require noise studies to identify all the mitigation measures necessary to reduce noise levels to meet the City's Municipal Code CNEL standard (see **Table 3**) and Single Event Noise Standard.

TABLE 2
CITY OF IRVINE LAND USE NOISE COMPATIBILITY

		Energy Average (CNEL, dB)						
Land Use Categories	**Uses**	**≤**	**55**	**60**	**65**	**70**	**75**	**80>**
RESIDENTIAL	Single-Family	A	A	B	B	C	D	D
RESIDENTIAL	Mobile Home	A	A	B	C	C	D	D
COMMERCIAL Regional	Hotel, Motel, Transient Lodging	A	A	B	B	C	C	D
COMMERCIAL Regional, Community	Commercial retail, Bank, Restaurant, Movie theater	A	A	A	A	B	B	C
COMMERCIAL Recreation INSTITUTIONAL General	Amphitheater, Concert Hall, Auditorium, Meeting hall	B	B	C	C	D	D	D
COMMERCIAL Recreation	Children's amusement park, Miniature golf, Go-cart track, Health club, Equestrian center	A	A	A	B	B	D	D
COMMERCIAL Community INDUSTRIAL General	Automobile service station, Auto dealer, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
INSTITUTIONAL General	Hospital, Church, Library, School classrooms	A	A	B	C	C	D	D
OPEN SPACE	Parks	A	A	A	B	C	D	D
OPEN SPACE	Golf course, Nature centers, Cemeteries, Wildlife reserves, Wildlife habitat	A	A	A	A	B	C	C
AGRICULTURAL	Agriculture	A	A	A	A	A	A	A

NOTES:

ZONE A Clearly Compatible	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements
ZONE B Normally Compatible	New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.
ZONE C Normally Incompatible	New construction or development should normally be discouraged. If new construction or development does proceed, a detailed analysis or noise reduction requirements must be made and needed noise insulation features must be included in the design.
ZONE D Clearly Incompatible	New construction or development should generally not be undertaken.

SOURCE: City of Irvine General Plan, Noise Element, 2015.

TABLE 3
CITY OF IRVINE NOISE STANDARDS

Zone	Location	Time Period	Noise Levels for a Period Not Exceeding (minutes/hour)				
			30	15	5	1	0 (anytime)
Noise zone 1: All hospitals, libraries, churches, schools and residential properties.	Exterior	7:00 a.m.—10:00 p.m.	55	60	65 [1]	70	75
		10:00 p.m.—7:00 a.m.	50	55	60	65 [1]	70
	Interior	7:00 a.m.—10:00 p.m.	--	--	55	60	65
		10:00 p.m.—7:00 a.m.	--	--	45	50	55
Noise zone 2: All professional office and public institutional properties.	Exterior	Anytime	55	60	65	70	75
	Interior	Anytime	--	--	55	60	65
Noise zone 3: All commercial properties excluding professional office properties.	Exterior	Anytime	60	65	70	75	80
	Interior	Anytime	--	--	55	60	65
Noise zone 4: All industrial properties.	Exterior	Anytime	70	75	80	85	90
	Interior	Anytime	--	--	55	60	65

NOTES:
1 This standard does not apply to multifamily residence private balconies. Multifamily developments with balconies that do not meet the 65 CNEL are required to provide occupancy disclosure notices to all future tenants regarding potential noise impacts.
2 It shall be unlawful for any person at any location within the City to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any property within designated noise zones either within or without the City to exceed the applicable noise standard.
3 Each of the noise standards specified above shall be reduced by five dB(A) for impact, or predominant tone noise or for noises consisting of speech or music.
4 In the event that the noise source and the affected property are within different noise zones, the noise standards of the affected property shall apply.
SOURCE: City of Irvine, 2020.

Stationary Noise

- *Policy (a):* Require any new construction to meet the City Noise Ordinance standards as a condition of building permit approval.
- *Policy (b):* Require developers to depict, on any appropriate development application review (zone change, subdivisions, conditional use permit, site plan, and building plans), any potential noise sources known at the time of submittal and mitigation measures that ensure these noise sources meet the City Noise Ordinance standards. Such sources include, but are not limited to, the following:
  – Truck pickup and loading areas.
  – Mechanical and electrical equipment such as air conditioning, swimming pool pumps and filters, and spa pumps.
  – Exterior nuisances such as speaker boxes and outdoor public address systems.
- *Policy (c):* Condition subdivision approval of the projects adjacent to any developed/occupied uses by requiring the developer to submit a construction-related noise mitigation plan to the Director of Community Development for review and approval prior to issuance of grading permits. The plan must depict the location of construction equipment and how the noise from

this equipment will be mitigated during construction of the project, through the use of such methods as following:

– Temporary noise attenuation fences.

– Preferential location of equipment.

– Use of current technology and noise suppression equipment.

Noise Abatement

- *Policy (a):* Coordinate efforts to reduce noise impacts with appropriate public and government agencies.

1.6.2 City of Irvine Municipal Code

Table 3 summarizes Section 6-8-204, General Provisions, of the City's Municipal Code, which provides interior and exterior noise standards that apply to all properties within a designated zone located in the City.

The City Municipal Code Section 6.8.205.A limits construction activities between the hours of 7:00 A.M. to 7:00 P.M. Mondays through Fridays, and 9:00 A.M. to 6:00 P.M. on Saturdays. No construction activities shall be permitted outside of these hours or on Sundays and federal holidays, unless a temporary waiver is granted by the Chief Building Official or his or her authorized representative. Trucks, vehicles, and equipment that are making or are involved with material deliveries, loading, or transfer of materials, equipment service, maintenance of any devices or appurtenances for or within any construction project in the City shall not be operated or driven on City streets outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the City. Any waiver granted shall take impact upon the community into consideration. No construction activity will be permitted outside of these hours except in emergencies including maintenance work on the City rights-of-way that might be required.

1.6.3 County of Orange Municipal Code

Section 4-6-4 and 4-6-5 of the Orange County Municipal Code provides exterior and interior noise standards, respectively, to the entire territory of Orange County, including incorporated and unincorporated territory. The County's noise standards for exterior and interior noise levels are provided in **Table 4**.

TABLE 4
COUNTY OF ORANGE NOISE STANDARDS

Noise Zone[1]	Location	Noise Level	Time Period
1	Exterior	55 dB(A)	7:00 A.M. – 10:00 P.M.
		50 db(A)	10:00 P.M. – 7:00 A.M.
	Interior	55 dB(A)	7:00 A.M. – 10:00 P.M.
		45 dB(A)	10:00 P.M. – 7:00 A.M.

NOTES:
1 The entire territory of Orange County, including incorporated and unincorporated territory, is hereby designated as "Noise Zone 1."
SOURCE: County of Orange, 2020.

The Orange County Municipal Code Section 4-6-7(e) exempts noise associated with construction, repair, remodeling, or grading of any real property, provided said activities take place between the hours of 7:00 A.M. to 8:00 P.M. on weekdays, including Saturday.

1.6.4 Groundborne Vibration

The effects of groundborne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most Projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration levels exceed the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings. The City does not address vibration either in the municipal code or in the Noise Element of the General Plan. The County does not address vibration the municipal code. However, the FTA's *Transit Noise and Vibration Impact Assessment* (FTA, 2018) has identified the human annoyance response to vibration levels as 80 VdB and building damage with a threshold of 0.2 in/sec PPV for non-engineered timber buildings.[9]

1.7 Environmental Setting

1.7.1 Noise-Sensitive Receptor Locations

Some land uses are considered more sensitive to noise than others due to the amount of noise exposure and the types of activities typically involved at the receptor location. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, nursing homes, and parks are generally more sensitive to noise than commercial and industrial land uses. The distance of the noise sensitive receptor locations was calculated from the property line of the receptors to the closest proposed project site boundary. Existing noise sensitive uses within 500 feet of the proposed project site are shown in **Figure 3** and include the following:

9 FTA, Transit Noise and Vibration Impact Assessment, Section 12.2.2, May. 2018.

- The Crean Lutheran High School Athletic Complex, located between Portola Parkway and the toe of the existing dam, approximately 55 feet from the project site.
- Residential neighborhoods located on the southwest side of Portola Parkway, are as close as 180 feet from the proposed access road construction. Construction of the new proposed dam, reservoir and treatment facilities would occur farther away from these sensitive receptors, approximately 700 feet.
- Crean Lutheran High School, located on the south side of Portola Parkway, east of Sand Canyon Road. This property line of the school is located approximately 140 feet from the proposed access road construction.

All other noise-sensitive uses are located at greater distances and/or shielded from activity at the proposed project by buildings closer to the project area and would experience lower noise levels associated with the proposed project. Therefore, additional sensitive receptors beyond those identified above are not evaluated in this report.

1.7.2 Ambient Noise Levels

The existing noise environment within the project area is comprised primarily of vehicle traffic including trucks, buses, etc. on Portola Parkway, Sand Canyon Avenue, Irvine Boulevard, and State Route 133 (SR-133). Secondary noise sources include nearby residential activities and activities associated with nearby schools. While the proposed project site is located with the jurisdiction of the Orange County, the residents and school that would be impacted by the noise from the project are located within the jurisdiction of the City of Irvine. Therefore, the analysis uses the City of Irvine's noise thresholds. The Noise Element of the City of Irvine's General Plan provides estimated vehicular traffic noise levels for areas throughout the City for the year 2020. The General Plan does not have estimated traffic noise levels for the local roadways directly adjacent to the proposed project site. The closest roadway segment with estimated 2020 traffic noise levels is Irvine Boulevard between Yale Avenue and Jeffrey Road. Similar to the proposed project vicinity, this area consists primarily of residential land uses, where the noise environmental is comprised primarily from vehicular traffic. The estimated 2020 traffic noise levels for this area is 71.7 dBA CNEL, 100 feet from the centerline of the roadway.

1.7.3 Vibration-Sensitive Receptor Locations

Activities associated with implementation of the proposed project have the potential to generate low levels of groundborne vibration due to the operation of equipment (i.e., rubber-tired dozer, drill rigs, and haul trucks). Groundborne vibrations propagate though the ground and rapidly diminish in intensity with increasing distance from the source. No high-impact activities, such as pile driving or blasting, would be used during construction of the proposed project. The nearest off-site buildings to the project site that could be exposed to vibration levels generated from project activities include residential uses located on the southwest side of Portola Parkway, located approximately 300 feet from the proposed project boundary.

SOURCE: Google, 2020; ESA, 2020

Syphon Reservoir Improvement Project

Figure 3
Noise Sensitive Receiver Locations

ESA

SECTION 2
Thresholds of Significance

The significance thresholds below are derived from the Environmental Checklist questions in Appendix G of the State CEQA Guidelines. Accordingly, a significant impact associated with noise would occur based on the following thresholds described below:

NOI-1: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

NOI-2: Generation of excessive groundborne vibration or groundborne noise levels?

NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The following significance criteria are used to evaluate potential noise and vibration impacts of the project based on the regulatory framework described above. The Project would result in potentially significant impacts under the following circumstances:

- Project construction activities occur between the hours of 7:00 p.m. and 7:00 a.m. for the City and between the hours of 8:00 p.m. and 7:00 a.m. for the County.
- The Project-related operations would cause ambient noise levels to exceed the City's noise standards as stated in Section 6-8-204 of the City's Municipal Code and Section 4-6-4 and 4-6-5 of the Orange County Municipal Code (see Table 3 and 4 above in Section 1.7).
- Potential Building Damage – Project construction activities cause groundborne vibration levels to exceed 0.2 in/sec PPV at the nearest residential buildings.
- Potential Human Annoyance – Project construction activities cause groundborne vibration levels to exceed 80 VdB at nearby residential uses.

The proposed project site is located with the jurisdiction of the Orange County. However, the receptors that will be impacted by the construction and operation of the proposed project are located within the City of Irvine. Therefore, this analysis uses the City of Irvine's thresholds to determine significance.

This page intentionally left blank.

SECTION 3
Impact Analysis

3.1 Methodology

3.1.1 On-Site Construction Noise

On-site construction noise impacts were evaluated by determining the noise levels generated by the different types of construction activity anticipated, calculating the construction-related noise level at nearby sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise) at those receptors. More, specifically, the following steps were undertaken to assess construction-period noise impacts:

1. Typical noise levels for each type of construction equipment were obtained from the FHWA's Construction Noise Handbook (FHWA 2006);
2. Distances between construction site locations (noise sources) and surrounding sensitive receptors were measured using Project architectural drawings and site plans and Google Earth;
3. The construction noise level was then calculated, in terms of hourly L_{eq}, for sensitive receptor locations based on the standard point source noise-distance attenuation factor of 6.0 dBA for each doubling of distance.

3.1.2 Off-Site Roadway Noise (Construction)

Roadway noise impacts have been evaluated using the Caltrans Technical Noise Supplement (TeNS) method based on the traffic data provided in the Project's Construction Transportation Impact Analysis (Fehr & Peers 2020). The Caltrans TeNS method allows for the definition of roadway configurations, barrier information (if any), and receiver locations.

3.1.3 Groundborne Vibration (Construction and Operations)

Groundborne vibration impacts were evaluated by identifying potential vibration sources, measuring the distance between vibration sources and surrounding structure locations, and making a significance determination based on the significance thresholds described below.

3.2 Noise Impacts

Threshold NOI-1: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Impact NOI-1: **The proposed project could generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. (Less than Significant).**

3.2.1 Construction Noise

On-Site Construction Noise

Construction of the proposed project is estimated to require approximately 41 months (weather permitting) and would require the use of heavy equipment during the various construction phases at the proposed project site. During each stage of development, there would be a different mix of equipment. As such, construction activity noise levels at and near the proposed project area would fluctuate depending on the particular type, number, and duration of use of the various pieces of construction equipment. Additionally, as previously shown in Table 1, construction is currently anticipated to begin in the fall of 2022 with the potential of overlap for a number of phases of construction.

Additional geotechnical work may or may not occur, and the intensity of any geotechnical work is unknown at this time. There are three potential geotechnical tests that could occur: borings, test pits, or trenches. The geotechnical work would be associated with the damn upgrades and would most likely occur in the reservoir area, at a distance of 330 feet (100 meters) or more from the nearest sensitive uses. Because the intensity of any work that will occur is unknown, the analysis determines the maximum intensity of geotechnical work that can occur concurrently and independent from the reservoir work. The *Irvine Ranch Water District Syphon Reservoir Geotechnical Investigations Project Initial Study/Mitigated Negative Declaration* was used to determine the equipment and workers that would be used to conduct the additional geotechnical investigations.

Individual pieces of construction equipment anticipated during Project construction could produce maximum noise levels of 75 dBA to 85 dBA L_{max} at a reference distance of 50 feet from the noise source, as shown in **Table 5**. These maximum noise levels would occur when equipment is operating at full power. The estimated usage factor for the equipment is also shown in Table 5, which are based on FHWA's Construction Handbook (FHWA 2006). Typical or average construction noise levels account for the estimated usage factors as shown.

Construction activity would result in the loudest noise levels at ground-level sensitive land uses nearest to the proposed project area that have a direct line-of-sight to construction activities. This is because the first tier of buildings immediately surrounding the proposed project site would act as a noise barrier to other sensitive receptors located beyond these buildings. Therefore, construction-related noise levels are only presented for receptors closest to the proposed project site, as shown in Figure 3. Specifically, the nearest off-site noise sensitive receptors include the following:

- R1: The Crean Lutheran High School Athletic Complex, located between Portola Parkway and the toe of the existing dam, approximately 55 feet from the proposed project site.
- R2 and R3: Residential neighborhoods located on the southwest side of Portola Parkway, are as close as 180 feet from the proposed access road construction. Construction of the new proposed dam, reservoir and treatment facilities would occur farther away from these sensitive receptors, approximately 700 feet.
- R4: Crean Lutheran High School, located on the south side of Portola Parkway, east of Sand Canyon Road. This property line of the school is located approximately 140 feet from the proposed access road construction.

TABLE 5
CONSTRUCTION EQUIPMENT NOISE LEVELS

Construction Equipment	Estimated Usage Factor, %	Noise Level at 50 Feet (dBA, Lmax)
Backhoe	40%	78
Bore/Drill Rig	40%	78
Cement/Mortar Mixers	40%	79
Compactor	20%	83
Cranes	16%	81
Dozer	40%	82
Excavator	40%	81
Grader	40%	85
Pavers	50%	77
Pick-up Truck	40%	75
Pumps	50%	81
Roller	20%	80
Rubber Tired Dozer	40%	82
Rubber Tired Loader	40%	79
Rollers	20%	80
Scraper	40%	84
Support Truck	40%	76
Tractor/Loader/Backhoe	25%	80
Water Truck	10%	80

SOURCE: FHWA 2006

Noise from construction activities would be generated by the operation of vehicles and equipment involved during various stages of construction: site excavation, grading, facilities construction and paving. The noise levels generated by construction equipment would vary depending on factors such as the type and number of equipment, the specific model (horsepower rating), the construction activities being performed, and the maintenance condition of the equipment. Construction noise associated with the proposed project was analyzed using a mix of typical construction equipment, estimated durations, and construction phasing, based on construction equipment data provided by IRWD and assumptions derived from similar projects. **Table 6** shows the estimated construction noise levels that would occur at the nearest off-site sensitive uses during a peak day of construction activity at the proposed project site. Details are provided in Appendix A.

TABLE 6
ESTIMATE OF CONSTRUCTION NOISE LEVELS (L_{EQ}) AT EXISTING OFF-SITE SENSITIVE RECEIVER LOCATIONS

	Receiver (Distance in feet from construction activity)			
Construction Phase [a, b]	**R1 (55) dBA, Leq**	**R2 (330) dBA, Leq**	**R3 (180) dBA, Leq**	**R4 (140) dBA, Leq**
Vegetation Clearing Access Routes/Intersection Improvements	87	73	78	80
Access Routes/Intersection Improvements	86	71	76	78
Excavation of Sediment/Existing Dam: *Mobilization, site prep/Staging Areas*	84	69	74	76
Excavation of Sediment/Existing Dam: *Upstream Excavation and Foundation Treatment*	87	72	77	79
Excavation of Sediment/Existing Dam: *Dam Excavation and Foundation Treatment*	88	73	78	81
Excavation of Sediment/Existing Dam: *Dam Excavation and Foundation Treatment* Construction of Dam/Spillway/Reservoir: *Install Inlet/Outlet*	89	74	79	81
Construction of Dam/Spillway/Reservoir: *Install Embankment to Bottom of Blanket Drain*	89	74	79	81
Construction of Dam/Spillway/Reservoir: *Install Blanket Drain*	79	64	69	71
Construction of Dam/Spillway/Reservoir: *Install Chimney/Remaining Embankment*	89	74	79	81
Construction of Dam/Spillway/Reservoir: *Install Chimney/Remaining Embankment* *Spillway Construction*	89	75	80	82
Construction of Dam/Spillway/Reservoir: *Spillway Construction* Construction of Filtration/Chlor/Dechlor Facility Wetlands/Riparian Installation	84	69	74	76
Construction of Dam/Spillway/Reservoir: *Spillway Construction* Construction of Filtration/Chlor/Dechlor Facility Wetlands/Riparian Installation Installation of Recreation Facilities	88	73	78	80

Construction Phase [a, b]	Receiver (Distance in feet from construction activity)			
	R1 (55) dBA, Leq	**R2 (330) dBA, Leq**	**R3 (180) dBA, Leq**	**R4 (140) dBA, Leq**
Construction of Filtration/Chlor/Dechlor Facility Wetlands/Riparian Installation Installation of Recreation Facilities	87	72	77	79
Construction of Filtration/Chlor/Dechlor Facility Installation of Recreation Facilities	86	71	76	79
Construction of Filtration/Chlor/Dechlor Facility	79	64	69	71
Demobilization	77	64	68	70
Geotechnical Exploration [c] (minimum of 330 feet [100 meters] from nearest receptor)				
Borings (at 330 feet)	60	60	60	60
Test Pits (at 330 feet)	60	60	60	60
Trenches (at 330 feet)	61	61	61	61

NOTES:

a Construction schedule provided by the project applicant.
b Detailed construction noise calculations are provided in Appendix A.
c Based on Irvine Ranch Water District Syphon Reservoir Geotechnical Investigations Project Initial Study/Mitigated Negative Declaration, February 2019.

SOURCE: ESA 2021.

As shown in Table 6, construction noise levels are estimated to reach a maximum of 89 dBA L_{eq} at the nearest sensitive receptor (R1). Existing residences and school facilities in the vicinity of the proposed project area would be exposed to temporary and sporadic increased noise from nearby construction activities. Weather permitting, the overall construction would last for approximately 36 to 41 months. However, since equipment operates intermittently and moves around the site, noise from operation of construction equipment would be sporadic and temporary during the construction period. Construction noise would be noticeable during the operation of heavy grading equipment working at the site (sporadically over the duration of construction), especially during the vegetation clearing, excavation, and construction period.

The City has not established numerical thresholds for construction noise; however, per the City Municipal Code, Section 6-8-205, construction shall only occur between the hours of 7:00 A.M. to 7:00 P.M. Mondays through Fridays, and 9:00 A.M. to 6:00 P.M. on Saturdays. The proposed project construction activities would comply with the hours allowed by the City and the duration of construction would be short term. If the proposed project's construction work is needed to be conducted outside of the allowable hours, IRWD will work with the appropriate entity to secure a variance/waiver. Thus, a significant noise impact would not occur during project construction and construction noise impacts would be less than significant.

Off-Site Construction Noise

Delivery and haul truck trips would occur throughout the construction period. Trucks traveling to and from the project area would be required to travel along the haul route approved by the City for the proposed project. The following two haul routes are being proposed for the project:

- Haul Route 1: SR-133, north on Irvine Boulevard, and east on Sand Canyon Avenue for trucks traveling inbound and westbound on Sand Canyon Avenue and south on Irvine Boulevard to SR-133 for trucks traveling outbound.
- Haul Route 2: I-5, east on Sand Canyon Avenue for trucks traveling inbound and westbound on Sand Canyon Avenue to I-5 for trucks traveling outbound.

Table 7 shows the estimated construction traffic noise levels that would occur at the nearest off-site sensitive uses along the proposed haul routes. Details are provided in Appendix B. Sensitive noise receptors along the haul route are located approximately 40 to 80 feet from the edge of the roadways. Construction traffic noise levels generated by truck trips would range from approximately 57.5 dBA, L_{eq} to 72.7 dBA, L_{eq}. Detailed traffic noise calculations are provided in Appendix B. Construction truck trips would be required to comply with the City's allowable hours as described above and would be temporary in nature. Therefore, construction activities would comply with the City's noise standard, and impacts would be less than significant.

3.2.2 Operational Noise

Operation of the proposed project would not increase the average daily traffic (ADT) volumes along the major thoroughfares within the project vicinity. Additionally, the proposed inlet and outlet pipelines that would supply and drain the reservoir would be located underground and would not result in any operational noise. The primary pumps used for water distribution are already existing and located off-site. Operation of the proposed project would introduce small pumps located within the proposed treatment facilities. A proposed masonry block wall building would house the storage tanks, metering pumps, and control system. The small pumps located on-site would not generate noise above ambient conditions at sensitive receptor property lines. Therefore, impacts from the operations of the proposed project would be less than significant.

Mitigation: None required.

Significance after Mitigation: Less Than Significant Impact.

TABLE 7
ESTIMATE OF CONSTRUCTION TRAFFIC NOISE LEVELS (L_{EQ}) AT EXISTING OFF-SITE SENSITIVE RECEIVER LOCATIONS

	Roadway Segment (Distance in feet from construction activity)			
Construction Phase	**Portola Pkwy, between SR-133 and Paragon (60) dBA, Leq**	**Sand Canyon Ave, between Portola Pkwy and Irvine Blvd (40) dBA, Leq**	**Irvine Blvd, between San Canyon Ave and Native Spring (55) dBA, Leq**	**SR-133, between Irvine Blvd and SR-241 (80) dBA, Leq**
Vegetation Clearing Access Routes/Intersection Improvements	70.7	71.6	72.0	71.2
Access Routes/Intersection Improvements	62.5	63.4	63.9	63.1
Excavation of Sediment/Existing Dam: *Mobilization, site prep/Staging Areas*	58.4	59.1	59.8	59.1
Excavation of Sediment/Existing Dam: *Upstream Excavation and Foundation Treatment*	61.9	62.6	63.3	62.6
Excavation of Sediment/Existing Dam: *Dam Excavation and Foundation Treatment*	61.9	62.6	63.3	62.6
Excavation of Sediment/Existing Dam: *Dam Excavation and Foundation Treatment* Construction of Dam/Spillway/Reservoir: *Install Inlet/Outlet*	70.9	71.8	72.3	71.5
Construction of Dam/Spillway/Reservoir: *Install Embankment to Bottom of Blanket Drain*	70.4	71.2	71.7	70.9
Construction of Dam/Spillway/Reservoir: *Install Blanket Drain*	70.4	71.2	71.7	70.9
Construction of Dam/Spillway/Reservoir: *Install Chimney/Remaining Embankment*	70.4	71.2	71.7	70.9
Construction of Dam/Spillway/Reservoir: *Install Chimney/Remaining Embankment* *Spillway Construction*	71.4	72.2	72.7	71.9
Construction of Dam/Spillway/Reservoir: *Spillway Construction* Construction of Filtration/Chlor/Dechlor Facility Wetlands/Riparian Installation	70.1	70.9	71.4	70.7

Construction Phase	Roadway Segment (Distance in feet from construction activity)			
	Portola Pkwy, between SR-133 and Paragon (60) dBA, Leq	**Sand Canyon Ave, between Portola Pkwy and Irvine Blvd (40) dBA, Leq**	**Irvine Blvd, between San Canyon Ave and Native Spring (55) dBA, Leq**	**SR-133, between Irvine Blvd and SR-241 (80) dBA, Leq**
Construction of Dam/Spillway/Reservoir: *Spillway Construction* Construction of Filtration/Chlor/Dechlor Facility Wetlands/Riparian Installation Installation of Recreation Facilities	70.5	71.4	71.9	71.1
Construction of Filtration/Chlor/Dechlor Facility Wetlands/Riparian Installation Installation of Recreation Facilities	69.3	70.1	70.6	69.8
Construction of Filtration/Chlor/Dechlor Facility Installation of Recreation Facilities	68.6	69.4	69.9	69.1
Construction of Filtration/Chlor/Dechlor Facility	67.9	68.8	69.2	68.4
Demobilization	57.5	58.2	58.9	58.3

NOTES:
A) Construction schedule and truck traffic information provided by the project applicant.
B) Detailed traffic noise calculations are provided in Appendix B.
SOURCE: ESA 2020.

3.3 Vibration Impacts

Threshold NOI-2: Generation of excessive groundborne vibration or groundborne noise levels.

Impact NOI-2: The proposed project would not generate excessive groundborne vibration or groundborne noise levels. (Less than Significant).

3.3.1 Construction Vibration

Construction activities for the proposed project have the potential to generate low levels of groundborne vibration as the operation of heavy equipment (i.e., backhoe, dozer, grader, loader, and haul trucks, etc.) generates vibrations that propagate though the ground and diminish in intensity with distance from the source. No high-impact activities, such as pile driving or blasting, would be used during the proposed project's construction. In order to evaluate potential structural damage, the nearest off-site sensitive buildings to the project area were identified. The residential buildings located on the south side of Portola Parkway are approximately from 300 feet from the proposed project boundary line. Groundborne vibrations from construction activities very rarely reach the levels that can damage structures, but they may be perceived in buildings very close to a construction site.

The PPV vibration velocities for several types of construction equipment that can generate perceptible vibration levels are identified in **Table 8**. Based on the information presented in Table 8, vibration velocities could range from 0.0014 to 0.0083 in/sec PPV at 300 feet from the source of activity.

TABLE 8
VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

	Approximate PPV (in/sec)						
Equipment	25 Feet	50 Feet	60 Feet	75 Feet	100 Feet	200 Feet	300 Feet
Vibratory Roller	0.2100	0.0853	0.0673	0.0503	0.0346	0.0141	0.0083
Large Bulldozer	0.0890	0.0361	0.0285	0.0213	0.0147	0.0060	0.0035
Loaded Trucks	0.0760	0.0309	0.0244	0.0182	0.0125	0.0060	0.0035
Jackhammer	0.0350	0.0142	0.0112	0.0084	0.0058	0.0051	0.0030
Small Bulldozer	0.0030	0.0012	0.0010	0.0007	0.0005	0.0023	0.0014

SOURCE: FTA 2018; ESA 2020.

Proposed construction activities would occur throughout the project area and would not be concentrated at the point closest to the nearest structure. Based on the vibration levels presented in Table 8, at a distance of 300 feet from the proposed project area, the maximum vibration level would be up to approximately 0.0083 in/sec PPV for a vibratory roller, which would not exceed the significance threshold of 0.2 in/sec PPV. The geotechnical work would be associated with the damn upgrades and would most likely occur in the reservoir area, at a distance of 330 feet (100 meters) or more from the nearest sensitive uses, which would generate vibration levels below 0.2 in/sec PPV at sensitive receptor locations. Therefore, the use of all construction equipment would not result in a groundborne vibration velocity level above 0.2 inches per second at the nearest off-site structure. Therefore, impacts would be less than significant.

With respect to human annoyance, the nearest residential buildings located within 300 feet from the proposed project site would be exposed to vibration levels below the 80 VdB threshold for human annoyance. Therefore, impacts would be less than significant.

3.3.2 Operational Vibration

Sources of groundborne vibration would be unchanged from the existing conditions. Additionally, operational vibration impacts of the improvements at the new proposed reservoir would be consistent with the existing vibration velocity levels and with the existing ambient vibration velocity levels. As such, operational vibration impacts of the proposed Syphon Reservoir improvements would be less than significant.

Mitigation: None required.

Significance after Mitigation: Less Than Significant Impact.

3.4 Airport and Airstrip Noise Impacts

Threshold NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

Impact NOI-3: The proposed project would not expose people residing or working in the project area to excessive noise levels within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport. (No Impact).

The proposed project area is not located within the vicinity of a private airstrip. Further, the nearest airport to the project area is the John Wayne Airport, located approximately 7.7 miles to the southwest of the project area. The proposed project is not located within an airport land use plan or within 2 miles of a public airport or public use airport. Therefore, the proposed project would have no impact related to public or private airport/airstrip noise levels.

Mitigation: None required.

Significance after Mitigation: No Impact.

3.5 Cumulative Impacts

CEQA Guidelines require a discussion of cumulative impacts of a project "when the project's incremental effect is cumulatively considerable" (2011 CEQA Guidelines, Section 15130). As defined by Section 15065 (a)(3) "cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (2011 CEQA Guidelines, Section 15065 (a)(3)). These cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines Section 15355).

Two cumulative projects within 1,000 feet of the proposed project site have been identified, which include the Gateway Community Park / City of Irvine Master Parks Plan and the Truck Route Roadway Rehabilitation (CIP 311902) Project. Should all three projects undergo construction at the same time, the projects would be required to comply with the construction hours allowed by the City or comply with City restrictions imposed if a variance to the allowable construction hours for either project is issued. As described in Section 3.3, the proposed project construction and operation would comply with the City's noise standard, and impacts would be less than significant. Therefore, the proposed project, when combined with the identified cumulative projects, would not cause a cumulatively considerable noise impact. With regard to groundborne vibration, the construction vibration levels generated by the proposed project would be substantially below the FTA thresholds. Vibration level diminish rapidly from the source and the range of vibration concern is usually limited to 50 feet from the vibration source; thus, the proposed project, when combined with the identified cumulative projects, would not cause a cumulatively considerable vibration impact. As a result, cumulative impacts would be less than significant.

Mitigation: None required.

Significance after Mitigation: Less Than Significant Impact.

3.6 References

California Department of Transportation (Caltrans). Technical Noise Supplement (TeNS). September, 2013.

City of Irvine Municipal Code. Chapter 2 – Noise. Available at: https://library.municode.com/ca/irvine/codes/code_of_ordinances?nodeId=TIT6PUWO_DIV8PO_CH2NO. Accessed on June 2, 2020.

County of Orange Municipal Code. Division 6 – Noise Control. Available at: https://library.municode.com/ca/orange_county/codes/code_of_ordinances?nodeId=TIT4HESAANRE_DIV6NOCO_ART1GEPR_S4-6-6INNOST. Accessed on June 2, 2020.

Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual. September 2018.

Fehr & Peers. Methodologies and Assumptions Memorandum for Irvine Ranch Water District (IRWD) Syphon Reservoir Construction Transportation Impact Analysis. May 18, 2020.

Irvine Ranch Water District (IRWD). Construction Schedule Assumptions. May 2018.

Irvine Ranch Water District (IRWD). Syphon Reservoir Geotechnical Investigations Project Initial Study/Mitigated Negative Declaration, February 2019.

This page intentionally left blank.

Appendix A
Construction Equipment Noise

This page intentionally left blank.

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R1					R2				
Construction Phase **Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft, Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**
Vegetation Removal					**69**	***70***				**87**	***87***		
Rubber Tired Dozer	3	82	40%	470	67	63	66	0	55	86	82	85	0
Water Truck	1	80	10%	470	61	51	54	0	55	79	69	72	0
Rubber Tired Loader	4	79	40%	570	64	60	63	0	155	75	71	74	0
Pick-up Truck	3	75	40%	670	57	53	56	0	255	66	62	65	0
Access Route/Intersection Improvements													
Grader	2	85	40%	470	69	65	68	0	55	87	83	86	0
Excavator	3	81	40%	470	66	62	65	0	55	85	81	84	0
Crawler Tractor	1	80	25%	470	61	55	58	0	55	79	73	76	0
Tractor/Loader/Backhoe	2	80	25%	570	62	56	59	0	155	73	67	70	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Roller	2	80	20%	670	60	53	56	0	255	69	62	65	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0
Access Route/Intersection Improvements					**69**	***68***				**87**	***86***		
Grader	2	85	40%	470	69	65	68	0	55	87	83	86	0
Excavator	3	81	40%	470	66	62	65	0	55	85	81	84	0
Crawler Tractor	1	80	25%	470	61	55	58	0	55	79	73	76	0
Tractor/Loader/Backhoe	2	80	25%	570	62	56	59	0	155	73	67	70	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Roller	2	80	20%	670	60	53	56	0	255	69	62	65	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0
Mobilization, site prep/Staging Areas					**66**	***66***				**84**	***84***		
Grader	1	85	40%	470	66	62	65	0	55	84	80	83	0
Flatbed Truck	1	84	40%	470	65	61	64	0	55	83	79	82	0
Excavator	1	81	40%	470	62	58	61	0	55	80	76	79	0
Tool Carrier	1	80	25%	570	59	53	56	0	155	70	64	67	0
Water Truck	2	80	10%	570	62	52	55	0	155	73	63	66	0
Rubber Tired Loader	1	79	40%	570	58	54	57	0	155	69	65	68	0
Off-highway Truck	2	76	40%	670	56	52	55	0	255	65	61	64	0
Pick-up Truck	3	75	40%	670	57	53	56	0	255	66	62	65	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

						R1					**R2**		
Upstream Excavation and Foundation Treatment					**69**	***69***				**87**	***87***		
Grader	2	85	40%	470	69	65	68	0	55	87	83	86	0
Track Dozer	2	82	40%	470	66	62	65	0	55	84	80	83	0
Rubber Tired Dozer	2	82	40%	470	66	62	65	0	55	84	80	83	0
Excavator	2	81	40%	570	63	59	62	0	155	74	70	73	0
Pumps	3	81	50%	570	65	62	65	0	155	76	73	76	0
Water Truck	2	80	10%	570	62	52	55	0	155	73	63	66	0
Off-highway Truck	6	76	40%	670	61	57	60	0	255	70	66	69	0
Pick-up Truck	3	75	40%	670	57	53	56	0	255	66	62	65	0
Damn Excavation and Foundation Treatment					**71**	***71***				**89**	***88***		
Grader	1	85	40%	470	66	62	65	0	55	84	80	83	0
Scraper	4	84	40%	470	71	67	70	0	55	89	85	88	0
Rubber Tired Dozer	3	82	40%	470	67	63	66	0	55	86	82	85	0
Track Dozer	1	82	40%	470	63	59	62	0	55	81	77	80	0
Excavator	1	81	40%	570	60	56	59	0	155	71	67	70	0
Pumps	3	81	50%	570	65	62	65	0	155	76	73	76	0
Roller	1	80	20%	570	59	52	55	0	155	70	63	66	0
Water Truck	1	80	10%	670	57	47	50	0	255	66	56	59	0
Off-highway Truck	3	76	40%	670	58	54	57	0	255	67	63	66	0
Pick-up Truck	2	75	40%	670	55	51	54	0	255	64	60	63	0
Damn Excavation and Foundation Treatment					**71**	***71***				**89**	***89***		
Grader	1	85	40%	470	66	62	65	0	55	84	80	83	0
Scraper	4	84	40%	470	71	67	70	0	55	89	85	88	0
Rubber Tired Dozer	3	82	40%	470	67	63	66	0	55	86	82	85	0
Track Dozer	1	82	40%	470	63	59	62	0	55	81	77	80	0
Excavator	1	81	40%	570	60	56	59	0	155	71	67	70	0
Pumps	3	81	50%	570	65	62	65	0	155	76	73	76	0
Roller	1	80	20%	570	59	52	55	0	155	70	63	66	0
Water Truck	1	80	10%	670	57	47	50	0	255	66	56	59	0
Off-highway Truck	3	76	40%	670	58	54	57	0	255	67	63	66	0
Pick-up Truck	2	75	40%	670	55	51	54	0	255	64	60	63	0
Install Inlet/Outlet													
Flatbed Truck	1	84	40%	470	65	61	64	0	55	83	79	82	0
Excavator	1	81	40%	470	62	58	61	0	55	80	76	79	0
Tool Carrier	1	80	25%	570	59	53	56	0	155	70	64	67	0
Rubber Tired Loader	1	79	40%	570	58	54	57	0	155	69	65	68	0
Pick-up Truck	1	75	40%	670	52	48	51	0	255	61	57	60	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R1					R2				
Install Embankment to Bottom of Blanket Drain					**72**	***71***				**91**	***89***		
Grader	1	85	40%	470	66	62	65	0	55	84	80	83	0
Scraper	6	84	40%	470	72	68	71	0	55	91	87	90	0
Rubber Tired Dozer	3	82	40%	470	67	63	66	0	55	86	82	85	0
Track Dozer	1	82	40%	570	61	57	60	0	155	72	68	71	0
Water Truck	2	80	10%	570	62	52	55	0	155	73	63	66	0
Roller	2	80	20%	570	62	55	58	0	155	73	66	69	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0
Pick-up Truck	3	75	40%	670	57	53	56	0	255	66	62	65	0
Install Blanket Drain					**63**	***62***				**81**	***79***		
Track Dozer	1	82	40%	470	63	59	62	0	55	81	77	80	0
Roller	1	80	20%	470	61	54	57	0	55	79	72	75	0
Water Truck	2	80	10%	570	62	52	55	0	155	73	63	66	0
Rubber Tired Loader	1	79	40%	570	58	54	57	0	155	69	65	68	0
Pick-up Truck	1	75	40%	670	52	48	51	0	255	61	57	60	0
Install Chimney/Remaining Embankment					**72**	***71***				**91**	***89***		
Grader	1	85	40%	470	66	62	65	0	55	84	80	83	0
Scraper	6	84	40%	470	72	68	71	0	55	91	87	90	0
Rubber Tired Dozer	3	82	40%	470	67	63	66	0	55	86	82	85	0
Track Dozer	1	82	40%	570	61	57	60	0	155	72	68	71	0
Water Truck	2	80	10%	570	62	52	55	0	155	73	63	66	0
Roller	2	80	20%	570	62	55	58	0	155	73	66	69	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0
Pick-up Truck	3	75	40%	670	57	53	56	0	255	66	62	65	0
Install Chimney/Remaining Embankment					**72**	***72***				**91**	***89***		
Grader	1	85	40%	470	66	62	65	0	55	84	80	83	0
Scraper	6	84	40%	470	72	68	71	0	55	91	87	90	0
Rubber Tired Dozer	3	82	40%	470	67	63	66	0	55	86	82	85	0
Track Dozer	1	82	40%	570	61	57	60	0	155	72	68	71	0
Water Truck	2	80	10%	570	62	52	55	0	155	73	63	66	0
Roller	2	80	20%	570	62	55	58	0	155	73	66	69	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0
Pick-up Truck	3	75	40%	670	57	53	56	0	255	66	62	65	0
Spillway Construction													
Roller	1	80	20%	470	61	54	57	0	55	79	72	75	0
Tractor/Loader/Backhoe	4	80	25%	470	67	61	64	0	55	85	79	82	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Cement/Mortar Mixers	4	79	40%	570	64	60	63	0	155	75	71	74	0
Pavers	1	77	50%	670	54	51	54	0	255	63	60	63	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R1					R2				
Spillway Construction					**67**	***67***				**85**	***84***		
Roller	1	80	20%	470	61	54	57	0	55	79	72	75	0
Tractor/Loader/Backhoe	4	80	25%	470	67	61	64	0	55	85	79	82	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Cement/Mortar Mixers	4	79	40%	570	64	60	63	0	155	75	71	74	0
Pavers	1	77	50%	670	54	51	54	0	255	63	60	63	0
Construction of Filtration/Chlor/Dechlor Facility													
Compactor	1	83	20%	470	64	57	60	0	55	82	75	78	0
Tractor/Loader/Backhoe	2	80	25%	470	64	58	61	0	55	82	76	79	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Dumper/Tenders	1	76	40%	670	53	49	52	0	255	62	58	61	0
Wetlands/Riparian Installation													
Skid Steer Loader	1	80	25%	470	61	55	58	0	55	79	73	76	0
Water Truck	1	80	10%	470	61	51	54	0	55	79	69	72	0
Pick-up Truck	3	75	40%	570	59	55	58	0	155	70	66	69	0
ATV	2	75	40%	670	55	51	54	0	255	64	60	63	0
Spillway Construction					**69**	***70***				**87**	***88***		
Roller	1	80	20%	470	61	54	57	0	55	79	72	75	0
Tractor/Loader/Backhoe	4	80	25%	470	67	61	64	0	55	85	79	82	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Cement/Mortar Mixers	4	79	40%	570	64	60	63	0	155	75	71	74	0
Pavers	1	77	50%	670	54	51	54	0	255	63	60	63	0
Construction of Filtration/Chlor/Dechlor Facility													
Compactor	1	83	20%	470	64	57	60	0	55	82	75	78	0
Tractor/Loader/Backhoe	2	80	25%	470	64	58	61	0	55	82	76	79	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Dumper/Tenders	1	76	40%	670	53	49	52	0	255	62	58	61	0
Wetlands/Riparian Installation													
Skid Steer Loader	1	80	25%	470	61	55	58	0	55	79	73	76	0
Water Truck	1	80	10%	470	61	51	54	0	55	79	69	72	0
Pick-up Truck	3	75	40%	570	59	55	58	0	155	70	66	69	0
ATV	2	75	40%	670	55	51	54	0	255	64	60	63	0
Installation of Recreation Facilities													
Grader	2	85	40%	470	69	65	68	0	55	87	83	86	0
Excavator	3	81	40%	470	66	62	65	0	55	85	81	84	0
Crawler Tractor	1	80	25%	470	61	55	58	0	55	79	73	76	0
Tractor/Loader/Backhoe	2	80	25%	570	62	56	59	0	155	73	67	70	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Roller	2	80	20%	670	60	53	56	0	255	69	62	65	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

						R1					R2		
Construction of Filtration/Chlor/Dechlor Facility					**69**	***69***				**87**	***87***		
Compactor	1	83	20%	470	64	57	60	0	55	82	75	78	0
Tractor/Loader/Backhoe	2	80	25%	470	64	58	61	0	55	82	76	79	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Dumper/Tenders	1	76	40%	670	53	49	52	0	255	62	58	61	0
Wetlands/Riparian Installation													
Skid Steer Loader	1	80	25%	470	61	55	58	0	55	79	73	76	0
Water Truck	1	80	10%	470	61	51	54	0	55	79	69	72	0
Pick-up Truck	3	75	40%	570	59	55	58	0	155	70	66	69	0
ATV	2	75	40%	670	55	51	54	0	255	64	60	63	0
Installation of Recreation Facilities													
Grader	2	85	40%	470	69	65	68	0	55	87	83	86	0
Excavator	3	81	40%	470	66	62	65	0	55	85	81	84	0
Crawler Tractor	1	80	25%	470	61	55	58	0	55	79	73	76	0
Tractor/Loader/Backhoe	2	80	25%	570	62	56	59	0	155	73	67	70	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Roller	2	80	20%	670	60	53	56	0	255	69	62	65	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R1					R2				
Construction of Filtration/Chlor/Dechlor Facility					**69**	***68***				**87**	***86***		
Compactor	1	83	20%	470	64	57	60	0	55	82	75	78	0
Tractor/Loader/Backhoe	2	80	25%	470	64	58	61	0	55	82	76	79	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Dumper/Tenders	1	76	40%	670	53	49	52	0	255	62	58	61	0
Installation of Recreation Facilities													
Grader	2	85	40%	470	69	65	68	0	55	87	83	86	0
Excavator	3	81	40%	470	66	62	65	0	55	85	81	84	0
Crawler Tractor	1	80	25%	470	61	55	58	0	55	79	73	76	0
Tractor/Loader/Backhoe	2	80	25%	570	62	56	59	0	155	73	67	70	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Roller	2	80	20%	670	60	53	56	0	255	69	62	65	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0
Construction of Filtration/Chlor/Dechlor Facility					**64**	***61***				**82**	***79***		
Compactor	1	83	20%	470	64	57	60	0	55	82	75	78	0
Tractor/Loader/Backhoe	2	80	25%	470	64	58	61	0	55	82	76	79	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Dumper/Tenders	1	76	40%	670	53	49	52	0	255	62	58	61	0
Demobilization					**62**	***61***				**80**	***77***		
Flatbed Truck	1	84	40%	470	65	61	64	0	55	83	79	82	0
Excavator	1	81	40%	470	62	58	61	0	55	80	76	79	0
Tool Carrier	1	80	25%	570	59	53	56	0	155	70	64	67	0
Water Truck	1	80	10%	570	59	49	52	0	155	70	60	63	0
Rubber Tired Loader	1	79	40%	670	56	52	55	0	255	65	61	64	0
Pick-up Truck	3	75	40%	670	57	53	56	0	255	66	62	65	0

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R3					R4				
Construction Phase **Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft, Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**
Vegetation Removal					**72**	***73***				**77**	***78***		
Rubber Tired Dozer	3	82	40%	330	70	66	69	0	180	76	72	75	0
Water Truck	1	80	10%	330	64	54	57	0	180	69	59	62	0
Rubber Tired Loader	4	79	40%	430	66	62	65	0	280	70	66	69	0
Pick-up Truck	3	75	40%	530	59	55	58	0	380	62	58	61	0
Access Route/Intersection Improvements													
Grader	2	85	40%	330	72	68	71	0	180	77	73	76	0
Excavator	3	81	40%	330	69	65	68	0	180	75	71	74	0
Crawler Tractor	1	80	25%	330	64	58	61	0	180	69	63	66	0
Tractor/Loader/Backhoe	2	80	25%	430	64	58	61	0	280	68	62	65	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Roller	2	80	20%	530	63	56	59	0	380	65	58	61	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0
Access Route/Intersection Improvements					**72**	***71***				**77**	***76***		
Grader	2	85	40%	330	72	68	71	0	180	77	73	76	0
Excavator	3	81	40%	330	69	65	68	0	180	75	71	74	0
Crawler Tractor	1	80	25%	330	64	58	61	0	180	69	63	66	0
Tractor/Loader/Backhoe	2	80	25%	430	64	58	61	0	280	68	62	65	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Roller	2	80	20%	530	63	56	59	0	380	65	58	61	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0
Mobilization, site prep/Staging Areas					**69**	***69***				**74**	***74***		
Grader	1	85	40%	330	69	65	68	0	180	74	70	73	0
Flatbed Truck	1	84	40%	330	68	64	67	0	180	73	69	72	0
Excavator	1	81	40%	330	65	61	64	0	180	70	66	69	0
Tool Carrier	1	80	25%	430	61	55	58	0	280	65	59	62	0
Water Truck	2	80	10%	430	64	54	57	0	280	68	58	61	0
Rubber Tired Loader	1	79	40%	430	60	56	59	0	280	64	60	63	0
Off-highway Truck	2	76	40%	530	59	55	58	0	380	61	57	60	0
Pick-up Truck	3	75	40%	530	59	55	58	0	380	62	58	61	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R3					R4				
Upstream Excavation and Foundation Treatment					**72**	*72*				**77**	*77*		
Grader	2	85	40%	330	72	68	71	0	180	77	73	76	0
Track Dozer	2	82	40%	330	69	65	68	0	180	74	70	73	0
Rubber Tired Dozer	2	82	40%	330	69	65	68	0	180	74	70	73	0
Excavator	2	81	40%	430	65	61	64	0	280	69	65	68	0
Pumps	3	81	50%	430	67	64	67	0	280	71	68	71	0
Water Truck	2	80	10%	430	64	54	57	0	280	68	58	61	0
Off-highway Truck	6	76	40%	530	63	59	62	0	380	66	62	65	0
Pick-up Truck	3	75	40%	530	59	55	58	0	380	62	58	61	0
Damn Excavation and Foundation Treatment					**74**	*73*				**79**	*78*		
Grader	1	85	40%	330	69	65	68	0	180	74	70	73	0
Scraper	4	84	40%	330	74	70	73	0	180	79	75	78	0
Rubber Tired Dozer	3	82	40%	330	70	66	69	0	180	76	72	75	0
Track Dozer	1	82	40%	330	66	62	65	0	180	71	67	70	0
Excavator	1	81	40%	430	62	58	61	0	280	66	62	65	0
Pumps	3	81	50%	430	67	64	67	0	280	71	68	71	0
Roller	1	80	20%	430	61	54	57	0	280	65	58	61	0
Water Truck	1	80	10%	530	59	49	52	0	380	62	52	55	0
Off-highway Truck	3	76	40%	530	60	56	59	0	380	63	59	62	0
Pick-up Truck	2	75	40%	530	58	54	57	0	380	60	56	59	0
Damn Excavation and Foundation Treatment					**74**	*74*				**79**	*79*		
Grader	1	85	40%	330	69	65	68	0	180	74	70	73	0
Scraper	4	84	40%	330	74	70	73	0	180	79	75	78	0
Rubber Tired Dozer	3	82	40%	330	70	66	69	0	180	76	72	75	0
Track Dozer	1	82	40%	330	66	62	65	0	180	71	67	70	0
Excavator	1	81	40%	430	62	58	61	0	280	66	62	65	0
Pumps	3	81	50%	430	67	64	67	0	280	71	68	71	0
Roller	1	80	20%	430	61	54	57	0	280	65	58	61	0
Water Truck	1	80	10%	530	59	49	52	0	380	62	52	55	0
Off-highway Truck	3	76	40%	530	60	56	59	0	380	63	59	62	0
Pick-up Truck	2	75	40%	530	58	54	57	0	380	60	56	59	0
Install Inlet/Outlet													
Flatbed Truck	1	84	40%	330	68	64	67	0	180	73	69	72	0
Excavator	1	81	40%	330	65	61	64	0	180	70	66	69	0
Tool Carrier	1	80	25%	430	61	55	58	0	280	65	59	62	0
Rubber Tired Loader	1	79	40%	430	60	56	59	0	280	64	60	63	0
Pick-up Truck	1	75	40%	530	54	51	54	0	380	57	53	56	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R3					R4				
Install Embankment to Bottom of Blanket Drain					**75**	***74***				**81**	***79***		
Grader	1	85	40%	330	69	65	68	0	180	74	70	73	0
Scraper	6	84	40%	330	75	71	74	0	180	81	77	80	0
Rubber Tired Dozer	3	82	40%	330	70	66	69	0	180	76	72	75	0
Track Dozer	1	82	40%	430	63	59	62	0	280	67	63	66	0
Water Truck	2	80	10%	430	64	54	57	0	280	68	58	61	0
Roller	2	80	20%	430	64	57	60	0	280	68	61	64	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0
Pick-up Truck	3	75	40%	530	59	55	58	0	380	62	58	61	0
Install Blanket Drain					**66**	***64***				**71**	***69***		
Track Dozer	1	82	40%	330	66	62	65	0	180	71	67	70	0
Roller	1	80	20%	330	64	57	60	0	180	69	62	65	0
Water Truck	2	80	10%	430	64	54	57	0	280	68	58	61	0
Rubber Tired Loader	1	79	40%	430	60	56	59	0	280	64	60	63	0
Pick-up Truck	1	75	40%	530	54	51	54	0	380	57	53	56	0
Install Chimney/Remaining Embankment					**75**	***74***				**81**	***79***		
Grader	1	85	40%	330	69	65	68	0	180	74	70	73	0
Scraper	6	84	40%	330	75	71	74	0	180	81	77	80	0
Rubber Tired Dozer	3	82	40%	330	70	66	69	0	180	76	72	75	0
Track Dozer	1	82	40%	430	63	59	62	0	280	67	63	66	0
Water Truck	2	80	10%	430	64	54	57	0	280	68	58	61	0
Roller	2	80	20%	430	64	57	60	0	280	68	61	64	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0
Pick-up Truck	3	75	40%	530	59	55	58	0	380	62	58	61	0
Install Chimney/Remaining Embankment					**75**	***75***				**81**	***80***		
Grader	1	85	40%	330	69	65	68	0	180	74	70	73	0
Scraper	6	84	40%	330	75	71	74	0	180	81	77	80	0
Rubber Tired Dozer	3	82	40%	330	70	66	69	0	180	76	72	75	0
Track Dozer	1	82	40%	430	63	59	62	0	280	67	63	66	0
Water Truck	2	80	10%	430	64	54	57	0	280	68	58	61	0
Roller	2	80	20%	430	64	57	60	0	280	68	61	64	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0
Pick-up Truck	3	75	40%	530	59	55	58	0	380	62	58	61	0
Spillway Construction													
Roller	1	80	20%	330	64	57	60	0	180	69	62	65	0
Tractor/Loader/Backhoe	4	80	25%	330	70	64	67	0	180	75	69	72	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Cement/Mortar Mixers	4	79	40%	430	66	62	65	0	280	70	66	69	0
Pavers	1	77	50%	530	56	53	56	0	380	59	56	59	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R3					R4				
Spillway Construction					**70**	***69***				**75**	***74***		
Roller	1	80	20%	330	64	57	60	0	180	69	62	65	0
Tractor/Loader/Backhoe	4	80	25%	330	70	64	67	0	180	75	69	72	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Cement/Mortar Mixers	4	79	40%	430	66	62	65	0	280	70	66	69	0
Pavers	1	77	50%	530	56	53	56	0	380	59	56	59	0
Construction of Filtration/Chlor/Dechlor Facility													
Compactor	1	83	20%	330	67	60	63	0	180	72	65	68	0
Tractor/Loader/Backhoe	2	80	25%	330	67	61	64	0	180	72	66	69	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Dumper/Tenders	1	76	40%	530	55	52	55	0	380	58	54	57	0
Wetlands/Riparian Installation													
Skid Steer Loader	1	80	25%	330	64	58	61	0	180	69	63	66	0
Water Truck	1	80	10%	330	64	54	57	0	180	69	59	62	0
Pick-up Truck	3	75	40%	430	61	57	60	0	280	65	61	64	0
ATV	2	75	40%	530	58	54	57	0	380	60	56	59	0
Spillway Construction					**72**	***73***				**77**	***78***		
Roller	1	80	20%	330	64	57	60	0	180	69	62	65	0
Tractor/Loader/Backhoe	4	80	25%	330	70	64	67	0	180	75	69	72	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Cement/Mortar Mixers	4	79	40%	430	66	62	65	0	280	70	66	69	0
Pavers	1	77	50%	530	56	53	56	0	380	59	56	59	0
Construction of Filtration/Chlor/Dechlor Facility													
Compactor	1	83	20%	330	67	60	63	0	180	72	65	68	0
Tractor/Loader/Backhoe	2	80	25%	330	67	61	64	0	180	72	66	69	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Dumper/Tenders	1	76	40%	530	55	52	55	0	380	58	54	57	0
Wetlands/Riparian Installation													
Skid Steer Loader	1	80	25%	330	64	58	61	0	180	69	63	66	0
Water Truck	1	80	10%	330	64	54	57	0	180	69	59	62	0
Pick-up Truck	3	75	40%	430	61	57	60	0	280	65	61	64	0
ATV	2	75	40%	530	58	54	57	0	380	60	56	59	0
Installation of Recreation Facilities													
Grader	2	85	40%	330	72	68	71	0	180	77	73	76	0
Excavator	3	81	40%	330	69	65	68	0	180	75	71	74	0
Crawler Tractor	1	80	25%	330	64	58	61	0	180	69	63	66	0
Tractor/Loader/Backhoe	2	80	25%	430	64	58	61	0	280	68	62	65	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Roller	2	80	20%	530	63	56	59	0	380	65	58	61	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0

Project: IRWD Syphon
Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R3					R4				
Construction of Filtration/Chlor/Dechlor Facility					**72**	*72*				**77**	*77*		
Compactor	1	83	20%	330	67	60	63	0	180	72	65	68	0
Tractor/Loader/Backhoe	2	80	25%	330	67	61	64	0	180	72	66	69	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Dumper/Tenders	1	76	40%	530	55	52	55	0	380	58	54	57	0
Wetlands/Riparian Installation													
Skid Steer Loader	1	80	25%	330	64	58	61	0	180	69	63	66	0
Water Truck	1	80	10%	330	64	54	57	0	180	69	59	62	0
Pick-up Truck	3	75	40%	430	61	57	60	0	280	65	61	64	0
ATV	2	75	40%	530	58	54	57	0	380	60	56	59	0
Installation of Recreation Facilities													
Grader	2	85	40%	330	72	68	71	0	180	77	73	76	0
Excavator	3	81	40%	330	69	65	68	0	180	75	71	74	0
Crawler Tractor	1	80	25%	330	64	58	61	0	180	69	63	66	0
Tractor/Loader/Backhoe	2	80	25%	430	64	58	61	0	280	68	62	65	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Roller	2	80	20%	530	63	56	59	0	380	65	58	61	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

						R3					**R4**		
Construction of Filtration/Chlor/Dechlor Facility					**72**	***71***				**77**	***76***		
Compactor	1	83	20%	330	67	60	63	0	180	72	65	68	0
Tractor/Loader/Backhoe	2	80	25%	330	67	61	64	0	180	72	66	69	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Dumper/Tenders	1	76	40%	530	55	52	55	0	380	58	54	57	0
Installation of Recreation Facilities													
Grader	2	85	40%	330	72	68	71	0	180	77	73	76	0
Excavator	3	81	40%	330	69	65	68	0	180	75	71	74	0
Crawler Tractor	1	80	25%	330	64	58	61	0	180	69	63	66	0
Tractor/Loader/Backhoe	2	80	25%	430	64	58	61	0	280	68	62	65	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Roller	2	80	20%	530	63	56	59	0	380	65	58	61	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0
Construction of Filtration/Chlor/Dechlor Facility					**67**	***64***				**72**	***69***		
Compactor	1	83	20%	330	67	60	63	0	180	72	65	68	0
Tractor/Loader/Backhoe	2	80	25%	330	67	61	64	0	180	72	66	69	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Dumper/Tenders	1	76	40%	530	55	52	55	0	380	58	54	57	0
Demobilization					**65**	***64***				**70**	***68***		
Flatbed Truck	1	84	40%	330	68	64	67	0	180	73	69	72	0
Excavator	1	81	40%	330	65	61	64	0	180	70	66	69	0
Tool Carrier	1	80	25%	430	61	55	58	0	280	65	59	62	0
Water Truck	1	80	10%	430	61	51	54	0	280	65	55	58	0
Rubber Tired Loader	1	79	40%	530	58	55	58	0	380	61	57	60	0
Pick-up Truck	3	75	40%	530	59	55	58	0	380	62	58	61	0

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R5				
Construction Phase **Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft, Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**
Vegetation Removal					**79**	***80***		
Rubber Tired Dozer	3	82	40%	140	78	74	77	0
Water Truck	1	80	10%	140	71	61	64	0
Rubber Tired Loader	4	79	40%	240	71	67	70	0
Pick-up Truck	3	75	40%	340	63	59	62	0
Access Route/Intersection Improvements								
Grader	2	85	40%	140	79	75	78	0
Excavator	3	81	40%	140	77	73	76	0
Crawler Tractor	1	80	25%	140	71	65	68	0
Tractor/Loader/Backhoe	2	80	25%	240	69	63	66	0
Water Truck	1	80	10%	240	66	56	59	0
Roller	2	80	20%	340	66	59	62	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0
Access Route/Intersection Improvements					**79**	***78***		
Grader	2	85	40%	140	79	75	78	0
Excavator	3	81	40%	140	77	73	76	0
Crawler Tractor	1	80	25%	140	71	65	68	0
Tractor/Loader/Backhoe	2	80	25%	240	69	63	66	0
Water Truck	1	80	10%	240	66	56	59	0
Roller	2	80	20%	340	66	59	62	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0
Mobilization, site prep/Staging Areas					**76**	***76***		
Grader	1	85	40%	140	76	72	75	0
Flatbed Truck	1	84	40%	140	75	71	74	0
Excavator	1	81	40%	140	72	68	71	0
Tool Carrier	1	80	25%	240	66	60	63	0
Water Truck	2	80	10%	240	69	59	62	0
Rubber Tired Loader	1	79	40%	240	65	61	64	0
Off-highway Truck	2	76	40%	340	62	58	61	0
Pick-up Truck	3	75	40%	340	63	59	62	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R5				
Upstream Excavation and Foundation Treatment					**79**	***79***		
Grader	2	85	40%	140	79	75	78	0
Track Dozer	2	82	40%	140	76	72	75	0
Rubber Tired Dozer	2	82	40%	140	76	72	75	0
Excavator	2	81	40%	240	70	66	69	0
Pumps	3	81	50%	240	72	69	72	0
Water Truck	2	80	10%	240	69	59	62	0
Off-highway Truck	6	76	40%	340	67	63	66	0
Pick-up Truck	3	75	40%	340	63	59	62	0
Damn Excavation and Foundation Treatment					**81**	***81***		
Grader	1	85	40%	140	76	72	75	0
Scraper	4	84	40%	140	81	77	80	0
Rubber Tired Dozer	3	82	40%	140	78	74	77	0
Track Dozer	1	82	40%	140	73	69	72	0
Excavator	1	81	40%	240	67	63	66	0
Pumps	3	81	50%	240	72	69	72	0
Roller	1	80	20%	240	66	59	62	0
Water Truck	1	80	10%	340	63	53	56	0
Off-highway Truck	3	76	40%	340	64	60	63	0
Pick-up Truck	2	75	40%	340	61	57	60	0
Damn Excavation and Foundation Treatment					**81**	***81***		
Grader	1	85	40%	140	76	72	75	0
Scraper	4	84	40%	140	81	77	80	0
Rubber Tired Dozer	3	82	40%	140	78	74	77	0
Track Dozer	1	82	40%	140	73	69	72	0
Excavator	1	81	40%	240	67	63	66	0
Pumps	3	81	50%	240	72	69	72	0
Roller	1	80	20%	240	66	59	62	0
Water Truck	1	80	10%	340	63	53	56	0
Off-highway Truck	3	76	40%	340	64	60	63	0
Pick-up Truck	2	75	40%	340	61	57	60	0
Install Inlet/Outlet								
Flatbed Truck	1	84	40%	140	75	71	74	0
Excavator	1	81	40%	140	72	68	71	0
Tool Carrier	1	80	25%	240	66	60	63	0
Rubber Tired Loader	1	79	40%	240	65	61	64	0
Pick-up Truck	1	75	40%	340	58	54	57	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

						R5		
Install Embankment to Bottom of Blanket Drain					**83**	***81***		
Grader	1	85	40%	140	76	72	75	0
Scraper	6	84	40%	140	83	79	82	0
Rubber Tired Dozer	3	82	40%	140	78	74	77	0
Track Dozer	1	82	40%	240	68	64	67	0
Water Truck	2	80	10%	240	69	59	62	0
Roller	2	80	20%	240	69	62	65	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0
Pick-up Truck	3	75	40%	340	63	59	62	0
Install Blanket Drain					**73**	***71***		
Track Dozer	1	82	40%	140	73	69	72	0
Roller	1	80	20%	140	71	64	67	0
Water Truck	2	80	10%	240	69	59	62	0
Rubber Tired Loader	1	79	40%	240	65	61	64	0
Pick-up Truck	1	75	40%	340	58	54	57	0
Install Chimney/Remaining Embankment					**83**	***81***		
Grader	1	85	40%	140	76	72	75	0
Scraper	6	84	40%	140	83	79	82	0
Rubber Tired Dozer	3	82	40%	140	78	74	77	0
Track Dozer	1	82	40%	240	68	64	67	0
Water Truck	2	80	10%	240	69	59	62	0
Roller	2	80	20%	240	69	62	65	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0
Pick-up Truck	3	75	40%	340	63	59	62	0
Install Chimney/Remaining Embankment					**83**	***82***		
Grader	1	85	40%	140	76	72	75	0
Scraper	6	84	40%	140	83	79	82	0
Rubber Tired Dozer	3	82	40%	140	78	74	77	0
Track Dozer	1	82	40%	240	68	64	67	0
Water Truck	2	80	10%	240	69	59	62	0
Roller	2	80	20%	240	69	62	65	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0
Pick-up Truck	3	75	40%	340	63	59	62	0
Spillway Construction								
Roller	1	80	20%	140	71	64	67	0
Tractor/Loader/Backhoe	4	80	25%	140	77	71	74	0
Water Truck	1	80	10%	240	66	56	59	0
Cement/Mortar Mixers	4	79	40%	240	71	67	70	0
Pavers	1	77	50%	340	60	57	60	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

						R5		
Spillway Construction					**77**	***76***		
Roller	1	80	20%	140	71	64	67	0
Tractor/Loader/Backhoe	4	80	25%	140	77	71	74	0
Water Truck	1	80	10%	240	66	56	59	0
Cement/Mortar Mixers	4	79	40%	240	71	67	70	0
Pavers	1	77	50%	340	60	57	60	0
Construction of Filtration/Chlor/Dechlor Facility								
Compactor	1	83	20%	140	74	67	70	0
Tractor/Loader/Backhoe	2	80	25%	140	74	68	71	0
Water Truck	1	80	10%	240	66	56	59	0
Dumper/Tenders	1	76	40%	340	59	55	58	0
Wetlands/Riparian Installation								
Skid Steer Loader	1	80	25%	140	71	65	68	0
Water Truck	1	80	10%	140	71	61	64	0
Pick-up Truck	3	75	40%	240	66	62	65	0
ATV	2	75	40%	340	61	57	60	0
Spillway Construction					**79**	***80***		
Roller	1	80	20%	140	71	64	67	0
Tractor/Loader/Backhoe	4	80	25%	140	77	71	74	0
Water Truck	1	80	10%	240	66	56	59	0
Cement/Mortar Mixers	4	79	40%	240	71	67	70	0
Pavers	1	77	50%	340	60	57	60	0
Construction of Filtration/Chlor/Dechlor Facility								
Compactor	1	83	20%	140	74	67	70	0
Tractor/Loader/Backhoe	2	80	25%	140	74	68	71	0
Water Truck	1	80	10%	240	66	56	59	0
Dumper/Tenders	1	76	40%	340	59	55	58	0
Wetlands/Riparian Installation								
Skid Steer Loader	1	80	25%	140	71	65	68	0
Water Truck	1	80	10%	140	71	61	64	0
Pick-up Truck	3	75	40%	240	66	62	65	0
ATV	2	75	40%	340	61	57	60	0
Installation of Recreation Facilities								
Grader	2	85	40%	140	79	75	78	0
Excavator	3	81	40%	140	77	73	76	0
Crawler Tractor	1	80	25%	140	71	65	68	0
Tractor/Loader/Backhoe	2	80	25%	240	69	63	66	0
Water Truck	1	80	10%	240	66	56	59	0
Roller	2	80	20%	340	66	59	62	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R5				
Construction of Filtration/Chlor/Dechlor Facility					**79**	*79*		
Compactor	1	83	20%	140	74	67	70	0
Tractor/Loader/Backhoe	2	80	25%	140	74	68	71	0
Water Truck	1	80	10%	240	66	56	59	0
Dumper/Tenders	1	76	40%	340	59	55	58	0
Wetlands/Riparian Installation								
Skid Steer Loader	1	80	25%	140	71	65	68	0
Water Truck	1	80	10%	140	71	61	64	0
Pick-up Truck	3	75	40%	240	66	62	65	0
ATV	2	75	40%	340	61	57	60	0
Installation of Recreation Facilities								
Grader	2	85	40%	140	79	75	78	0
Excavator	3	81	40%	140	77	73	76	0
Crawler Tractor	1	80	25%	140	71	65	68	0
Tractor/Loader/Backhoe	2	80	25%	240	69	63	66	0
Water Truck	1	80	10%	240	66	56	59	0
Roller	2	80	20%	340	66	59	62	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0

Project: IRWD Syphon

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R5				
Construction of Filtration/Chlor/Dechlor Facility					**79**	***79***		
Compactor	1	83	20%	140	74	67	70	0
Tractor/Loader/Backhoe	2	80	25%	140	74	68	71	0
Water Truck	1	80	10%	240	66	56	59	0
Dumper/Tenders	1	76	40%	340	59	55	58	0
Installation of Recreation Facilities								
Grader	2	85	40%	140	79	75	78	0
Excavator	3	81	40%	140	77	73	76	0
Crawler Tractor	1	80	25%	140	71	65	68	0
Tractor/Loader/Backhoe	2	80	25%	240	69	63	66	0
Water Truck	1	80	10%	240	66	56	59	0
Roller	2	80	20%	340	66	59	62	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0
Construction of Filtration/Chlor/Dechlor Facility					**74**	***71***		
Compactor	1	83	20%	140	74	67	70	0
Tractor/Loader/Backhoe	2	80	25%	140	74	68	71	0
Water Truck	1	80	10%	240	66	56	59	0
Dumper/Tenders	1	76	40%	340	59	55	58	0
Demobilization					**72**	***70***		
Flatbed Truck	1	84	40%	140	75	71	74	0
Excavator	1	81	40%	140	72	68	71	0
Tool Carrier	1	80	25%	240	66	60	63	0
Water Truck	1	80	10%	240	66	56	59	0
Rubber Tired Loader	1	79	40%	340	62	58	61	0
Pick-up Truck	3	75	40%	340	63	59	62	0

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

Appendix B
Construction Traffic Noise

This page intentionally left blank.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Vegetation Removal and Access Route
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	40	0	154	70.7	71.0
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	40	0	154	71.6	71.9
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	40	0	154	72.0	72.3
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	40	0	154	71.2	71.5

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
 For hard ground, the propagation rate is 3 dB per doubling the distance.
 For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Access Route
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	20	0	22	62.5	62.8
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	20	0	22	63.4	63.7
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	20	0	22	63.9	64.2
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	20	0	22	63.1	63.4

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Mobilization, site prep/Staging Areas
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	30	0	6	58.4	58.7
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	30	0	6	59.1	59.4
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	30	0	6	59.8	60.1
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	30	0	6	59.1	59.4

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Upstream Excavation and Foundation Treatment
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	62	0	14	61.9	62.2
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	62	0	14	62.6	62.9
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	62	0	14	63.3	63.6
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	62	0	14	62.6	62.9

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Dam Excavation and Foundation Treatment
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	62	0	14	61.9	62.2
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	62	0	14	62.6	62.9
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	62	0	14	63.3	63.6
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	62	0	14	62.6	62.9

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
 For hard ground, the propagation rate is 3 dB per doubling the distance.
 For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Dam Excavation and Foundation Treatment and Install Inlet/Outlet
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	140	0	152	70.9	71.2
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	140	0	152	71.8	72.1
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	140	0	152	72.3	72.6
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	140	0	152	71.5	71.8

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Install Embankment to Bottom of Blanket Drain
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	78	0	138	70.4	70.7
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	78	0	138	71.2	71.5
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	78	0	138	71.7	72.0
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	78	0	138	70.9	71.2

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Install Blanket Drain
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	78	0	138	70.4	70.7
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	78	0	138	71.2	71.5
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	78	0	138	71.7	72.0
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	78	0	138	70.9	71.2

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Install Chimney/Remaining Embankment
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	78	0	138	70.4	70.7
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	78	0	138	71.2	71.5
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	78	0	138	71.7	72.0
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	78	0	138	70.9	71.2

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Install Chimney/Remaining Embankment &Spillway Construction
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	156	0	168	71.4	71.7
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	156	0	168	72.2	72.5
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	156	0	168	72.7	73.0
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	156	0	168	71.9	72.2

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
- For hard ground, the propagation rate is 3 dB per doubling the distance.
- For soft ground, the propagation rate is 4.5 dB per doubling the distance.

Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Spillway Construction & Construction of Filtration & Wetlands Installation
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	150	0	122	70.1	70.4
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	150	0	122	70.9	71.2
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	150	0	122	71.4	71.7
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	150	0	122	70.7	71.0

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Spillway Construction & Construction of Filtration & Wetlands & Recreation Installation
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	170	0	134	70.5	70.8
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	170	0	134	71.4	71.7
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	170	0	134	71.9	72.2
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	170	0	134	71.1	71.4

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
- For hard ground, the propagation rate is 3 dB per doubling the distance.
- For soft ground, the propagation rate is 4.5 dB per doubling the distance.

Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Construction of Filtration & Wetlands & Recreation Installation
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	92	0	104	69.3	69.6
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	92	0	104	70.1	70.4
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	92	0	104	70.6	70.9
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	92	0	104	69.8	70.1

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Construction of Filtration & Recreation Installation
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	52	0	92	68.6	68.9
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	52	0	92	69.4	69.7
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	52	0	92	69.9	70.2
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	52	0	92	69.1	69.4

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
    For hard ground, the propagation rate is 3 dB per doubling the distance.
    For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Construction of Filtration/Chlor/Dechlor Facility
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	32	0	80	67.9	68.2
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	32	0	80	68.8	69.1
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	32	0	80	69.2	69.5
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	32	0	80	68.4	68.7

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Syphon
Analysis Scenario: Spillway Construction & Construction of Filtration & Wetlands & Recreation Installation
Source of Traffic Volumes: Applicant

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Potola Pkwy, between SR-133 and Paragon	Hard	60	55	55	55	32	0	4	57.5	57.8
Sand Canyon Ave, between Portola Pkwy and Irvine Blvd.	Hard	40	50	50	50	32	0	4	58.2	58.5
Irvine Blvd, between San Canyon Ave and Native Spring	Hard	55	60	60	60	32	0	4	58.9	59.2
SR-133, between Irvine Blvd and SR-241	Hard	80	65	65	65	32	0	4	58.3	58.6

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

Appendix E
Traffic Study

ESA

Prepared by
FEHR PEERS

101 Pacifica
Suite 300
Irvine, CA 92618
949.308.6300

Prepared for
Environmental Science Associates

Draft Irvine Ranch Water District Syphon Improvement Project

Transportation Impact Analysis

September 2020

Draft Irvine Ranch Water District
Syphon Reservoir Improvement Project
Transportation Impact Analysis

Prepared for:

Irvine Ranch Water District

September 2020

OC18-0553

FEHR PEERS

Table of Contents

Appendices

List of Figures

List of Tables

1. Executive Summary

Fehr & Peers has completed a Transportation Impact Analysis (TIA) for construction of the Irvine Ranch Water District (IRWD) Syphon Reservoir Improvement Project (Project) located near the intersection of Sand Canyon Avenue and Portola Parkway in Irvine, California. The Project proposes to increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam. As part of the Project, a private 2-lane roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site is proposed for construction vehicle access. This proposal will require reconstruction of the Sand Canyon Avenue and Portola Parkway intersection to accommodate the new northern leg and the associated traffic signals, lane striping, and signage changes. Pedestrian and bicycle infrastructure at the intersection will be reconstructed to maintain access like the existing condition while following the City of Irvine requirements.

As part of the TIA, consistent with California Environmental Quality Act (CEQA) requirements, a Vehicle Miles Traveled (VMT) analysis was conducted for the Project. Intersection Level of Service (LOS) was also conducted to determine intersection operations with and without the Project. The study intersections selected represent the intersections where construction traffic is proposed to travel through. Four routes are proposed for the Project.

Findings

On a peak construction activity day, approximately 232 daily trips are estimated, of which 36 trips (27 inbound/9 outbound) would occur during the AM peak hour and 18 trips (0 inbound/18 outbound) would occur during the PM peak hour. For the purpose of the intersection LOS analysis, the trip generation estimates were converted to Passenger Car Equivalent (PCE) trips. PCE reflects the additional effect larger vehicles have on intersection operations based on their larger size. A PCE factor of 1.0 was assumed for worker vehicles and a PCE factor of 3.0 was assumed for all construction trucks, based on the Highway Capacity Manual 6th Edition (HCM) (Transportation Research Board, 2017). As shown in Table 3, on a peak construction activity day, approximately 512 daily PCE trips are estimated, of which 72 PCE trips (45 inbound/27 outbound) would occur during the AM peak hour and 18 PCE trips (0 inbound/18 outbound) would occur during the PM peak hour.

The City of Irvine's *CEQA VMT Impact Analysis Guidelines* identify projects generating fewer than 250 weekday daily trips as requiring no further VMT impact analysis. All phases of construction have a daily trip generation less than 250 trips. Therefore, it can be determined that all the construction phases do not meet the daily trip screening threshold and require no further VMT impact analysis using the *CEQA VMT Impact Analysis Guidelines*.

The LOS analyses resulted in no intersection deficiencies under any of the "plus Project" scenarios. Therefore, no intersection improvements would be required.

2. Introduction

This report presents the analysis and findings of a Transportation Impact Analysis (TIA) prepared for construction of the Irvine Ranch Water District (IRWD) Syphon Reservoir Improvement Project (Project) located near the intersection of Sand Canyon Avenue and Portola Parkway in Irvine, California. This chapter discusses the TIA purpose, analysis locations and methods, scenarios, and report organization.

Study Purpose

The purpose of this study is to evaluate the temporary transportation impacts associated with the Syphon Reservoir Improvement Project. The Project proposes to increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam. The Project would allow the storage of additional recycled water produced at the Michelson Water Recycling Plant during periods of low demand (winter months) for use during periods of high demand (summer months). The Project would expand the reservoir's storage capacity from the current 500 Acre-Feet (AF) to approximately 5,000 AF and would help IRWD become more self-sufficient by reducing its dependence on costly and less-reliable imported water from both Northern California and the Colorado River. The Project would help IRWD to store more drought-proof recycled water during summer months and support the increased use of recycled water for public landscaping, agricultural, business, and industrial uses. Every gallon of recycled water IRWD uses for non-drinking water purposes saves a gallon of drinking water, helping the region's existing and planned future development to better withstand future water shortages. By reducing IRWD's dependence on costly imported water, the Project would allow IRWD to replace an expensive source of water for one that is less expensive and a drought-resilient supply, which increases IRWD's water supply reliability. The proposed Project is assumed to be operational by end of 2026.

The Project would be implemented within the IRWD service area at the location of the existing Syphon Reservoir, northeast of Portola Parkway between Bee Canyon Access Road and SR-133 in the County of Orange. The Crean Lutheran High School Athletic Complex is located between Portola Parkway and the toe of the existing dam. Residential neighborhoods are located on the southwest side of Portola Parkway. Figure 1 identifies the location of the Project within Irvine.

As part of the Project, a private 2-lane roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site is proposed for construction vehicle access during Project construction and maintenance/operations access during Project operation. This proposal will require reconstruction of the Sand Canyon Avenue and Portola Parkway intersection to accommodate the new northern leg and the associated traffic signals, lane striping, and signage changes. Pedestrian and bicycle infrastructure at the intersection would be reconstructed to maintain access like the existing condition while following the City of Irvine requirements. This improvement assumes the northbound approach at Sand Canyon Avenue and Portola Parkway would be modified from two left-turn lanes and two right-turn lanes to one left-turn lane, one shared through/left-turn lane, and two right-turn lanes. The southbound approach would be constructed with one shared left/through/right-turn lane. Split phasing (a traffic signal phasing that gives a green signal for all vehicle movements of one direction followed by a green signal for all movements of the opposite direction) would be incorporated for the northbound and new southbound approaches during construction and typical operations. During construction of the Project, this private roadway would be used by construction trips for ingress and egress of the construction site. Upon completion of the Project, this private roadway would be used by IRWD staff conducting maintenance and inspections as part of typical operations, similar to existing conditions. Trips by IRWD staff to the reservoir are not anticipated to increase as compared to the existing condition and are not considered to have a significant effect on the future intersection operations.

Study Area Boundary

The scope of the traffic analysis, methodology assumptions, and selection of study intersections was developed in consultation with City of Irvine staff and documented in the Scope of Work for Irvine Ranch Water District (IRWD) Syphon Reservoir Construction Transportation Impact Analysis dated June 29, 2020. The approved scope of work is included in Appendix A.

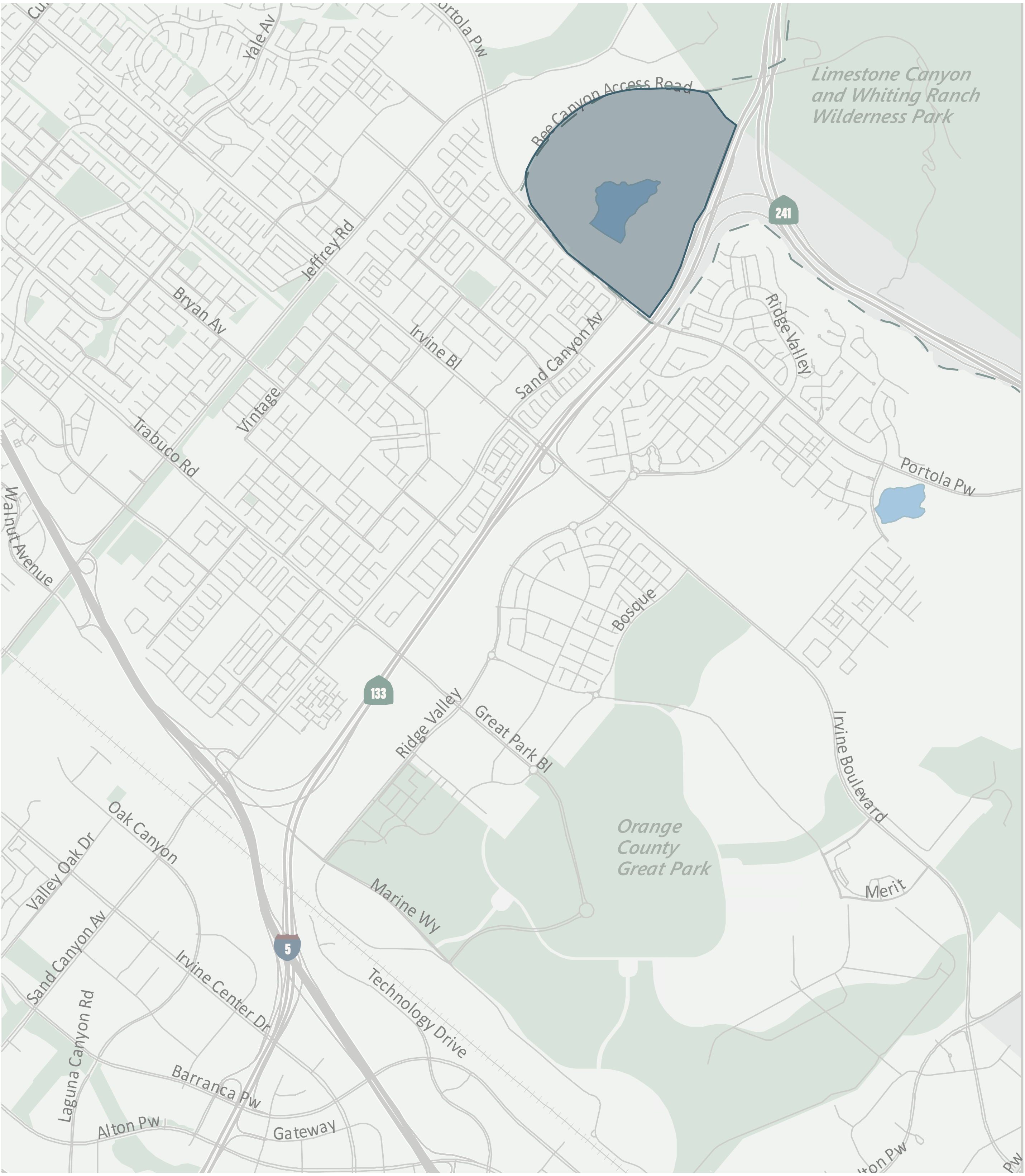
The study intersections selected represent the intersections where construction traffic is proposed to travel through. Four routes are proposed for the Project.

- Route 1A – I-5 (from the north), south on Sand Canyon Avenue for trucks traveling inbound and southbound on Sand Canyon Avenue to I-5 (to the north) for trucks traveling outbound.
- Route 1B – I-5 (from the south), south on Sand Canyon Avenue for trucks traveling inbound and southbound on Sand Canyon Avenue to I-5 (to the south) for trucks traveling outbound.
- Route 2A – SR-133 (from the north), west on Irvine Boulevard, and north on Sand Canyon Avenue for trucks traveling inbound and southbound on Sand Canyon Avenue and east on Irvine Boulevard to SR-133 (to the north) for trucks traveling outbound.
- Route 2B – SR-133 (from the south), west on Irvine Boulevard, and north on Sand Canyon Avenue for trucks traveling inbound and southbound on Sand Canyon Avenue and east on Irvine Boulevard to SR-133 (to the south) for trucks traveling outbound.

As presented in Figure 2, the following intersections have been selected for study:

1. Sand Canyon Avenue & Portola Parkway
2. Sand Canyon Avenue & Irvine Boulevard
3. Sand Canyon Avenue & Trabuco Road
4. Sand Canyon Avenue & I-5 Northbound Ramps
5. Sand Canyon Avenue & Marine Way
6. Sand Canyon Avenue & I-5 Southbound Ramps
7. SR-133 Southbound Ramps & Irvine Boulevard
8. SR-133 Northbound Off-Ramp & Irvine Boulevard

Freeway links were not included in this study as less than 50 peak hour trips would be added to the freeway system.



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

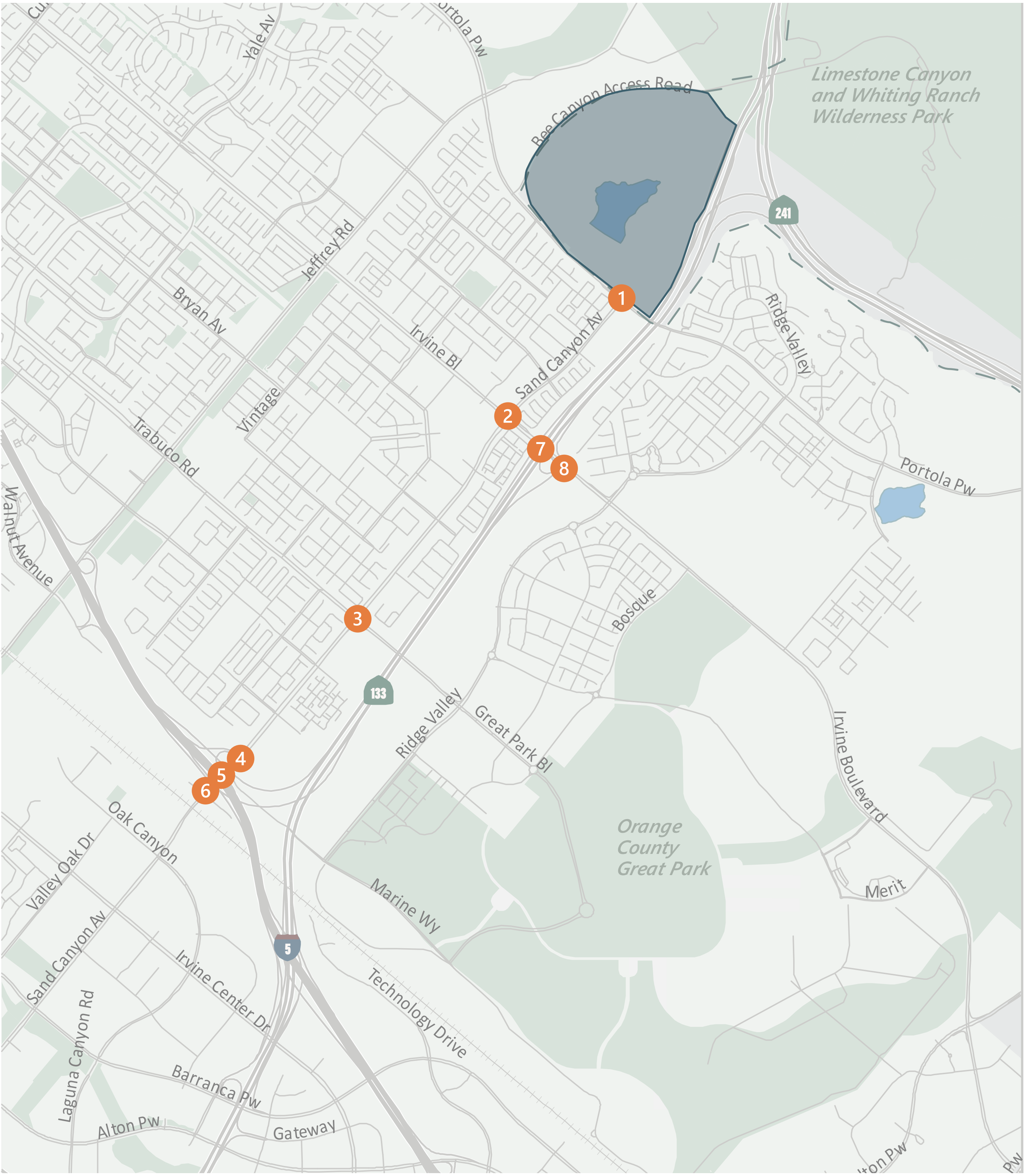
N

Legend

Project Site Syphon Reservoir

Figure 1

Project Location



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

N

Legend

- Study Intersections
- Project Site Syphon Reservoir

Figure 2

Study Intersections

Analysis Methods

The *City of Irvine Traffic Study Guidelines* (City of Irvine, April 2020) were used to identify the analysis methodologies for the Vehicle Miles Traveled (VMT) and intersection Level of Service (LOS) analyses. Many jurisdictions in Southern California have regarded construction-related traffic as causing adverse but not significant impacts because, while sometimes inconvenient, construction-related traffic effects are temporary.

Vehicle Miles Traveled Analysis

On September 27, 2013, Governor Jerry Brown signed Senate Bill (SB) 743 into law and started a process that has fundamentally changed transportation impact analyses conducted as part of California Environmental Quality Act (CEQA) compliance. The Governor's Office of Planning and Research (OPR) was charged with developing new guidelines for evaluating transportation impacts under CEQA using methods that no longer focus on measuring automobile delay and LOS.

OPR issued proposed updates to the CEQA guidelines in support of these goals in November 2017 and a supporting technical advisory in December 2018. The updates establish VMT as the metric for evaluating a project's environmental impacts on the transportation system. Lead agencies, including the City of Irvine, had until July 1, 2020 to implement these new requirements. On June 23, 2020, the City of Irvine adopted the *CEQA VMT Impact Analysis Guidelines* (City of Irvine, April 2020). These guidelines are included as an exhibit in the *City of Irvine Traffic Study Guidelines*.

Neither OPR nor the City of Irvine have provided guidance regarding VMT thresholds for construction related traffic. Nonetheless and per the approved scope of work, a VMT impact analysis was conducted for the Project that follows the adopted *CEQA VMT Impact Analysis Guidelines*.

Intersection Level of Service Analysis

For the signalized intersections within the study area, the transportation analysis was conducted in accordance with *City of Irvine Traffic Study Guidelines* requirements using the Intersection Capacity Utilization (ICU) methodology.

The ICU methodology is considered a standard approach for evaluating signalized intersection operations in Irvine. The ICU method of intersection capacity analysis determines the intersection volume-to-capacity (V/C) ratio and corresponding LOS for the turning movements and intersection characteristics at signalized intersections. "Capacity" represents the maximum volume of vehicles in the critical lanes that have a reasonable expectation of passing through an intersection in one hour under prevailing roadway and traffic conditions. The ICU method calculates the V/C ratio for each critical movement by dividing volume by capacity. The V/C ratios for each critical movement are summed with an added lost time due to vehicle start-ups and stops to determine the total intersection V/C ratio. Traffic conditions for signalized intersections were evaluated using the Vistro Version 7.0 software.

After the quantitative V/C and delay estimates were completed, the methodologies assign a qualitative letter grade that represents the operations of the intersection. These grades range from level of service (LOS) A (minimal delay) to LOS F (excessive congestion). LOS E represents at-capacity operations. Descriptions of the LOS letter grades for intersections are provided in Table 1.

Analysis Scenarios

The proposed Project is assumed to be operational by end of 2026. The study was directed at analyzing the potential Project generated traffic effect on the local street system under both existing and future year traffic conditions. The following traffic scenarios were developed and analyzed as part of this study:

- Existing Conditions – Due to emergence of COVID-19 in southern California and the decision of local schools to end on-campus classes for the 2019-2020 academic year, existing intersection counts could not be collected in the study area. However, the City of Irvine provided intersection counts from 2018 that were used to estimate 2020 intersection volumes. Per the approved scope of work with the City of Irvine, a growth factor of 2% per year was applied to previously collected counts to develop 2020 intersection volumes for the AM and PM peak hours.
- Existing plus Project Conditions – the proposed construction trip generation (in passenger car equivalence) and route assignment estimates was added to the Existing Conditions. Buildout of a private roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site was included.
- Short-Term Interim Year Approved Conditions – the future (Short-Term Interim Year Approved) conditions were developed using study area intersection volume growth rates on a per year basis. The per year growth rates were developed based on outputs from the latest versions of the Existing and Short-Term Interim Year Approved Irvine Traffic Analysis Model (ITAM) provided by the City of Irvine. The growth rate was applied to the Existing Conditions intersection volumes to reflect Existing Conditions growth to the Short-Term Interim Year Approved condition of ITAM.
- Short-Term Interim Year Approved plus Project Conditions – the proposed construction trip generation (in passenger car equivalence) and route assignment estimates was added to the Short-Term Interim Year Approved Conditions. Buildout of a private roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site was included.

TABLE 1
INTERSECTION LEVEL OF SERVICE CRITERIA

Level of Service	Description	ICU Volume to Capacity (V/C) Ratio
A	Signalized: Operations with very low delay occurring with favorable progression and/or short cycle length. Unsignalized: Little or no delay.	0.000 - 0.600
B	Signalized: Operations with low delay occurring with good progression and/or short cycle lengths. Unsignalized: Short traffic delays.	0.601 - 0.700
C	Signalized: Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear. Unsignalized: Average traffic delays.	0.701 - 0.800
D	Signalized: Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable. Unsignalized: Long traffic delays.	0.801 - 0.900
E	Signalized: Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. Unsignalized: Very long traffic delays.	0.901 - 1.000
F	Signalized: Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths. Unsignalized: Extreme traffic delays with intersection capacity exceeded	> 1.000

Sources: *Transportation Research Circular No. 212, Interim Materials on Highway Capacity,* Transportation Research Board, 1980.

- Short-Term Interim Year Pending Conditions – the future (Short-Term Interim Year Pending) conditions were developed using study area intersection volume growth rates on a per year basis. The per year growth rates were developed based on outputs from the latest versions of the Existing and Short-Term Interim Year Pending ITAM provided by the City of Irvine. The growth rate was applied to the Existing Conditions intersection volumes to reflect Existing Conditions growth to the Short-Term Interim Year Pending condition of ITAM.
- Short-Term Interim Year Pending plus Project Conditions – the proposed construction trip generation (in passenger car equivalence) and route assignment estimates was added to the Short-Term Interim Year Pending Conditions. Buildout of a private roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site was included.

Report Organization

This report is divided into eight chapters as described below:

- Chapter 1 – Executive summary summarizes the findings of the analysis.
- Chapter 2 – Introduction discusses the purpose and organization of the report.
- Chapter 3 – Existing Conditions describes the transportation system in the Project vicinity, including the surrounding roadway network, morning and evening peak period intersection turning movement volumes, existing bicycle, pedestrian, and transit facilities, and intersection operations.
- Chapter 4 – Performance criteria identify the thresholds for impacts and when traffic improvements would be required.
- Chapter 5 – Project characteristics identify the trip generation, distribution, and assignment of the Project traffic.
- Chapter 6 – Existing Plus Project Traffic Conditions addresses the Existing Conditions with the Project and discusses Project effect on intersections.
- Chapter 7 – Short-Term Interim Year Conditions addresses the Short-Term Interim Year without the Project.
- Chapter 8 – Short-Term Interim Year Plus Project Conditions addresses the Short-Term Interim Year Plus Project Conditions, with the Project, and discusses Project effect on intersections.
- Chapter 9 – Special Issues address site access analysis and VMT analysis.
- Chapter 10 – Required improvements address the improvements required of the Project.
- Chapter 11 – Conclusion summarizes the findings of the analysis.

3. Existing Conditions

This chapter describes transportation facilities in the study area including the surrounding roadway network, transit, pedestrian, and bicycle facilities. Existing intersection operations are also described.

Roadway System

The following discusses the roadways that would provide access to the site and are most likely to experience direct traffic effects, if any, from the Project (see Figure 1).

State Route 133 (SR-133) is a north-south freeway that runs between Laguna Beach, California, and Irvine. In the study area, SR-133 provides four general purpose travel lanes in both the northbound and southbound directions.

Interstate 5 (I-5) is a north-south freeway that runs between the Mexico border and the Oregon state line. In the study area, I-5 provides five general purpose travel lanes and one high occupancy vehicle lane in both the northbound and southbound directions.

Marine Way is an east-west roadway through Irvine. In the study area, the roadway generally provides one travel lane in each direction with turn pockets at intersections and driveways. The posted speed limit is 45 mph. No on-street parking is permitted on either side of the road.

Trabuco Road/Great Park Boulevard is an east-west roadway through Irvine. In the study area, the roadway generally provides three travel lanes in each direction with a raised median and turn pockets at intersections. The posted speed limit is 50 mph. No on-street parking is permitted on either side of the road.

Irvine Boulevard is an east-west roadway through Irvine that provides access to SR-133. In the study area, the roadway generally provides three travel lanes in each direction with a raised median and turn pockets at intersections. The posted speed limit is 55 mph. No on-street parking is permitted on either side of the road.

Portola Parkway is an east-west roadway through Irvine. In the study area, the roadway generally provides two travel lanes in each direction with a raised median and turn pockets at intersections. The posted speed limit is 55 mph. No on-street parking is permitted on either side of the road.

Sand Canyon Avenue is a north-south roadway through Irvine that provides access to I-5. In the study area, the roadway generally provides four travel lanes in each direction between Trabuco Road/Great Park

Boulevard and I-5, three travel lanes in each direction between Irvine Boulevard and Trabuco Road/Great Park Boulevard, and two travel lanes in each direction between Portola Parkway and Irvine Boulevard. A raised median and turn pockets are generally provided at intersections. The posted speed limit is 50 mph. No on-street parking is permitted on either side of the road.

Existing Pedestrian and Bicycle Facilities

Pedestrian facilities in the study area include sidewalks, crosswalks, and pedestrian signals. All the roadways in the study areas provide sidewalks or paths on both sides of the street. Sidewalks are not provided along SR-133 or I-5. At the signalized intersections in the study areas, crosswalks and pedestrian push-button actuated signals are provided. Figure 3 presents the following bicycle facilities in the study area, per the *California State Bicycle and Pedestrian Plan* (Caltrans, 2017) 3:

- **Bike paths (Class I)** – Bike paths provide a separate right-of-way and are designated for the exclusive use of people riding bicycles and walking with minimal crossflow traffic. Such paths can be well situated along creeks, canals, and rail lines. Class I Bikeways can also offer opportunities not provided by the road system by serving as both recreational areas and/or desirable commuter routes. Bike paths are provided along the following roadway segments.
    - Sand Canyon Avenue from Portola Parkway to I-5
    - Towngate from Hallmark to Crosspointe
    - Portola Parkway from Paragon to SR-133
    - Cypress Village Trail along I-5
- **Bike lanes (Class II)** – Bike lanes provide designated street space for bicyclists, typically adjacent to the outer vehicle travel lanes. Bike lanes include special lane markings, pavement legends, and signage. Bike lanes may be enhanced with painted buffers between vehicle lanes and/or parking, and green paint at conflict zones (such as driveways or intersections). The following roadway segments have Class II bike lanes.
    - Sand Canyon Avenue from Portola Parkway to I-5
    - Spring Meadows from Medallion to Coralwood
    - Towngate from Hallmark to Crosspointe
    - Roosevelt from Tulip to Sand Canyon Avenue
    - Marine Way from Sand Canyon to SR-133
    - Portola Parkway from Paragon to SR-133
    - Irvine Boulevard from Groveland to SR-133
    - Trabuco Road/Great Park Boulevard from Keystone to SR-133
    - Nightmist from Tulip to Sand Canyon Avenue

- **Bike routes (Class III)** – Bike routes provide enhanced mixed-traffic conditions for bicyclists through signage, striping, and/or traffic calming treatments, and to provide continuity to a bikeway network. Bike routes are typically designated along gaps between bike trails or bike lanes, or along low-volume, low-speed streets. There are no Class III facilities in the study areas.

- **Separated Bikeway (Class IV)** – Separated bikeways, also referred to as cycle tracks or protected bikeways, are bikeways for the exclusive use of bicycles which are physically separated from vehicle traffic. Separated Bikeways were recently adopted by Caltrans in 2015. Types of separation may include, but are not limited to, grade separation, flexible posts, physical barriers, or on-street parking. There are no Class IV facilities in the study areas.

Existing Transit Service

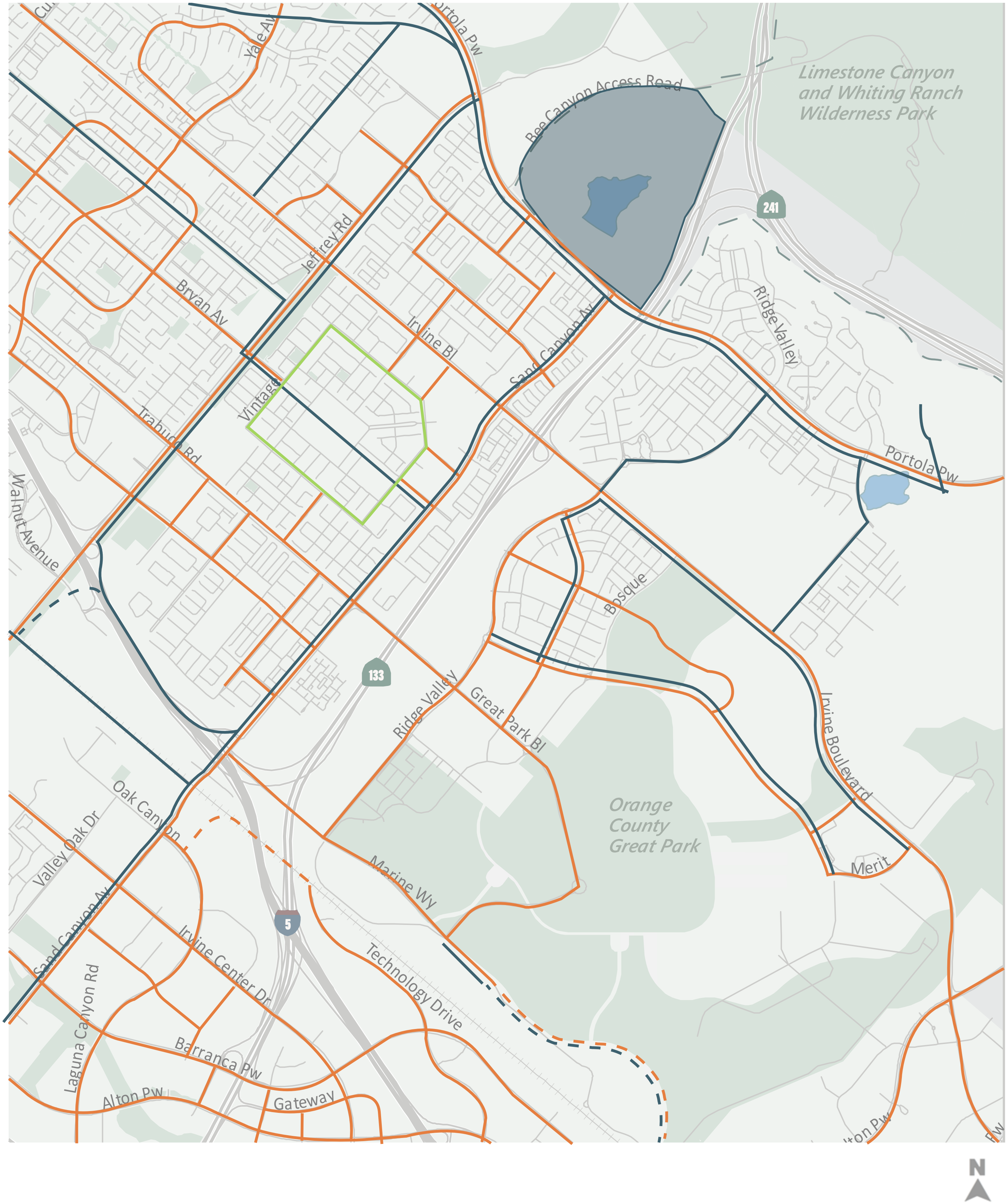
Transit service in the study areas is provided by Orange County Transit Authority (OCTA). OCTA operates Routes 83 and 206 along I-5 in the study area. These routes provide regional service but have no stops in the study area.

Existing Traffic Counts

Due to the COVID-19 pandemic in 2020, travel activity and traffic volumes in the existing year of analysis were substantially decreased throughout the study area and Southern California. It was not possible to collect counts that represented existing traffic conditions. A baseline condition that reflected travel activity and traffic volume prior to the COVID-19 pandemic was developed for the intersection analysis. Historical AM and PM peak hour turning movement counts collected at the study intersection in 2018 provided by the City of Irvine. Each of these counts were grown by 2% per year from their respective count year to the established baseline year of 2020. Peak hour intersection volumes are summarized on Figure 4 along with existing lane configurations and traffic controls. The traffic counts from 2018 are provided in Appendix B.

Existing Operations Analysis

Existing intersection operations were evaluated using the methods described in Chapter 1 for the weekday AM and PM peak hours at the study intersections. The analysis was based on the volumes, lane configurations, and traffic control presented on Figure 4. Detailed intersection LOS calculation worksheets are presented in Appendix C. As shown in Table 2, all signalized study intersections currently operate at LOS C or better in both the AM and PM peak hours.

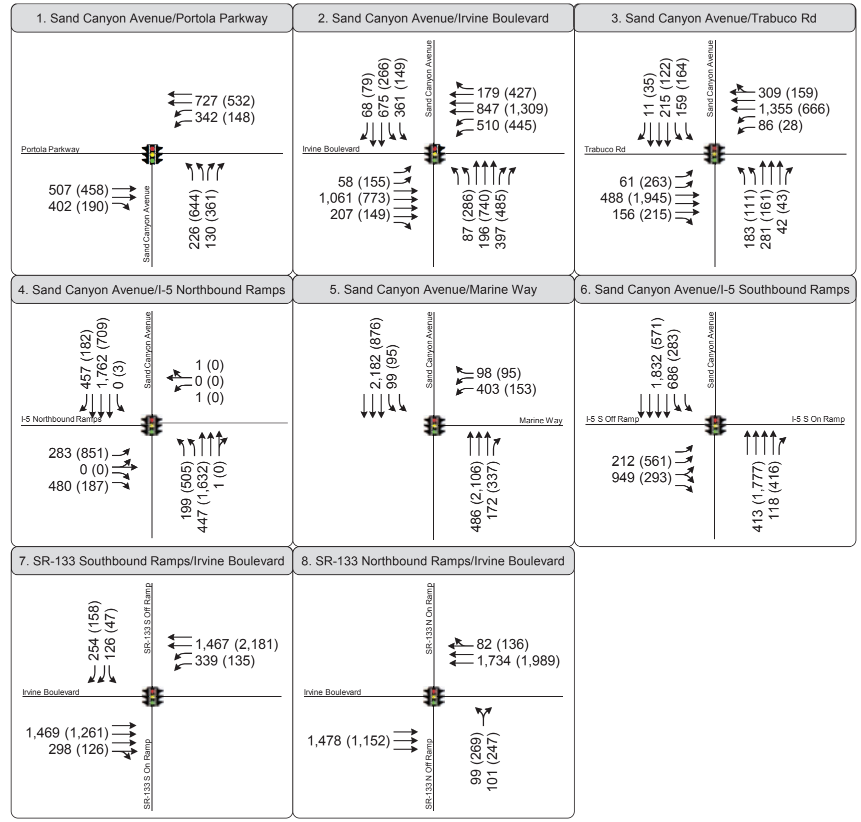


Legend

- Project Site Syphon Reservoir
- On-Street Bikeway
- Planned On-Street Bikeway
- On-Street Bikeway on One Side of the Road
- Off-Street Bikeway
- Planned Off-Street Bikeway

Figure 3

Bicycle Facilities



Legend
- Study Intersections
- Project Site Syphon Reservoir
- XX(XX) AM(PM)

Figure 4
Existing Peak Hour
Traffic Volumes, Lane Configurations, and Traffic Control

TABLE 2
EXISTING
INTERSECTION LEVEL OF SERVICE

ID	N/S Street Name	E/W Street Name	Control Type	Time Period	Existing Conditions	
					V/C	LOS
1	Sand Canyon Avenue	Portola Parkway	Signalized	AM PM	0.366 0.418	A A
2	Sand Canyon Avenue	Irvine Boulevard	Signalized	AM PM	0.580 0.541	A A
3	Sand Canyon Avenue	Trabuco Road	Signalized	AM PM	0.496 0.519	A A
4	Sand Canyon Avenue	I-5 Northbound Ramps	Signalized	AM PM	0.538 0.622	A B
5	Sand Canyon Avenue	Marine Way	Signalized	AM PM	0.596 0.547	A A
6	Sand Canyon Avenue	I-5 Southbound Ramps	Signalized	AM PM	0.600 0.520	A A
7	SR-133 Southbound Ramps	Irvine Boulevard	Signalized	AM PM	0.556 0.738	A C
8	SR-133 Northbound Off-Ramp	Irvine Boulevard	Signalized	AM PM	0.465 0.625	A B

4. Performance Criteria

The determination of significance for Project impacts is based on applicable policies, regulations, goals, and guidelines defined by the City of Irvine. The proposed impact criteria for this study are presented below.

Vehicle Miles Traveled Impact Thresholds

On June 23, 2020, the City of Irvine adopted the *CEQA VMT Impact Analysis Guidelines*. These guidelines identify the screening criteria, analysis requirements, thresholds, and mitigation options for VMT analysis associated with the operation of new projects in the City of Irvine. The City of Irvine has not provided guidance regarding VMT thresholds for construction related traffic. The screening opportunities and VMT thresholds identified below are documented in the *CEQA VMT Impact Analysis Guidelines* and were utilized as part of the analysis and performance criteria for the Project.

Construction-related traffic is typically considered to cause adverse but not lasting intersection deficiencies because, while sometimes inconvenient, construction-related traffic effects are temporary. However, in an effort to document potential impacts related to the Project, the City of Irvine VMT impact thresholds were applied to the Project.

Screening

If the analysis of environmental impacts related to transportation (i.e., VMT impact analysis) is required for a discretionary project, but if it can be demonstrated that the project meets any one of the following four screening criteria, then no further VMT impact analysis is required:

1. The project results in a net increase of 250 or fewer weekday daily trips.
2. The project is located in a Transit Priority Area[1]
3. The project is 100-percent restricted affordable housing units
4. The project is locally serving such as 100,000 square feet or less of retail use, a daycare use or a locally serving public school

[1] A Transit Priority Area (TPA) is defined as within half-mile distance of existing rail transit station or located within half-mile of two or more existing bus routes with a frequency of service interval of 15 minutes or less during morning and evening peak hours.

Thresholds of Significance

The City's identified significance criteria is for the operation of new projects to generate 15 percent less VMT per capita (or per employee) compared to existing conditions, which is consistent with the OPR Technical Advisory recommendations. City staff will periodically update the VMT thresholds based on the latest calibrated and validated City VMT traffic model. Any technical updates to the VMT significance thresholds are subject to the approval of the Transportation Commission at the recommendation of the Director of Public Works and Transportation.

The table below identifies the existing residential VMT per capita and the non-residential VMT per employee, as well as the proposed residential VMT per capita and non-residential VMT per employee significance thresholds, as documented in the *CEQA VMT Impact Analysis Guidelines*. The residential significance threshold is based on the countywide residential VMT divided by the countywide population, while the non-residential significance threshold is based on the countywide commute and other (i.e., customer and client) VMT divided by the number of countywide employees.

Land Use Type	Existing	Significance Threshold* (15 percent reduction)
Residential (VMT per population)	17.5	14.9
Non-Residential (VMT per employee)	48.8	41.5

* Any technical updates to the VMT significance thresholds are subject to the approval of the Transportation Commission at the recommendation of the Director of Public Works and Transportation.
Source: *CEQA VMT Impact Analysis Guidelines* (City of Irvine, April 2020)

If the project VMT rate exceeds the respective threshold, then the project creates a significant impact. When a project results in a significant VMT impact, it must identify the mitigation measures to reduce the impact to a level that meets the City's adopted VMT threshold. All feasible mitigation measures must be incorporated into the project to substantially reduce the impact even if the project cannot meet the adopted VMT threshold.

Signalized Intersections Deficiencies

Construction-related traffic is typically considered to cause adverse but not lasting intersection deficiencies because, while sometimes inconvenient, construction-related traffic effects are temporary. However, in an effort to document potential intersection deficiencies related to the Project, City of Irvine intersection criteria was applied to all signalized intersections. A signalized intersection is considered to be deficient if one of the following criteria is met.

- A location is at acceptable LOS in the baseline condition and the project causes the location to become deficient; or
- A location at unacceptable LOS in the baseline condition and the project causes the location to further deteriorate by two percent or more (i.e. 0.02 v/c ratio change).

According to the *City of Irvine Traffic Study Guidelines*, LOS E shall be considered acceptable for links and intersections in accordance with the City's General Plan Objective B-1. LOS D shall be considered acceptable for all other areas of the City. Based on these criteria, all study intersections will be identified as operating acceptably if they are at or better than LOS D.

For intersection analysis, if an intersection is determined to be deficient based on the criteria above, then the project will be required to improve the intersection, at a minimum, back to the baseline condition.

5. Project Characteristics

Trip Generation

Construction of the Project is estimated to be approximately 41 months, depending on weather conditions and other variables. Construction is currently anticipated to begin in the Fall of 2022. Most construction activities would be limited to 7:00 AM to 7:00 PM Monday through Friday. Construction of the Project would include activities implemented in phases as outlined below.

- Access Routes/Intersection Improvements
- Excavation of Sediment/Existing Dam
- Construction of Dam/Spillway/Reservoir
- Construction of Filtration/Chlor/Dechlor Facilities
- Wetlands/Riparian Installation
- Installation of Recreation Facilities
- Demobilization

Construction Vehicle Type

Haul Trucks

Hauling hours are anticipated to be 7:00 AM to 3:00 PM on weekdays. During the peak trip period, approximately 52 material delivery trucks would enter and exit the site per workday for approximately twelve months. During other times of construction, material deliveries would be expected in the range of 5 to 10 material delivery trucks per day. These trucks are assumed to arrive and depart evenly between 7:00 AM and 3:00 PM during an 8-hour shift.

Equipment and Delivery Trucks

In addition to haul trucks, the site is also expected to generate equipment and delivery trucks during each phase of construction. These materials would be delivered to the site and stored on-site. These deliveries are expected to occur in a variety of vehicles including small delivery trucks to cement mixer trucks and 18-wheel trucks. Additionally, construction equipment would also have to be delivered to the site. This equipment could include bulldozers, excavators, and other large items of machinery. Most of the heavy equipment is expected to be transported to the site on large trucks such as 18-wheelers or other similar vehicles. These trucks are assumed to arrive and depart evenly between 7:00 AM and 3:00 PM during an 8-hour shift.

Employee Vehicles

The number of construction workers would vary throughout the construction period. Parking for all construction workers would be provided on-site. Construction workers are assumed to arrive in single occupant vehicles.

Construction Period Trip Generation

Based on the aforementioned information, a construction period trip generation analysis was conducted to estimate daily, morning, and evening peak hour trips of the phase with the highest trip generation potential. As seen in Table 3, the construction of Dam/Spillway/Reservoir phase represents the day with the highest trip generation potential with approximately 116 vehicles.

Construction workers often travel to and from a worksite outside of the typical peak commute hours. Construction hours are anticipated to occur from 7:00 AM to 7:00 PM, with most worker trips and truck trips anticipated to occur outside of the AM and PM peak hours. For the purpose of the analysis, it was assumed that up to 40% of the construction workers would arrive at the construction site during the peak morning commute hour and up to 40% would depart the construction site during the peak evening commute hour. Equipment trucks were assumed to arrive and depart evenly between 7:00 AM and 3:00 PM during an 8-hour shift.

Table 3 presents a summary of the construction trip generation on a peak day. As shown, on a peak construction activity day, approximately 232 daily trips are estimated, of which 36 trips (27 inbound/9 outbound) would occur during the AM peak hour and 18 trips (0 inbound/18 outbound) would occur during the PM peak hour. For the purpose of the intersection LOS analysis, the trip generation estimates were converted to Passenger Car Equivalent (PCE) trips. PCE reflects the additional effect larger vehicles have on intersection operations based on their larger size. A PCE factor of 1.0 was assumed for worker vehicles and a PCE factor of 3.0 was assumed for all construction trucks, based on the *Highway Capacity Manual 6th Edition (HCM)* (Transportation Research Board, 2017). As shown in Table 3, on a peak construction activity day, approximately 512 daily PCE trips are estimated, of which 72 PCE trips (45 inbound/27 outbound) would occur during the AM peak hour and 18 PCE trips (0 inbound/18 outbound) would occur during the PM peak hour.

This trip generation is anticipated to occur for approximately two to three months. Trip generation outside of this phase would be reduced with approximately 30 daily to 154 daily trips being generated.

Trip Distribution and Assignment

Four routes are proposed for the Project.

- Route 1A – I-5 (from the north), north on Sand Canyon Avenue for trucks traveling inbound and southbound on Sand Canyon Avenue to I-5 (to the north) for trucks traveling outbound.
- Route 1B – I-5 (from the south), north on Sand Canyon Avenue for trucks traveling inbound and southbound on Sand Canyon Avenue to I-5 (to the south) for trucks traveling outbound.
- Route 2A – SR-133 (from the north), west on Irvine Boulevard, and north on Sand Canyon Avenue for trucks traveling inbound and southbound on Sand Canyon Avenue and east on Irvine Boulevard to SR-133 (to the north) for trucks traveling outbound.
- Route 2B – SR-133 (from the south), west on Irvine Boulevard, and north on Sand Canyon Avenue for trucks traveling inbound and southbound on Sand Canyon Avenue and east on Irvine Boulevard to SR-133 (to the south) for trucks traveling outbound.

Figure 5 shows the distribution and assignment of the four routes studied. Figure 6a – Figure 6d shows the study intersection turning movement volumes of the Project trips for each route.

Timeline

The proposed Project is assumed to be operational by end of 2026.

TABLE 3
CONSTRUCTION TRIP GENERATION

Phase	Duration (Months)	Peak Day Activity Under Each Phase			Total Vehicles	Total Daily Vehicle Trips
		Haul Trucks	Equipment and Delivery Trucks	Employee Vehicles		
Access Routes/Intersection Improvements	5	8	3	10	21	42
Excavation of Sediment/ Existing Dam	6.6	0	6	31	37	74
Construction of Dam/Spillway/Reservoir	13.8	52	18	46	116	232
Construction of Filtration/Chlor/Dechlor Facility	12	0	29	48	77	154
Wetlands/Riparian Installation	12	0	5	20	25	50
Installation of Recreation Facilities	3	0	5	10	15	30
Demobilization	1	0	7	15	22	44

Construction of Dam/Spillway/Reservoir Trip Generation							
Trip Type	Daily Trips [a]	Morning Peak Hour Trips			Evening Peak Hour Trips		
		In	Out	Total	In	Out	Total
Haul Truck Trips [b]	104	7	7	14	0	0	0
Delivery and Equipment Truck Trips [b]	36	2	2	4	0	0	0
Construction Worker Trips [c]	92	18	0	18	0	18	18
Phase Total	**232**	**27**	**9**	**36**	**0**	**18**	**18**

Construction of Dam/Spillway/Reservoir Trip Generation							
Trip Type and Passenger Car Equivalency	Daily Trips [a]	Morning Peak Hour Trips			Evening Peak Hour Trips		
		In	Out	Total	In	Out	Total
Haul Truck Trips PCE: 3.0	312	21	21	42	0	0	0
Delivery and Equipment Truck Trips PCE: 3.0	108	6	6	12	0	0	0
Construction Worker Trips PCE: 1.0	92	18	0	18	0	18	18
PCE Phase Total	**512**	**45**	**27**	**72**	**0**	**18**	**18**

Notes:

[a] - Daily trips were calculated by counting two trips, one inbound and one outbound trip for each vehicle

[b] - Daily haul and delivery/equipment truck trips were assumed to occur evenly throughout an 8-hour construction day. Therefore, the daily truck trips were divided by 8 hours to calculate morning and evening peak hour truck trips.

[c] - Up to 40% of the construction workers were assumed to arrive during the morning peak hour of adjacent street traffic. A total of up to 40% worker were assumed to depart during the evening peak hour.

Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

N

Legend

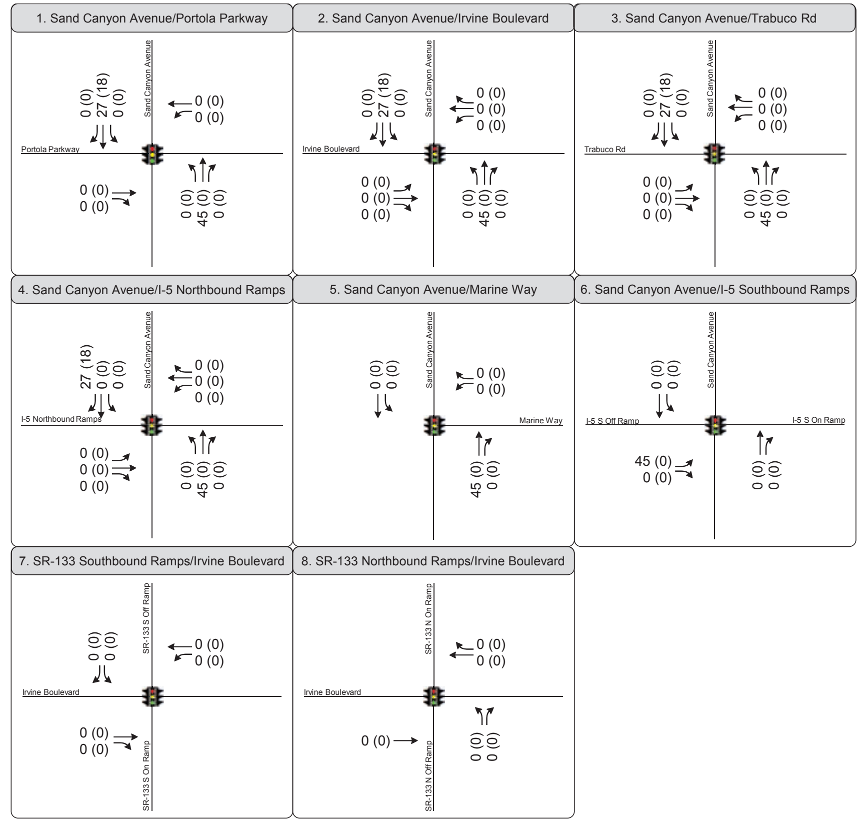
Project Site Syphon Reservoir

Route 1A
Route 1B
Route 2A
Route 2B

Figure 5

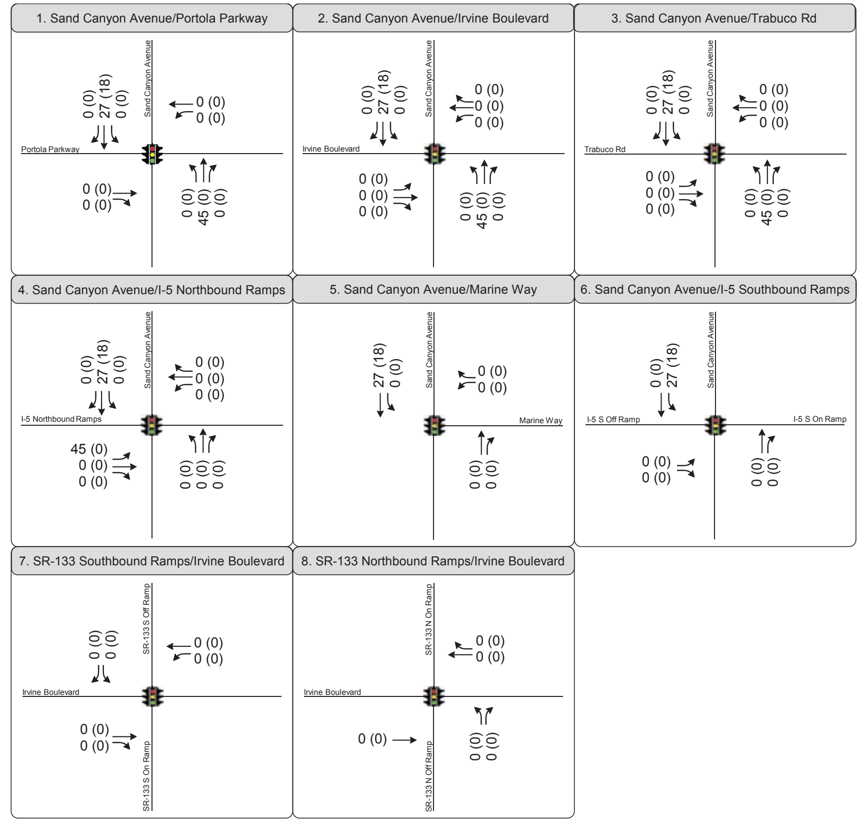
Distribution and Assignment

Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway



Legend
Study Intersections
Project Site Syphon Reservoir
XX(XX) AM(PM)

Figure 6a
Project Only (Route 1A) Peak Hour Traffic Volumes and Traffic Control



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend

Study Intersections

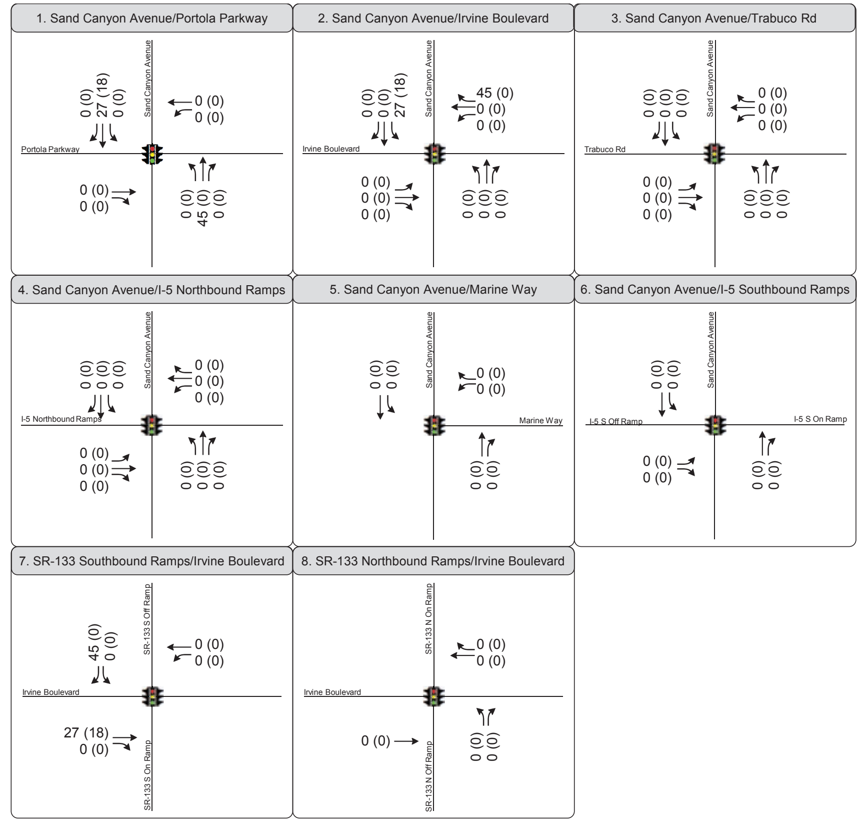
Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 6b

Project Only (Route 1B) Peak Hour Traffic Volumes and Traffic Control

Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway



Legend
Study Intersections
Project Site Syphon Reservoir
XX(XX) AM(PM)

Figure 6c
Project Only (Route 2A) Peak Hour Traffic Volumes and Traffic Control

Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend

Study Intersections

Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 6d

Project Only (Route 2B) Peak Hour Traffic Volumes and Traffic Control

6. Existing Plus Project Conditions

This chapter evaluates potential off-site intersection deficiencies under Existing Plus Project conditions.

Traffic Volumes

The Project traffic volumes on Figure 6a through Figure 6d were added to the existing traffic volumes from Figure 4 to estimate the Existing Plus Project traffic volumes for each route, as shown on Figure 7a through Figure 7d.

Intersection Improvements

All Existing Plus Project scenarios intersection lane configurations are assumed to include buildout of a private roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site. This improvement assumes the northbound approach at Sand Canyon Avenue and Portola Parkway is modified from two left-turn lanes and two right-turn lanes to one left-turn lane, one shared through/left-turn lane, and two right-turn lanes. The southbound approach will be constructed with one shared left/through/right-turn lane. Split phasing (a traffic signal operation that gives a green phase for all vehicle movements of one direction followed by a green phase for all movements of the opposite direction) would be incorporated for the northbound and new southbound approaches during construction and typical operations.

Intersection Operations

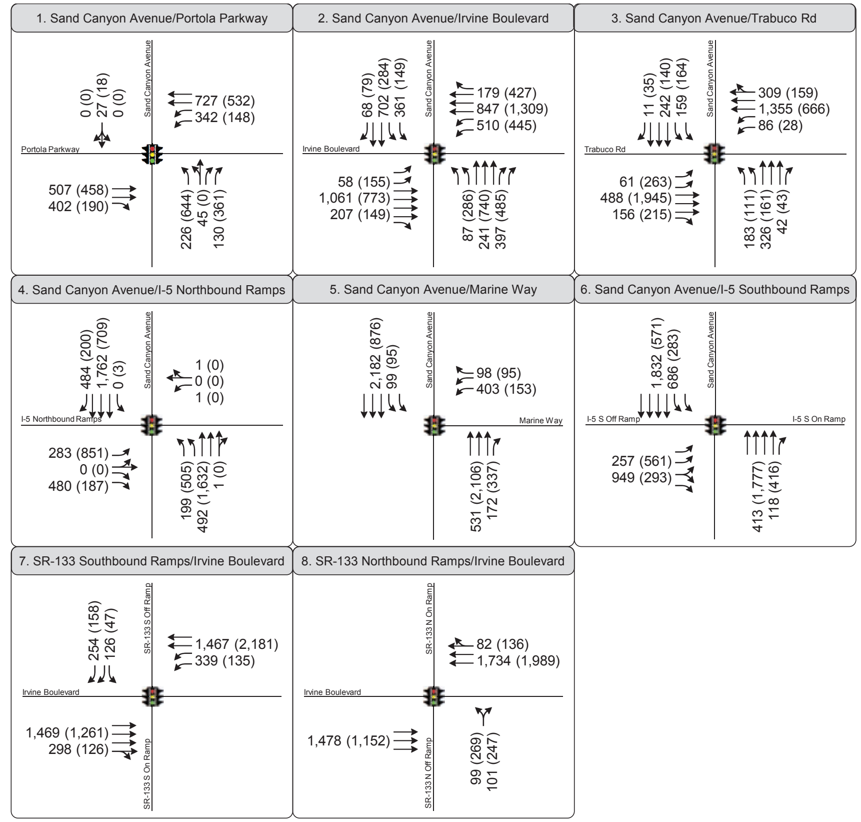
Existing Plus Project intersection operations were evaluated using the methods described in Chapter 1. All the Existing Plus Project analysis results for each route are presented in Table 4, based on the traffic volumes presented on Figure 7a through Figure 7d. As shown, all routes would have each signalized study intersections operate at LOS C or better in both the AM and PM peak hours.

Intersection Deficiencies

As presented in Table 4, after applying the intersection deficiency criteria, it was determined none of the route options would have a deficient intersection under the Existing Plus Project condition.

Recommended Improvements

There are no intersection deficiencies under Existing Plus Project condition. No intersection improvements are required.



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend

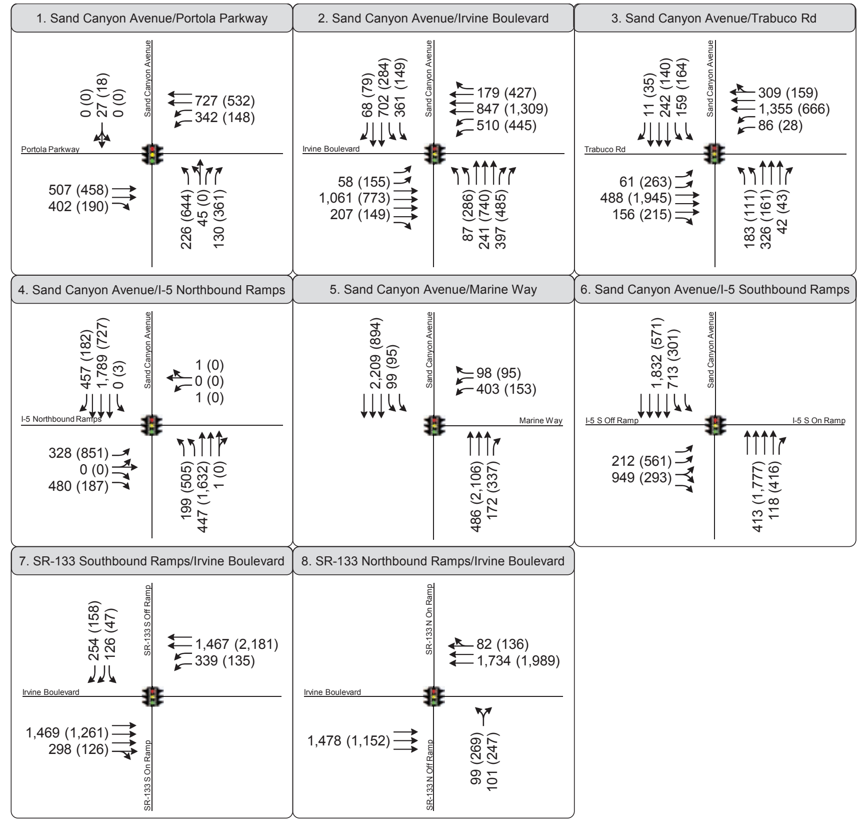
Study Intersections

Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 7a

Existing Plus Project (Route 1A) Peak Hour Traffic Volumes, Lane Configurations, and Traffic Control



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend

Study Intersections

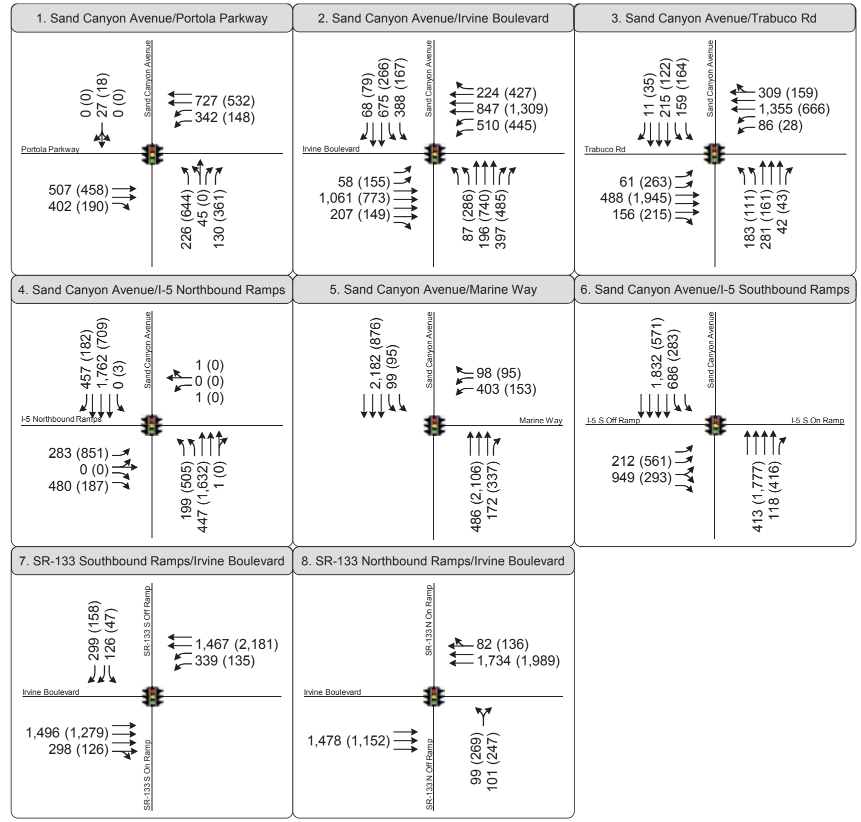
Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 7b

Existing Plus Project (Route 1B) Peak Hour

Traffic Volumes, Lane Configurations, and Traffic Control



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend

Study Intersections

Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 7c

Existing Plus Project (Route 2A) Peak Hour

Traffic Volumes, Lane Configurations, and Traffic Control

Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend
- Study Intersections
- Project Site Syphon Reservoir
- XX(XX) AM(PM)

Figure 7d
Existing Plus Project (Route 2B) Peak Hour
Traffic Volumes, Lane Configurations, and Traffic Control

TABLE 4
EXISTING PLUS PROJECT (ALL ROUTE OPTIONS)
INTERSECTION LEVEL OF SERVICE

ID	N/S Street Name	E/W Street Name	Control Type	Time Period	Existing Conditions		Existing Plus Project (Route 1A)				Existing Plus Project (Route 1B)				Existing Plus Project (Route 2A)				Existing Plus Project (Route 2B)			
					V/C	LOS	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient
1	Sand Canyon Avenue	Portola Parkway	Signalized	AM	0.366	A	0.396	A	0.030	No	0.396	A	0.030	No	0.396	A	0.030	No	0.396	A	0.030	No
				PM	0.418	A	0.429	A	0.011	No	0.429	A	0.011	No	0.429	A	0.011	No	0.429	A	0.011	No
2	Sand Canyon Avenue	Irvine Boulevard	Signalized	AM	0.580	A	0.588	A	0.008	No	0.588	A	0.008	No	0.580	A	0.000	No	0.580	A	0.000	No
				PM	0.541	A	0.541	A	0.000	No	0.541	A	0.000	No	0.546	A	0.005	No	0.546	A	0.005	No
3	Sand Canyon Avenue	Trabuco Road	Signalized	AM	0.496	A	0.505	A	0.009	No	0.505	A	0.009	No	0.496	A	0.000	No	0.496	A	0.000	No
				PM	0.519	A	0.519	A	0.000	No	0.519	A	0.000	No	0.519	A	0.000	No	0.519	A	0.000	No
4	Sand Canyon Avenue	I-5 Northbound Ramps	Signalized	AM	0.538	A	0.538	A	0.000	No	0.556	A	0.018	No	0.538	A	0.000	No	0.538	A	0.000	No
				PM	0.622	B	0.622	B	0.000	No	0.622	B	0.000	No	0.622	B	0.000	No	0.622	B	0.000	No
5	Sand Canyon Avenue	Marine Way	Signalized	AM	0.596	A	0.596	A	0.000	No	0.602	B	0.006	No	0.596	A	0.000	No	0.596	A	0.000	No
				PM	0.547	A	0.547	A	0.000	No	0.547	A	0.000	No	0.547	A	0.000	No	0.547	A	0.000	No
6	Sand Canyon Avenue	I-5 Southbound Ramps	Signalized	AM	0.600	A	0.600	A	0.000	No	0.608	B	0.008	No	0.600	A	0.000	No	0.600	A	0.000	No
				PM	0.520	A	0.520	A	0.000	No	0.525	A	0.005	No	0.520	A	0.000	No	0.520	A	0.000	No
7	SR-133 Southbound Ramps	Irvine Boulevard	Signalized	AM	0.556	A	0.556	A	0.000	No	0.556	A	0.000	No	0.569	A	0.013	No	0.569	A	0.013	No
				PM	0.738	C	0.738	C	0.000	No	0.738	C	0.000	No	0.738	C	0.000	No	0.738	C	0.000	No
8	SR-133 Northbound Off-Ramp	Irvine Boulevard	Signalized	AM	0.465	A	0.465	A	0.000	No	0.465	A	0.000	No	0.465	A	0.000	No	0.491	A	0.026	No
				PM	0.625	B	0.625	B	0.000	No	0.625	B	0.000	No	0.625	B	0.000	No	0.625	B	0.000	No

7. Short-Term Interim Year Conditions

This chapter evaluates the Short-Term Interim Year Conditions.

Future Traffic Forecasts

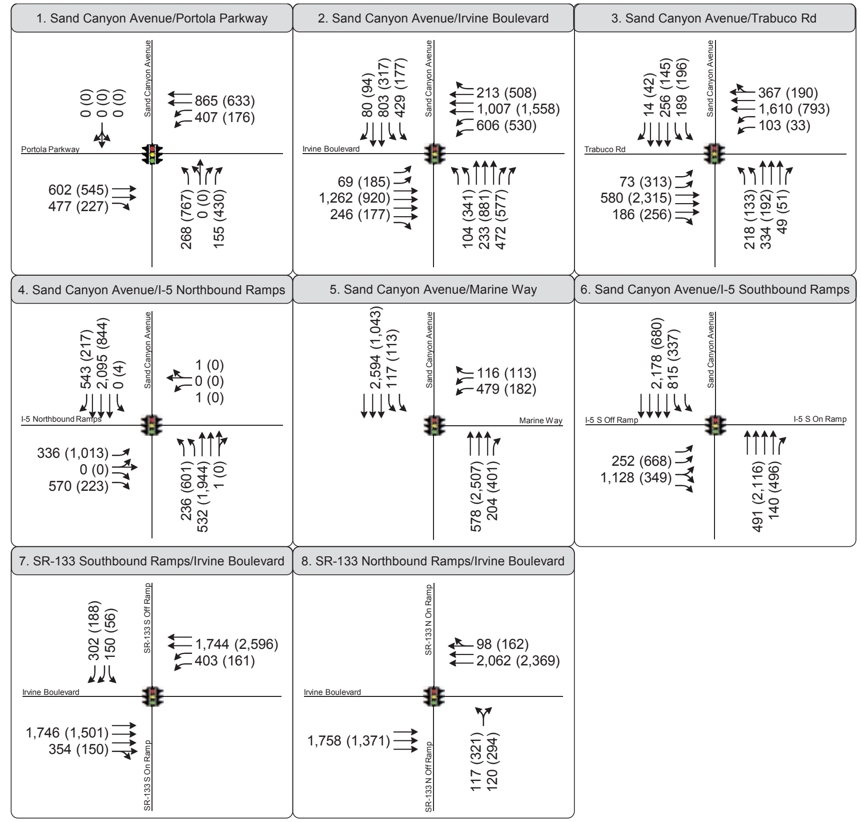
Per the approved scope of work, the Project is required to study the Short-Term Interim Year Approved and Short-Term Interim Year Pending scenarios from ITAM. ITAM forecasts for the base year and both short-term interim year scenarios were provided by the City of Irvine. These scenarios were used to determine growth rates on a per year basis that were applied to the 2020 existing intersection volumes to develop Short-Term Interim Year Approved and Pending intersection volumes. Study intersection volumes Short-Term Interim Year Approved are provided in Figure 8 and study intersection volumes Short-Term Interim Year Pending are provided in Figure 9.

Intersection Improvements

Both Short-Term Interim Year scenarios intersection lane configurations are assumed to include the same lane geometry as the Existing Conditions.

Intersection Operations

Short-Term Interim Year intersection operations were evaluated using the methods described in Chapter 1. The Short-Term Interim Year Approved analysis results are presented in Table 5. As shown, all signalized intersections operate at LOS D or better in both the AM and PM peak hours. The Short-Term Interim Year Pending analysis results are presented in Table 6. As shown, all signalized intersections operate at LOS D or better in both the AM and PM peak hours.

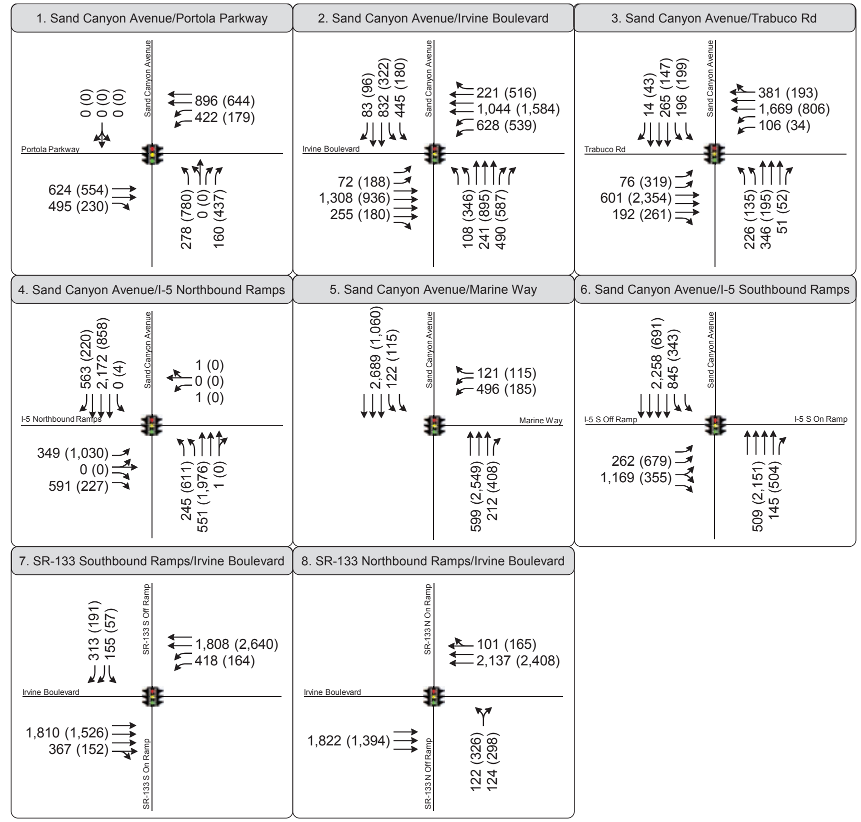


Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend
- Study Intersections
- Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 8
Short-Term Interim Year Approved Peak Hour
Traffic Volumes, Lane Configurations, and Traffic Control



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend

- Study Intersections
- Project Site Syphon Reservoir
- XX(XX) AM(PM)

Figure 9
Short-Term Interim Year Pending Peak Hour
Traffic Volumes, Lane Configurations, and Traffic Control

TABLE 5
SHORT-TERM YEAR APPROVED
INTERSECTION LEVEL OF SERVICE

ID	N/S Street Name	E/W Street Name	Control Type	Time Period	Short-Term Approved Conditions	
					V/C	LOS
1	Sand Canyon Avenue	Portola Parkway	Signalized	AM	0.426	A
				PM	0.488	A
2	Sand Canyon Avenue	Irvine Boulevard	Signalized	AM	0.681	B
				PM	0.635	B
3	Sand Canyon Avenue	Trabuco Road	Signalized	AM	0.580	A
				PM	0.609	B
4	Sand Canyon Avenue	I-5 Northbound Ramps	Signalized	AM	0.630	B
				PM	0.731	C
5	Sand Canyon Avenue	Marine Way	Signalized	AM	0.700	B
				PM	0.641	B
6	Sand Canyon Avenue	I-5 Southbound Ramps	Signalized	AM	0.704	C
				PM	0.610	B
7	SR-133 Southbound Ramps	Irvine Boulevard	Signalized	AM	0.652	B
				PM	0.869	D
8	SR-133 Northbound Off-Ramp	Irvine Boulevard	Signalized	AM	0.544	A
				PM	0.735	C

TABLE 6
SHORT-TERM YEAR PENDING
INTERSECTION LEVEL OF SERVICE

ID	N/S Street Name	E/W Street Name	Control Type	Time Period	Short-Term Pending Conditions V/C	Short-Term Pending Conditions LOS
1	Sand Canyon Avenue	Portola Parkway	Signalized	AM	0.439	A
				PM	0.495	A
2	Sand Canyon Avenue	Irvine Boulevard	Signalized	AM	0.704	C
				PM	0.644	B
3	Sand Canyon Avenue	Trabuco Road	Signalized	AM	0.600	A
				PM	0.618	B
4	Sand Canyon Avenue	I-5 Northbound Ramps	Signalized	AM	0.651	B
				PM	0.743	C
5	Sand Canyon Avenue	Marine Way	Signalized	AM	0.723	C
				PM	0.651	B
6	Sand Canyon Avenue	I-5 Southbound Ramps	Signalized	AM	0.728	C
				PM	0.619	B
7	SR-133 Southbound Ramps	Irvine Boulevard	Signalized	AM	0.674	B
				PM	0.883	D
8	SR-133 Northbound Off-Ramp	Irvine Boulevard	Signalized	AM	0.562	A
				PM	0.746	C

8. Short-Term Interim Year Plus Project Conditions

This chapter evaluates the potential off-site intersection deficiencies under Short-Term Interim Year Plus Project conditions.

Future Traffic Forecasts

The Project traffic volumes from Figure 6a through Figure 6d were added to the Short-Term Interim Year Approved traffic volumes from Figure 8 to estimate the Short-Term Interim Year Approved plus Project traffic volumes, as shown on Figure 10a through Figure 10d.

The Project traffic volumes from Figure 6a through Figure 6d were added to the Short-Term Interim Year Pending traffic volumes from Figure 9 to estimate the Short-Term Interim Year Pending plus Project traffic volumes, as shown on Figure 11a through Figure 11d.

Intersection Improvements

All Short-Term Interim Year Approved plus Project and Short-Term Interim Year Pending plus Project scenarios intersection lane configurations are assumed to include buildout of a private roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site. This improvement assumes the northbound approach at Sand Canyon Avenue and Portola Parkway is modified from two left-turn lanes and two right-turn lanes to one left-turn lane, one shared through/left-turn lane, and two right-turn lanes. The southbound approach will be constructed with one shared left/through/right-turn lane. Split phasing (a traffic signal operation that gives a green phase for all vehicle movements of one direction followed by a green phase for all movements of the opposite direction) would be incorporated for the northbound and new southbound approaches during construction and typical operations.

Intersection Operations

Short-Term Interim Year Approved plus Project and Short-Term Interim Year Pending plus Project intersection operations were evaluated using the methods described in Chapter 1. All the Short-Term Interim Year Approved plus Project analysis results for each route are presented in Table 7, based on the traffic volumes presented on Figure 10a through Figure 10d. As shown, all routes would have each signalized study intersections operate at LOS D or better in both the AM and PM peak hours. All the Short-Term

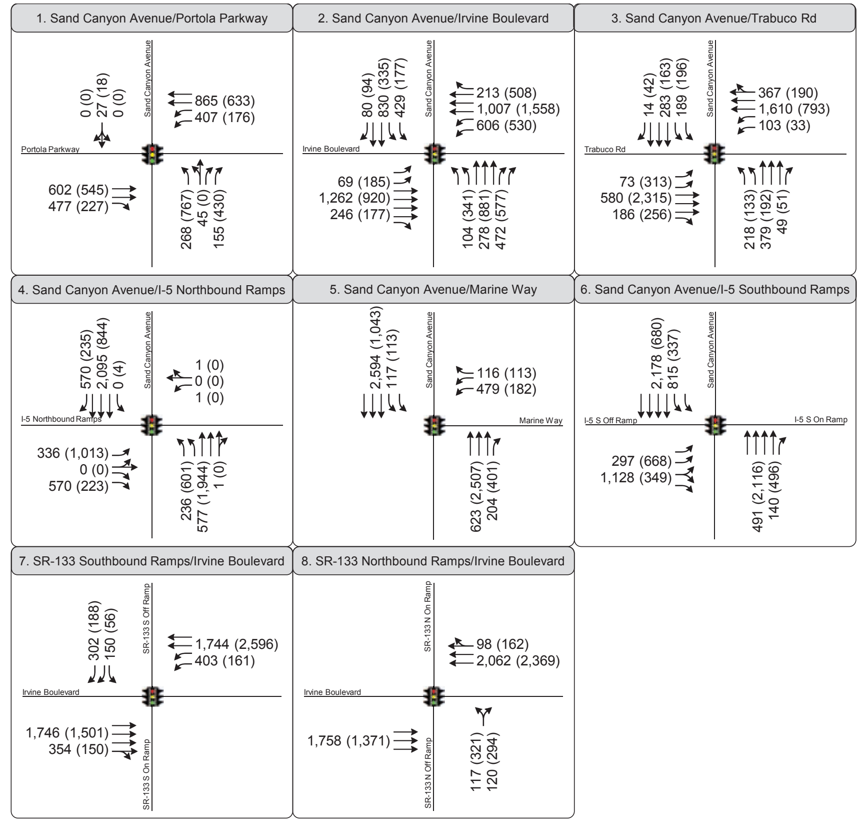
Interim Year Pending plus Project analysis results for each route are presented in Table 8, based on the traffic volumes presented on Figure 11a through Figure 11d. As shown, all routes would have each signalized study intersections operate at LOS D or better in both the AM and PM peak hours.

Intersection Deficiencies

As presented in Table 7, after applying the intersection deficiency criteria, it was determined none of the route options would have a deficient intersection under the Short-Term Interim Year Approved plus Project condition. As presented in Table 8, after applying the intersection deficiency criteria, it was determined none of the route options would have a deficient intersection under the Short-Term Interim Year Pending plus Project condition.

Recommended Improvements

There are no intersection deficiencies under either the Short-Term Interim Year Approved plus Project condition or the Short-Term Interim Year Pending plus Project conditions. No intersection improvements are required.



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

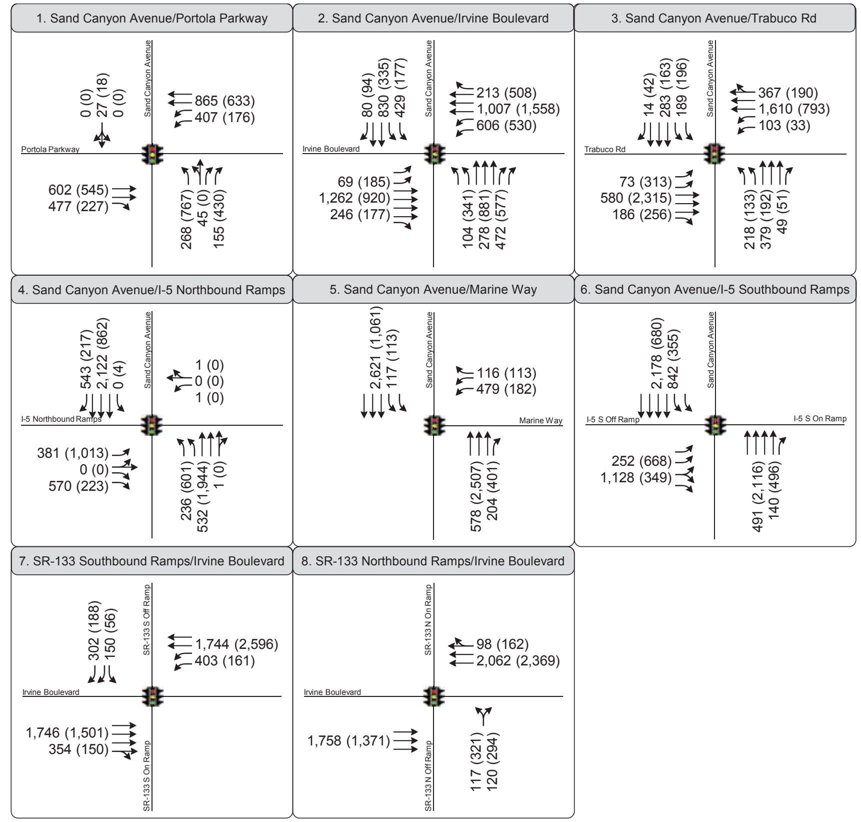
Legend

- Study Intersections
- Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 10a

Short-Term Interim Year Approved Plus Project (Route 1A) Peak Hour Traffic Volumes, Lane Configurations, and Traffic Control



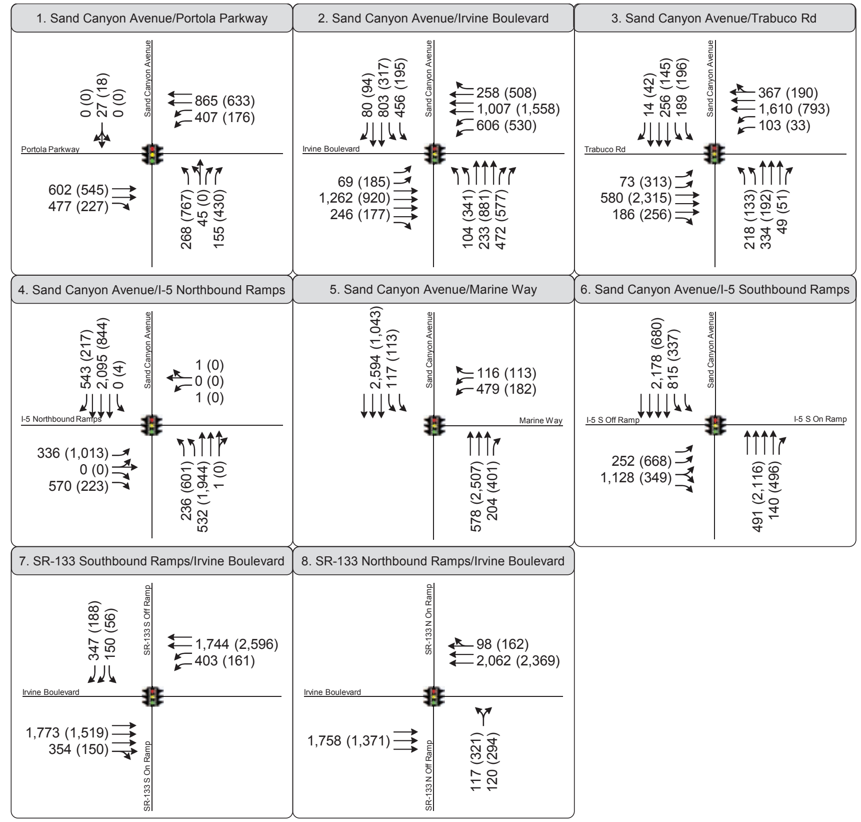
Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend

- Study Intersections
- Project Site Syphon Reservoir

XX(XX) AM(PM)

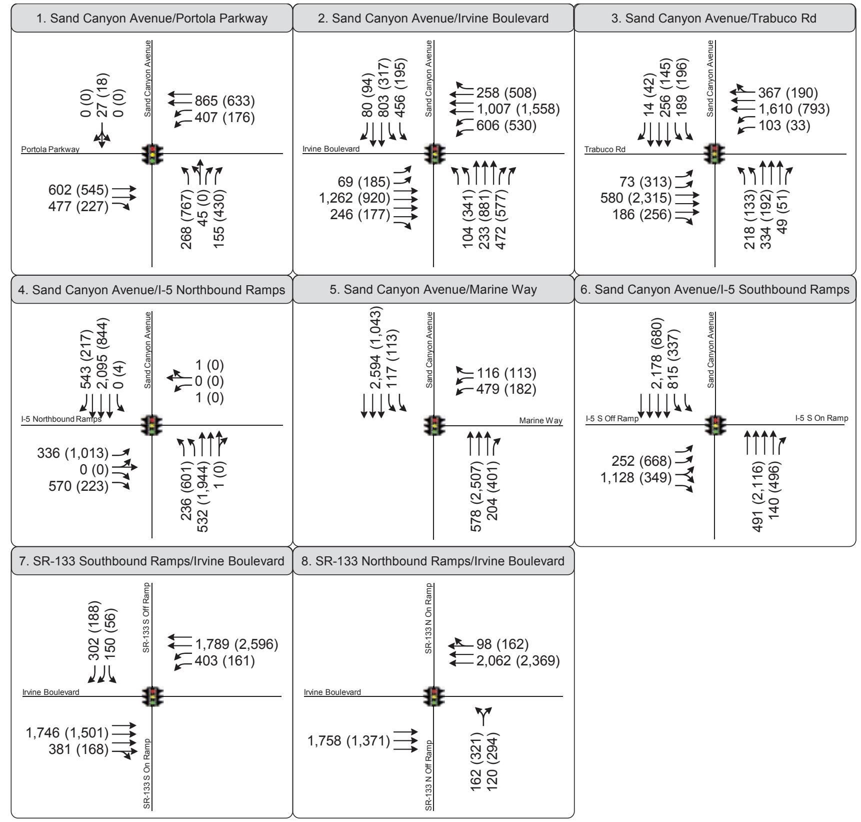
Figure 10b
Short-Term Interim Year Approved Plus Project (Route 1B) Peak Hour Traffic Volumes, Lane Configurations, and Traffic Control



Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend
Study Intersections
Project Site Syphon Reservoir
XX(XX) AM(PM)

Figure 10c
Short-Term Interim Year Approved Plus Project (Route 2A) Peak Hour Traffic Volumes, Lane Configurations, and Traffic Control



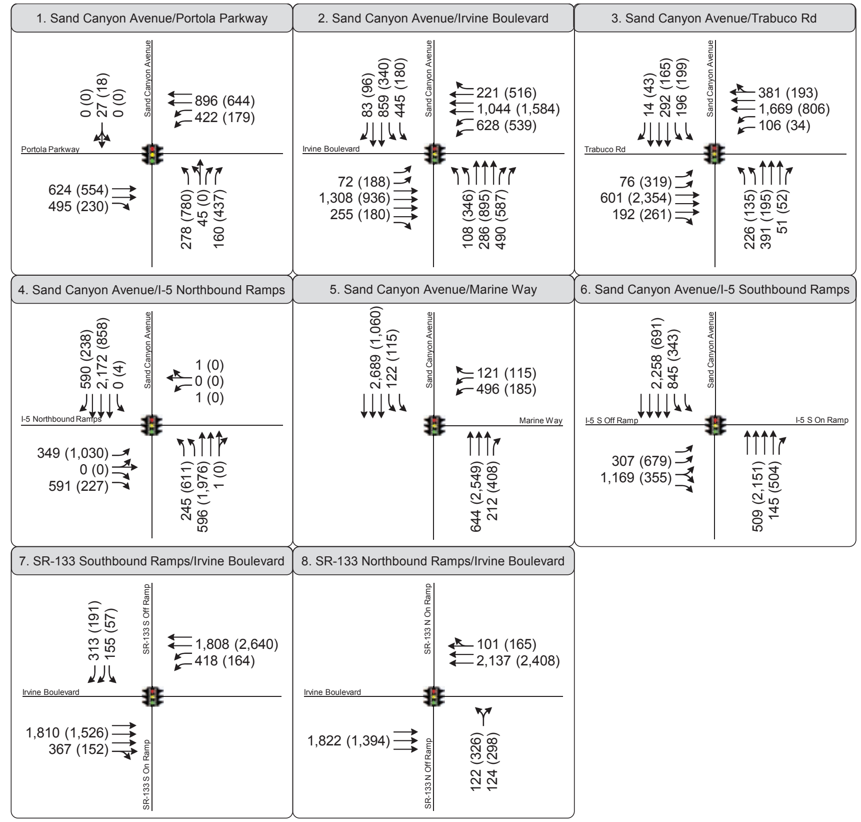
Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend
- Study Intersections
- Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 10d
Short-Term Interim Year Approved Plus Project (Route 2B) Peak Hour
Traffic Volumes, Lane Configurations, and Traffic Control

Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway



Legend

- Study Intersections
- Project Site Syphon Reservoir
- XX(XX) AM(PM)

Figure 11a

Short-Term Interim Year Pending Plus Project (Route 1A) Peak Hour Traffic Volumes, Lane Configurations, and Traffic Control

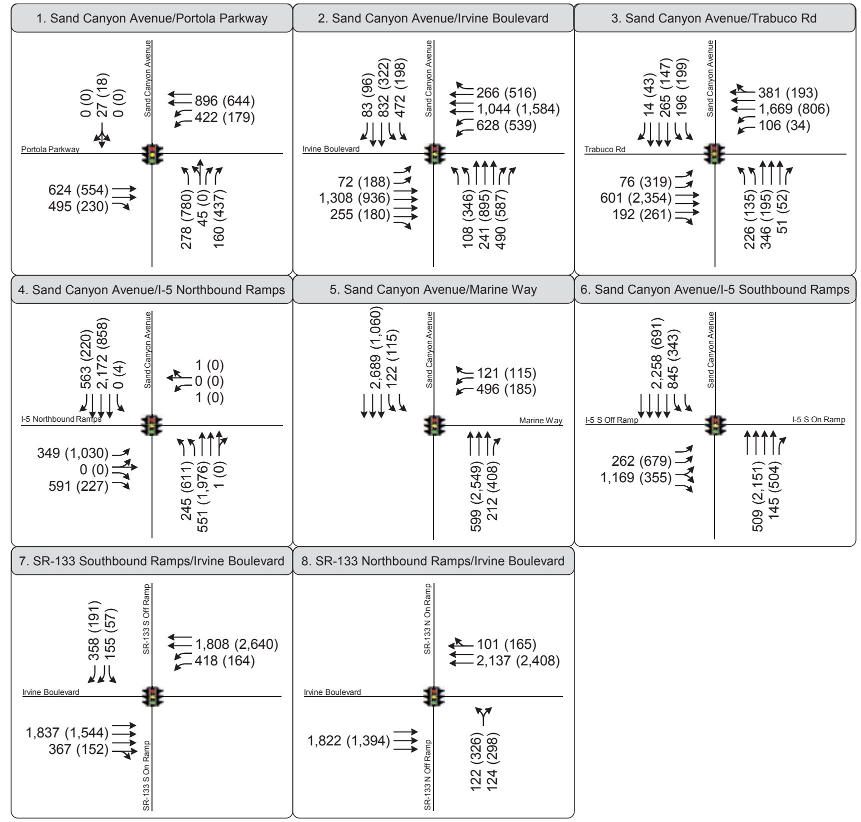
Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway

Legend
- Study Intersections
- Project Site Syphon Reservoir

XX(XX) AM(PM)

Figure 11b
Short-Term Interim Year Pending Plus Project (Route 1B) Peak Hour Traffic Volumes, Lane Configurations, and Traffic Control

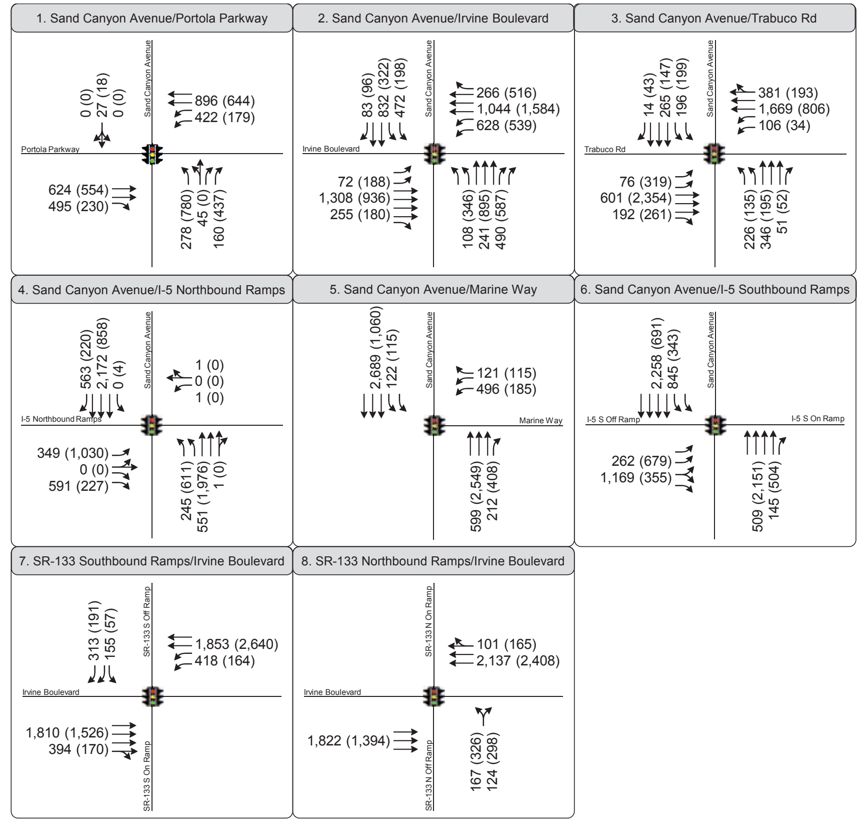
Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway



Legend
- Study Intersections
- Project Site Syphon Reservoir
- XX(XX) AM(PM)

Figure 11c
Short-Term Interim Year Pending Plus Project (Route 2A) Peak Hour Traffic Volumes, Lane Configurations, and Traffic Control

Note: For the purpose of this study Sand Canyon Avenue is regarded as a north-south roadway



Legend
- Study Intersections
- Project Site Syphon Reservoir
- XX(XX) AM(PM)

Figure 11d
Short-Term Interim Year Pending Plus Project (Route 2B) Peak Hour Traffic Volumes, Lane Configurations, and Traffic Control

TABLE 7
SHORT-TERM YEAR APPROVED PLUS PROJECT (ALL ROUTE OPTIONS)
INTERSECTION LEVEL OF SERVICE

					Short-Term Approved Conditions		Short-Term Approved Plus Project (Route 1A)				Short-Term Approved Plus Project (Route 1B)				Short-Term Approved Plus Project (Route 2A)				Short-Term Approved Plus Project (Route 2B)			
ID	N/S Street Name	E/W Street Name	Control Type	Time Period	V/C	LOS	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient
1	Sand Canyon Avenue	Portola Parkway	Signalized	AM	0.426	A	0.456	A	0.030	No	0.456	A	0.030	No	0.456	A	0.030	No	0.456	A	0.030	No
				PM	0.488	A	0.499	A	0.011	No	0.499	A	0.011	No	0.499	A	0.011	No	0.499	A	0.011	No
2	Sand Canyon Avenue	Irvine Boulevard	Signalized	AM	0.681	B	0.689	B	0.008	No	0.689	B	0.008	No	0.681	B	0.000	No	0.681	B	0.000	No
				PM	0.635	B	0.635	B	0.000	No	0.635	B	0.000	No	0.640	B	0.005	No	0.640	B	0.005	No
3	Sand Canyon Avenue	Trabuco Road	Signalized	AM	0.580	A	0.589	A	0.009	No	0.589	A	0.009	No	0.580	A	0.000	No	0.580	A	0.000	No
				PM	0.609	B	0.609	B	0.000	No	0.609	B	0.000	No	0.609	B	0.000	No	0.609	B	0.000	No
4	Sand Canyon Avenue	I-5 Northbound Ramps	Signalized	AM	0.630	B	0.630	B	0.000	No	0.648	B	0.018	No	0.630	B	0.000	No	0.630	B	0.000	No
				PM	0.731	C	0.731	C	0.000	No	0.731	C	0.000	No	0.731	C	0.000	No	0.731	C	0.000	No
5	Sand Canyon Avenue	Marine Way	Signalized	AM	0.700	B	0.700	B	0.000	No	0.705	C	0.005	No	0.700	B	0.000	No	0.700	B	0.000	No
				PM	0.641	B	0.641	B	0.000	No	0.641	B	0.000	No	0.641	B	0.000	No	0.641	B	0.000	No
6	Sand Canyon Avenue	I-5 Southbound Ramps	Signalized	AM	0.704	C	0.704	C	0.000	No	0.712	C	0.008	No	0.704	C	0.000	No	0.704	C	0.000	No
				PM	0.610	B	0.610	B	0.000	No	0.615	B	0.005	No	0.610	B	0.000	No	0.610	B	0.000	No
7	SR-133 Southbound Ramps	Irvine Boulevard	Signalized	AM	0.652	B	0.652	B	0.000	No	0.652	B	0.000	No	0.665	B	0.013	No	0.665	B	0.013	No
				PM	0.869	D	0.869	D	0.000	No	0.869	D	0.000	No	0.869	D	0.000	No	0.869	D	0.000	No
8	SR-133 Northbound Off-Ramp	Irvine Boulevard	Signalized	AM	0.544	A	0.544	A	0.000	No	0.544	A	0.000	No	0.544	A	0.000	No	0.569	A	0.025	No
				PM	0.735	C	0.735	C	0.000	No	0.735	C	0.000	No	0.735	C	0.000	No	0.735	C	0.000	No

TABLE 8
SHORT-TERM YEAR PENDING PLUS PROJECT (ALL ROUTE OPTIONS)
INTERSECTION LEVEL OF SERVICE

					Short-Term Pending Conditions		Short-Term Pending Plus Project (Route 1A)				Short-Term Pending Plus Project (Route 1B)				Short-Term Pending Plus Project (Route 2A)				Short-Term Pending Plus Project (Route 2B)			
ID	N/S Street Name	E/W Street Name	Control Type	Time Period	V/C	LOS	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient	V/C	LOS	Change in V/C	Deficient
1	Sand Canyon Avenue	Portola Parkway	Signalized	AM	0.439	A	0.470	A	0.031	No	0.470	A	0.031	No	0.470	A	0.031	No	0.470	A	0.031	No
				PM	0.495	A	0.506	A	0.011	No	0.506	A	0.011	No	0.506	A	0.011	No	0.506	A	0.011	No
2	Sand Canyon Avenue	Irvine Boulevard	Signalized	AM	0.704	C	0.711	C	0.007	No	0.711	C	0.007	No	0.704	C	0.000	No	0.704	C	0.000	No
				PM	0.644	B	0.644	B	0.000	No	0.644	B	0.000	No	0.650	B	0.006	No	0.650	B	0.006	No
3	Sand Canyon Avenue	Trabuco Road	Signalized	AM	0.600	A	0.609	B	0.009	No	0.609	B	0.009	No	0.600	A	0.000	No	0.600	A	0.000	No
				PM	0.618	B	0.618	B	0.000	No	0.618	B	0.000	No	0.618	B	0.000	No	0.618	B	0.000	No
4	Sand Canyon Avenue	I-5 Northbound Ramps	Signalized	AM	0.651	B	0.651	B	0.000	No	0.670	B	0.019	No	0.651	B	0.000	No	0.651	B	0.000	No
				PM	0.743	C	0.743	C	0.000	No	0.743	C	0.000	No	0.743	C	0.000	No	0.743	C	0.000	No
5	Sand Canyon Avenue	Marine Way	Signalized	AM	0.723	C	0.723	C	0.000	No	0.728	C	0.005	No	0.723	C	0.000	No	0.723	C	0.000	No
				PM	0.651	B	0.651	B	0.000	No	0.651	B	0.000	No	0.651	B	0.000	No	0.651	B	0.000	No
6	Sand Canyon Avenue	I-5 Southbound Ramps	Signalized	AM	0.728	C	0.728	C	0.000	No	0.736	C	0.008	No	0.728	C	0.000	No	0.728	C	0.000	No
				PM	0.619	B	0.619	B	0.000	No	0.625	B	0.006	No	0.619	B	0.000	No	0.619	B	0.000	No
7	SR-133 Southbound Ramps	Irvine Boulevard	Signalized	AM	0.674	B	0.674	B	0.000	No	0.674	B	0.000	No	0.687	B	0.013	No	0.687	B	0.013	No
				PM	0.883	D	0.883	D	0.000	No	0.883	D	0.000	No	0.883	D	0.000	No	0.883	D	0.000	No
8	SR-133 Northbound Off-Ramp	Irvine Boulevard	Signalized	AM	0.562	A	0.562	A	0.000	No	0.562	A	0.000	No	0.562	A	0.000	No	0.587	A	0.025	No
				PM	0.746	C	0.746	C	0.000	No	0.746	C	0.000	No	0.746	C	0.000	No	0.746	C	0.000	No

9. Special Issues

This chapter addresses the site access analysis and VMT analysis for the Project.

Site Access Analysis

As part of the Project, a private 2-lane roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site is proposed for construction vehicle access during Project construction and maintenance/operations access during Project operation. This proposal will require reconstruction of the Sand Canyon Avenue and Portola Parkway intersection to accommodate the new northern leg and the associated traffic signals, lane striping, and signage changes. Pedestrian and bicycle infrastructure at the intersection would be reconstructed to maintain access like the existing condition while following the City of Irvine requirements. This improvement assumes the northbound approach at Sand Canyon Avenue and Portola Parkway would be modified from two left-turn lanes and two right-turn lanes to one left-turn lane, one shared through/left-turn lane, and two right-turn lanes. The southbound approach would be constructed with one shared left/through/right-turn lane. Split phasing (a traffic signal operation that gives a green phase for all vehicle movements of one direction followed by a green phase for all movements of the opposite direction) would be incorporated for the northbound and new southbound approaches during construction and typical operations. During construction of the Project, this private roadway would be used by construction trips for ingress and egress of the construction site. Upon completion of the Project, this private roadway would be used by IRWD staff conducting maintenance and inspections as part of typical operations, similar to existing conditions. Trips by IRWD staff to the reservoir are not anticipated to increase as compared to the existing condition and are not considered to have a significant effect on the future intersection operations.

An analysis of the *City of Irvine Transportation Design Procedures* (City of Irvine, February 2007) [TDPs] was conducted to address primary access to the Project. The following TDPs were reviewed at request of the City of Irvine per the approved scope of work.

TDP – 1 Turn Lane Pocket Lengths

TDP – 1 identifies recommended lengths of left-turn pockets using a Nomograph for Left-Turn Storage, which uses inputs sch as the number of left-turning vehicles, cycle length, and truck percentage. Eastbound left-turn pockets are not proposed at the intersection of Sand Canyon Avenue and Portola Parkway as the Project is planning to only modify the northbound and southbound approaches. Therefore TDP – 1 is not applicable to this Project.

TDP – 14 Driveway Lengths

TDP – 14 identifies recommended lengths for driveways to projects based on the number of peak hour trips entering a project site. The Project will construct a 2-lane private roadway from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site. While plans for this roadway have yet to be submitted, it is estimated that this private roadway will exceed 1,500 feet (ft) from the Sand Canyon Avenue and Portola Parkway intersection to the Project site. Signage indicating the use as a private road will be installed at the intersection and along the roadway. As a private road, access control will be maintained with a gate at least 500 ft away from the intersection. During the construction period this gate will remain open during hours of construction and closed when no construction is occurring. Following construction, the gate will remain closed and only IRWD staff conducting maintenance and inspections as part of typical operations will have access to open the gate. The gate location will provide an area for vehicles to turn around if they do not have access beyond the gate. As peak hour traffic into the Project site is estimated to be 27 vehicles, TDP – 14 recommends a driveway of at least 50 ft. The private road length (greater than 1,500 ft) and distance to the gate (at least 500 ft) exceed the recommendation of 50 feet based on TDP – 14.

TDP – 15 Gate Stacking

TDP – 15 identifies recommendations for vehicle stacking and gate-stacking at project sites. TDP-15 provides recommendations based on different types of land uses for vehicle stacking analysis. As a construction project, none of the examples provided in TDP-15 reflect the Projects' construction management operations or typical conditions of the reservoir following construction. The Project will construct a 2-lane private road with at least 500 ft of distance between the Sand Canyon Avenue and Portola Parkway intersection and a proposed gate. Signage indicating the use as a private road will be installed at the intersection and along the roadway. The proposed gate location will provide an area for vehicles to turn around if they do not have access beyond the gate.

During construction, the gate will remain open during hours of construction and closed when no construction is occurring. With an open gate, the private roadway and internal staging on-site can accommodate vehicle queuing that may be associated with a peak construction activity day.

Following construction, the gate will remain closed and only IRWD staff conducting maintenance and inspections as part of typical operations will have access to open the gate. The trips by IRWD staff will be nominal and are not considered to have a significant effect on the future intersection operations. The proposed gate location and gate operations during typical operations can meet the nominal inbound volume during future operations.

CEQA VMT Impact Analysis

The City of Irvine's *CEQA VMT Impact Analysis Guidelines* identify projects generating fewer than 250 weekday daily trips as requiring no further VMT impact analysis. As identified in Table 3, all phases of construction generate fewer than 250 daily weekday trips. Therefore, it can be determined that all the construction phases do not meet the daily trip screening threshold and require no further VMT impact analysis using the *CEQA VMT Impact Analysis Guidelines*. In addition, many jurisdictions in Southern California have regarded construction-related traffic as causing adverse but not significant impacts because, while sometimes inconvenient, construction-related traffic effects are temporary.

Pedestrian Network Impact Analysis

Disruptions to Existing Facilities

Significance Criteria

The following significance criteria were applied:

> A significant impact occurs if a project disrupts existing pedestrian facilities.

Project Impact

Pedestrian infrastructure at the intersection of Sand Canyon Avenue and Portola Parkway will be reconstructed to maintain existing access while following the City of Irvine requirements. Therefore, it is concluded that the Project impact related to this item is less than significant.

Project Interferes with Planned Pedestrian Facilities

Significance Criteria

The following significance criteria were applied to determine if the Project conflicts with planned facilities:

> A significant impact occurs if a project interferes with planned pedestrian facilities.

Project Impact

Pedestrian infrastructure at the intersection of Sand Canyon Avenue and Portola Parkway will be reconstructed to maintain existing access while following the City of Irvine requirements. The Project will not affect any planned pedestrian facilities in the study area. Therefore, it is concluded that the Project impact related to this item is less than significant.

Project Conflicts with Adopted Pedestrian System Plans, Guidelines, Policies, or Standards

Significance Criteria

A significant impact occurs if a project conflicts or creates inconsistencies with adopted pedestrian system plans, guidelines, policies, or standards.

Project Impact

The Project is consistent with the policies identified in the City of Irvine General Plan Objective B-3: Pedestrian Circulation. The Project will reconstruct pedestrian infrastructure at the intersection of Sand Canyon Avenue and Portola Parkway to maintain existing access while following the City of Irvine requirements. Therefore, it is concluded that the Project impact related to this item is less than significant.

Bicycle Network Impact Analysis

Disruptions to Existing Facilities

Significance Criteria

The following significance criteria were applied:

A significant impact occurs if a project disrupts existing bicycle facilities.

Project Impact

Bicycle infrastructure at the intersection of Sand Canyon Avenue and Portola Parkway will be reconstructed to maintain existing access while following the City of Irvine requirements. Therefore, it is concluded that the Project impact related to this item is less than significant.

Project Interferes with Planned Bicycle Facilities

Significance Criteria

The following significance criteria were applied to determine if the Project conflicts with planned facilities:

> A significant impact occurs if a project interferes with planned bicycle facilities.

Project Impact

Bicycle infrastructure at the intersection of Sand Canyon Avenue and Portola Parkway will be reconstructed to maintain existing access while following the City of Irvine requirements. The Project will not affect any planned bicycle facilities in the study area. Therefore, it is concluded that the Project impact related to this item is less than significant.

Project Conflicts with Adopted Bicycle System Plans, Guidelines, Policies, or Standards

Significance Criteria

A significant impact occurs if a project conflicts or creates inconsistencies with adopted bicycle system plans, guidelines, policies, or standards.

Project Impact

The Project is consistent with the policies identified in the City of Irvine General Plan Objective B-4: Bicycle Circulation. The Project will reconstruct bicycle infrastructure at the intersection of Sand Canyon Avenue and Portola Parkway to maintain existing access while following the City of Irvine requirements. Therefore, it is concluded that the Project impact related to this item is less than significant.

Transit System

Disruptions to Existing Transit Service

Significance Criteria

The following significance criteria were applied to determine if the Project is responsible for a disruption of existing transit services or facilities:

> A significant impact occurs if a project disrupts existing transit services or facilities.

Project Impact

As noted in the review of existing transit routes, no transit routes currently run through the study area. Therefore, it is concluded that the Project impact related to this item is less than significant.

Interference with Planned Transit Services

Significance Criteria

The following significance criteria were applied:

> A significant impact occurs if a project interferes with planned transit services or facilities.

Project Impact

As noted in the review of existing transit routes, no transit routes currently run through the study area. Furthermore, the Project does not propose any changes to existing bus pullout along any of the study roadways. Therefore, it is concluded that the Project impact related to this item is less than significant.

Project Conflicts or Creates Inconsistencies with Adopted Transit System Plans, Guidelines, Policies, or Standards

Significance Criteria

The following significance criteria regarding consistency with adopted transit plans, guidelines, policies, or standards were applied:

> A significant impact occurs if a project conflicts or creates inconsistencies with adopted transit system plans, guidelines, policies, or standards.

Project Impact

Based on the review of the Project, it can be concluded that the Project does not conflict with these policies or other policies related to transit. The impact is therefore less than significant, and no mitigation is required.

Demand for Public Transit Services Above Capacity

Significance Criteria

The following significance criteria were applied:

> A significant impact occurs if the project creates demand for public transit service above the capacity which is provided or planned.

Project Impact

The Project is consistent with the policies identified in the City of Irvine General Plan Objective B-6: Public Transit Circulation. Therefore, it is concluded that the Project impact related to this item is less than significant.

CMP Traffic Impact Analysis

The *2015 Orange County Congestion Management Program* (Orange County Transportation Authority, November 2015) [CMP] guidelines require that projects with the potential to create an impact of more than 3% of LOS E capacity on the CMP highway system links should require a traffic impact analysis. All projects generating 2,400 or more daily trips should require evaluation. If a project will have direct access to a CMP link, the threshold is reduced to 1,600 or more daily trips. A traffic impact analysis is not required if one has already been performed for the Project as part of an earlier development approval which takes the impact on the CMP highway system into account.

The nearest OCTA CMP intersection is Irvine Boulevard and SR-133 Northbound ramps. As documented in Table 3, the Project generates less than 1,600 daily trips on a peak construction activity day. Therefore, a CMP traffic impact analysis is not required.

10. Improvements

Based on the results of the analysis and in accordance with the adopted *Traffic Impact Analysis Guidelines*, no significant impacts or intersection deficiencies were identified as part of this Project and therefore no improvements are required.

While no significant impacts were identified as part of this study, the following measures are recommended to alleviate the potential effect of construction traffic:

- Off-site truck staging, if required, shall be provided in a legal area furnished by the contractor. Trucks shall not be permitted to travel along local residential streets.
- To the extent feasible, deliveries and pick-ups of construction materials should be scheduled during non-peak travel periods and coordinated to reduce the potential of trucks waiting to load or unload for protracted periods of time.
- Access shall remain unobstructed for land uses in proximity to the Project site during Project construction.
- Full-time lane or sidewalk closures are not anticipated for the Project. Temporary lane or sidewalk closures, when needed, shall be scheduled to avoid peak commute hours and peak school drop-off and pick-up hours to the extent possible. In the event of a lane or sidewalk closure, a worksite traffic control plan, approved by the City of Irvine, shall be implemented to route traffic or pedestrians around any such lane or sidewalk closures.

11. Conclusion

The purpose of this study is to evaluate the temporary transportation impacts associated with the Syphon Reservoir Improvement Project in Irvine, California. The following summarizes the results of this analysis:

- The Project proposes to increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam. The Project would be implemented within the IRWD service area at the location of the existing Syphon Reservoir, northeast of Portola Parkway between Bee Canyon Access Road and SR-133.
- The scope of the traffic analysis, methodology assumptions, and selection of study intersections was developed in consultation with City of Irvine staff and documented in the Scope of Work for Irvine Ranch Water District (IRWD) Syphon Reservoir Construction Transportation Impact Analysis dated June 29, 2020.
- The study intersections selected represent the intersections where construction traffic is proposed to travel through. Four routes are proposed for the Project.
- On a peak construction activity day, approximately 232 daily trips are estimated, of which 36 trips (27 inbound/9 outbound) would occur during the AM peak hour and 18 trips (0 inbound/18 outbound) would occur during the PM peak hour. For the purpose of the intersection LOS analysis, the trip generation estimates were converted to PCE which resulted in approximately 512 daily PCE trips are estimated, of which 72 PCE trips (45 inbound/27 outbound) would occur during the AM peak hour and 18 PCE trips (0 inbound/18 outbound) would occur during the PM peak hour on the same peak construction activity day.
- The LOS analyses for all Existing Plus Project routes, Short-Term Interim Year Approved plus Project, and Short-Term Interim Year Pending plus Project that the Project would have no deficiencies at any study intersection. Therefore, no intersection improvements to address intersection deficiencies would be required.
- Based on the daily trip generation on a peak construction activity day, the Project does not meet the daily trip screening threshold and does not require further VMT impact analysis.
- The Project does not have a significant impact on the pedestrian, bicycle, or transit network.

Appendix A:

Scope of Work for Irvine Ranch Water District (IRWD) Syphon Reservoir Construction Transportation Impact Analysis

FEHR & PEERS

MEMORANDUM

Date: June 29, 2020

To: Justin Equina, City of Irvine

CC: Jennifer Jacobus, PhD, ESA
Jo Ann Corey, Irvine Ranch Water District

From: Spencer Reed, PE and Ethan Yue Sun, PhD

Subject: Scope of Work for Irvine Ranch Water District (IRWD) Syphon Reservoir Construction Transportation Impact Analysis

OC18-0553

Fehr & Peers has been retained by ESA to assist with the transportation impact analysis for construction of the Irvine Ranch Water District (IRWD) Syphon Reservoir Project (Project) located near the intersection of Sand Canyon Avenue and Portola Parkway. Based on the City of Irvine's Traffic Study Guidelines (City of Irvine, August 2004, Updated 2020), this project is required to evaluate the impacts associated with construction of the Project. As the Project is anticipated to generate less than 50 peak hour trips (see trip generation section below), a Limited Scope Traffic Impact Analysis (TIA) will be prepared to evaluative short-term interim-year conditions and satisfy the City's analysis requirements.

The purpose of this memorandum is to document the methodologies and assumptions which will be used in the transportation impact analysis so there is an opportunity to approve the approach prior to preparing the traffic study. This Limited Scope TIA will include the following sections.

I. Executive Summary

This section will provide a summary of the project description and the analysis results. Any mitigations recommended as part of the project will also be included, if necessary.

Sun-Sun T. Murillo 7/2/20
Approved by Development Review Date

II. Introduction

This section will describe the project, outline the Limited Scope TIA, and include the following sections:

Project Site

The Project proposes to increase the capacity of the existing Syphon Reservoir and replace the existing engineered dam with a new and larger engineered dam. The Project would allow the storage of additional recycled water produced at the Michelson WRP during periods of low demand (winter months) for use during periods of high demand (summer months). The Project would expand the reservoir's storage capacity from the current 500 Acre-Feet (AF) to approximately 5,000 AF and would help IRWD become more self-sufficient by reducing its dependence on costly and less-reliable imported water from both Northern California and the Colorado River. The Project would help IRWD to store more drought-proof recycled water during summer months and support the increased use of recycled water for public landscaping, agricultural, business and industrial uses. Every gallon of recycled water IRWD uses for non-drinking water purposes saves a gallon of drinking water, helping the region's existing and planned future development to better withstand future water shortages. By reducing IRWD's dependence on costly imported water, the Project would allow IRWD to replace an expensive source of water for one that is less expensive and a drought-resilient supply, which increases IRWD's water supply reliability.

The Project would be implemented within the IRWD service area at the location of the existing Syphon Reservoir, northeast of Portola Parkway between Bee Canyon Access Road and SR-133 in the County of Orange. The Crean Lutheran High School Athletic Complex is located between Portola Parkway and the toe of the existing dam. Residential neighborhoods are located on the southwest side of Portola Parkway.

As part of the Project, a private 2-lane roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site is proposed for construction vehicle access. This proposal will require reconstruction of the Sand Canyon Avenue and Portola Parkway intersection to accommodate the new northern leg and the associated traffic signals, lane striping, and signage changes. During the Project, this private roadway will be used by construction trips for ingress and egress of the construction site. Upon completion of the Project, this private roadway will be used by IRWD staff conducting maintenance and inspections as part of typical operations. The trips by IRWD staff will be nominal and are not considered to have a significant effect on the future intersection operations.

Study Area Boundary

The study intersections selected represent the intersections where construction traffic is proposed to travel through. Two route options are proposed for the Project. Route Option 1 will be SR-133, north on Irvine Boulevard, and east on Sand Canyon Avenue for trucks traveling inbound and westbound on Sand Canyon Avenue and south on Irvine Boulevard to SR-133 for trucks traveling outbound. Route Option 2 will be I-5, east on Sand Canyon Avenue for trucks traveling inbound and westbound on Sand Canyon Avenue to I-5 for trucks traveling outbound. As presented in Figure 1, the following intersections have been selected for study:

1. Sand Canyon Avenue & Portola Parkway
2. Sand Canyon Avenue & Irvine Boulevard
3. Sand Canyon Avenue & Trabuco Rd
4. Sand Canyon Avenue & I-5 Northbound Ramps
5. Sand Canyon Avenue & Marine Way
6. Sand Canyon Avenue & I-5 Southbound Ramps
7. SR-133 Southbound Ramps & Irvine Boulevard
8. SR-133 Northbound Off-Ramp & Irvine Boulevard

Data Collection

Due to emergence of COVID-19 in southern California and the decision of local schools to end on-campus classes for the 2019-2020 academic year, it is not recommended to collect existing intersection counts in the study area. However, the City of Irvine has agreed to provide the most recent intersection counts available that can be used to estimate 2020 intersection volumes. As prescribed by the City of Irvine, a growth factor of 2% per year will be applied to previously counts collected to develop 2020 intersection volumes for the AM and PM peak hours.

III. Existing Conditions

Existing Lane Uses

Existing land uses on site will be identified. The existing site is the IRWD syphon reservoir.

Sun-Sun T. Murillo 7/2/20
Approved by Development Review Date

Existing Roadways and Intersections

Fehr & Peers will collect the following information in a field visit to the study area:

- Lane & intersection configurations
- Traffic signal locations
- Signal phasing
- Land uses in the study area
- Existing pedestrian and bicycle facilities
- Transit service

IV. Performance Criteria

The performance criteria to determine potential impacts and mitigations will be consistent with the City's criteria, as outlined in the Traffic Study Guidelines. The City's Transportation Design Procedures (TDP) adopted February 2007 will be used as the performance criteria to evaluate the design features of the project access.

V. Proposed Project Impacts

Trip Generation

Construction of the Project is estimated to be approximately 41 months, depending on weather conditions and other variables. Construction is currently anticipated to begin in the Fall of 2022. Most construction activities would be limited to 7:00 AM to 4:00 PM Monday through Friday. Construction of the Project would include activities implemented in phases as outlined below.

- Access Routes/Intersection Improvements
- Excavation of Sediment/Existing Dam
- Construction of Dam/Spillway/Reservoir
- Construction of Filtration/Chlor/Dechlor Facilities
- Wetlands/Riparian Installation
- Installation of Recreation Facilities
- Demobilization

Construction Vehicle Type

Haul Trucks

Hauling hours are anticipated to be 7:00 AM to 3:00 PM on weekdays. During the peak trip period, approximately 52 material delivery trucks would enter and exit the site per workday for approximately twelve months. During other times of construction, material deliveries would be expected in the range of 5 to 10 material delivery trucks per day. These trucks are assumed to arrive and depart evenly between 7:00 AM and 3:00 PM during an 8-hour shift.

Equipment and Delivery Trucks

In addition to haul trucks, the site is also expected to generate equipment and delivery trucks during each phase of construction. These materials would be delivered to the site and stored on-site. These deliveries are expected to occur in a variety of vehicles including small delivery trucks to cement mixer trucks and 18-wheel trucks. Additionally, construction equipment would also have to be delivered to the site. This equipment could include bulldozers, excavators, and other large items of machinery. Most of the heavy equipment is expected to be transported to the site on large trucks such as 18-wheelers or other similar vehicles. These trucks are assumed to arrive and depart evenly between 7:00 AM and 3:00 PM during an 8-hour shift.

Employee Vehicles

The number of construction workers would vary throughout the construction period. Parking for all construction workers will be provided on-site. Construction workers are assumed to arrive in single occupant vehicles.

Construction Period Trip Generation

Based on the aforementioned information, a construction period trip generation analysis was conducted to estimate daily, morning, and evening peak hour trips of the phase with the highest trip generation potential. As seen in Table 1, the construction of Dam/Spillway/Reservoir phase represents the day with the highest trip generation potential with approximately 116 vehicles.

Construction workers often travel to and from a worksite outside of the typical peak commute hours. Construction hours are anticipated to occur from 7:00 AM to 4:00 PM, with most worker trips and truck trips anticipated to occur outside of the AM and PM peak hours. For the purpose of the analysis, it was assumed that up to 40% of the construction workers would arrive at the construction site during the peak morning commute hour and up to 40% would depart the construction site during the peak evening commute hour. Equipment trucks were assumed to arrive and depart evenly between 7:00 AM and 3:00 PM during an 8-hour shift.

Table 1 presents a summary of the construction trip generation on a peak day. As shown, on a peak construction activity day, approximately 232 daily trips are estimated, of which 36 trips (27 inbound/9 outbound) would occur during the AM peak hour and 18 trips (0 inbound/18 outbound) would occur during the PM peak hour. This trip generation is anticipated to occur for approximately two to three months. Trip generation outside of this phase would be reduced with approximately 30 daily to 154 daily trips being generated.

Adjustments to Trip Generation

No adjustments to the trip generation shall be made without prior written approval from the City.

Trip Distribution and Assignment

Two route options are proposed for the Project. Route Option 1 will be SR-133, north on Irvine Boulevard, and east on Sand Canyon Avenue for trucks traveling inbound and westbound on Sand Canyon Avenue and south on Irvine Boulevard to SR-133 for trucks traveling outbound. Route Option 2 will be I-5, east on Sand Canyon Avenue for trucks traveling inbound and westbound on Sand Canyon Avenue to I-5 for trucks traveling outbound.

Phasing

The proposed project will be constructed in a single phase and is assumed to be operational by early 2026.

Vehicle Miles Traveled Methodology and Approach

On September 27, 2013, Governor Jerry Brown signed Senate Bill (SB) 743 into law and started a process that will fundamentally change transportation impact analysis conducted as part of California Environmental Quality Act (CEQA) compliance. The Governor’s Office of Planning and Research (OPR) was charged with developing new guidelines for evaluating transportation impacts under CEQA using methods that no longer focus on measuring automobile delay and level of service (LOS).

OPR issued proposed updates to the CEQA guidelines in support of these goals in November 2017 and a supporting technical advisory in December 2018. The updates establish vehicle miles traveled (VMT) as the metric for evaluating a project's environmental impacts on the transportation system. Lead agencies, including the City of Irvine, have until July 1, 2020 to implement these new requirements. On June 23, 2020, the City of Irvine adopted the CEQA VMT Impact Analysis Guidelines. This project will include a VMT impact analysis section that follows the adopted CEQA VMT Impact Analysis Guidelines.

The City of Irvine's guidelines identify projects generating fewer than 250 daily trips as being screened out of VMT analysis. As identified in Table 1, all phases of construction have a daily trip generation less than 250 trips. Therefore, it can be assumed that all of the construction phases could be screened out of conducting a VMT analysis using the City of Irvine draft guidelines.

Many jurisdictions in Southern California have regarded construction-related traffic as causing adverse but not significant impacts because, while sometimes inconvenient, construction-related traffic effects are temporary. Therefore, due to all phases meeting the daily trip screening threshold of the City of Irvine and the temporary nature of the one phase that exceeds the threshold, this Project can be considered to be exempt from VMT and the traffic study will include a CEQA VMT Impact Analysis section and provide justification on how the project is exempt from VMT analysis.

Intersection Level of Service Analysis Methodology and Approach

The Intersection Capacity Utilization (ICU) methodology will be used to evaluate the intersection level of service (LOS) under the analysis scenarios identified below. The LOS will be reported at the study intersection for the AM and PM peak hours.

In addition, the Project's effect to non-automotive transportation will be evaluated based on the Project's consistency with existing or planned facilities in the study area

The following six scenarios will be analyzed:

- <u>Existing Conditions</u> – estimated intersection counts will be analyzed.
- <u>Existing plus Project Conditions</u> – the proposed construction trip generation (in passenger car equivilance) and route assignment estimates will be added to the Existing Conditions. Buildout of a private roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site will be included.

Sun-Sun T. Murillo 7/2/20

Approved by Development Review Date

- Short-Term Interim Year Approved Basline Conditions – the future (Short-Term Interim Year) conditions will be developed based on the latest verision of the Irvine Traffic Analysis Model (ITAM). Short-Term Interim Year Baseline Approved peak hour traffic volumes will be extracted for the study itnersections.

- Short-Term Interim Year Approved Baseline plus Project Conditions – the proposed construction trip generation (in passenger car equivilance) and route assignment estimates will be added to the Short-Term Interim Year Approved Basline Conditions . Buildout of a private roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site will be included.

- Short-Term Interim Year Pending Basline Conditions – the future (Short-Term Interim Year) conditions will be developed based on the latest verision of ITAM. Short-Term Interim Year Baseline Pending peak hour traffic volumes will be extracted for the study itnersections.

- Short-Term Interim Year Pending Baseline plus Project Conditions – the proposed construction trip generation (in passenger car equivilance) and route assignment estimates will be added to the Short-Term Interim Year Pending Basline Conditions . Buildout of a private roadway connection from the northern side of the Sand Canyon Avenue and Portola Parkway intersection to the Project site will be included.

The following parameters will be used in our operations analysis:

- Manual assignment of project trips added to the estimated intersection count volumes.
- Vistro v7.0 software and ICU methodology to analyze signalized study intersections.
- Volume to capacity (V/C) ratios and the associated LOS will be reported for the signalized Irvine study intersections under the ICU methodology.
- A VMT analysis will be prepared in accordance with adopted Traffic Impact Analysis Guidelines in effect at the time of project approval.
- Per the City of Irvine Traffic Impact Analysis Guidelines, lane capacities of 1,700 per hour per lane for through and turn lanes will be used for all volume/capacity calculations.
- Per the City of Irvine Traffic Impact Analysis Guidelines, lost time of 0.05 added to ICU calculation. Lost time represents the time in which no vehicles can pass through the intersection despite having a green signal (i.e. the delay from the driver in moving the vehicle as the signal changes from red to green)
- Inclusion of proposed private roadway under Plus Project condition

Sun-Sun T. Murillo 7/2/20

Approved by Development Review Date

VI. Special Analyses/Issues

Access Analysis

An analysis of the City's Transportation Design Procedures (TDPs) will be conducted for the primary access intersection (Sand Canyon Avenue/Portola) of the IRWD Syphon Reservoir. The TIA will identify the proposed lane geometry at this intersection to reflect this new access. The project is also responsible for restriping and other physical improvements necessary to implement the new access.

The specific TDPs to be evaluated include:

- TDP-1 (Turn lane pocket length) on eastbound Portola Parkway, if an eastbound left-turn lane is proposed
- TDP -14 (Driveway Lengths)
- TDP-15 (Gate Stacking), if applicable.

VII. Required Mitigation Measures

Based on the results and in accordance with the adopted Traffic Impact Analysis Guidelines, physical, operational, and alternative improvements required to mitigate unacceptable impacts due to the proposed project will be identified and analyzed.

VIII. Conclusions

A summary of the six analyzed scenarios, along with estimated effects of the mitigations, will be included in the TIA.

IX. Revisions to the Analysis

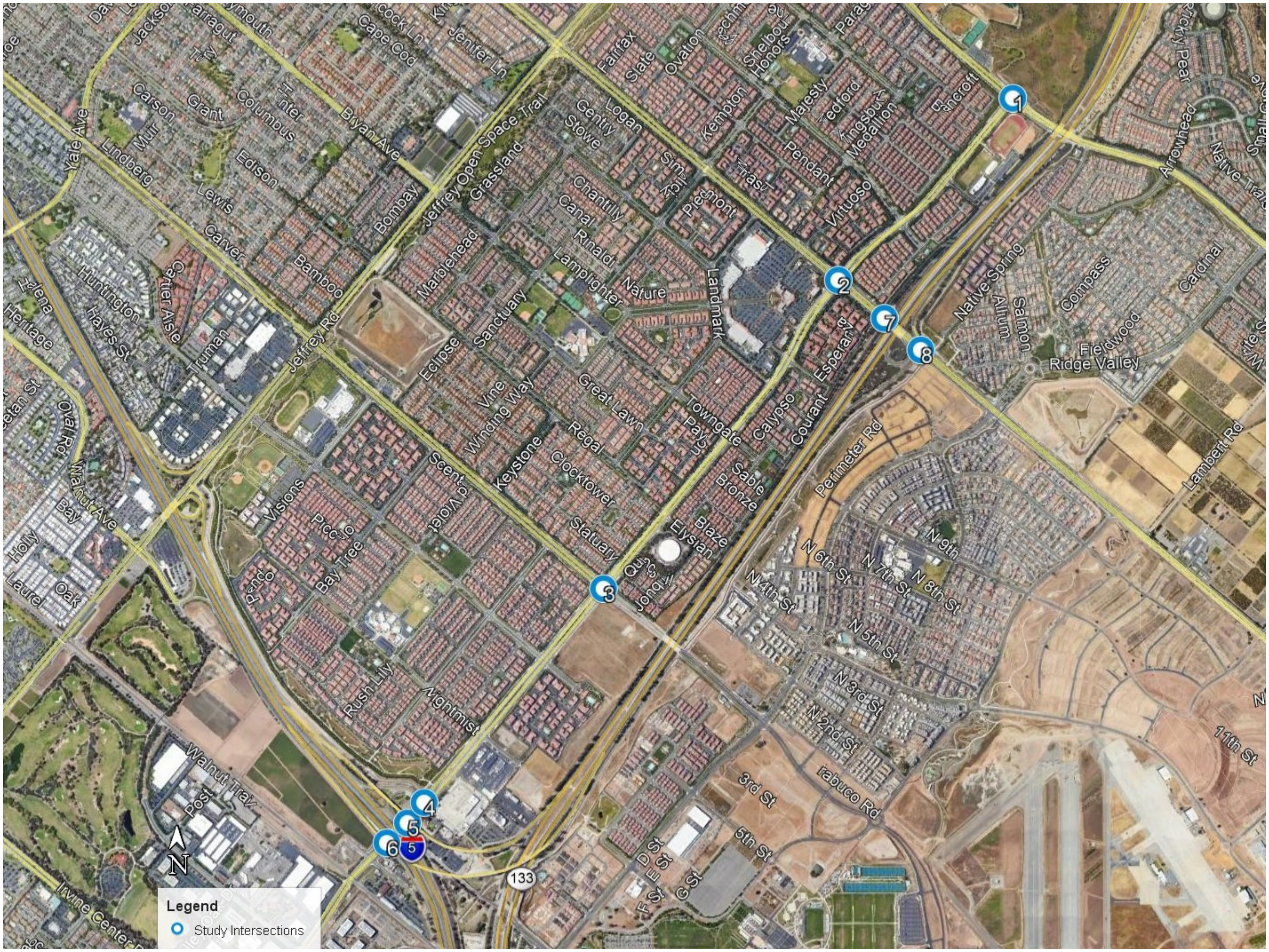
After a review and consolidated comments by city staff, Fehr & Peers will prepare one round of revisions to the TIA.

X. Signature

The TIA will be prepared under the supervision of, and signed, stamped, and dated by a registered traffic engineer or a registered professional civil engineer.

Sun-Sun T. Murillo 7/2/20

Approved by Development Review Date



Sun-Sun T. Murillo 7/2/20

Figure 1

Study Interesections

TABLE 1
CONSTRUCTION PERIOD TRIP GENERATION

Phase	Duration (Months)	Peak Day Activity Under Each Phase: Haul Trucks	Peak Day Activity Under Each Phase: Equipment and Delivery Trucks	Peak Day Activity Under Each Phase: Employee Vehicles	Total Vehicles	Total Daily Vehicle Trips
Access Routes/Intersecction Improvements	5	8	3	10	21	42
Excavation of Sediment/ Existing Dam	6.6	0	6	31	37	74
Construction of Dam/Spillway/Reservoir	13.8	52	18	46	116	232
Construction of Filtration/Chlor/Dechlor Facility	12	0	29	48	77	154
Wetlands/Riparian Installation	12	0	5	20	25	50
Installation of Recreation Facilities	3	0	5	10	15	30
Demobilization	1	0	7	15	22	44

Construction of Dam/Spillway/Reservoir Trip Generation

Trip Type	Daily Trips [a]	Morning Peak Hour Trips: In	Morning Peak Hour Trips: Out	Morning Peak Hour Trips: Total	Evening Peak Hour Trips: In	Evening Peak Hour Trips: Out	Evening Peak Hour Trips: Total
Haul Truck Trips [b]	104	7	7	14	0	0	0
Delivery and Equipment Truck Trips [b]	36	2	2	4	0	0	0
Construction Worker Trips [c]	92	18	0	18	0	18	18
Phase Total	**232**	**27**	**9**	**36**	**0**	**18**	**18**

Notes:

[a] - Daily trips were calculated by counting two trips, one inbound and one outbound trip for each vehicle

[b] - Daily haul and delivery/equipment truck trips were assumed to occur evenly throughout an 8-hour construction day. Therefore, the daily truck trips were divided by 8 hours to calculate morning and evening peak hour truck trips.

[c] - Up to 40% of the construction workers were assumed to arrive during the morning peak hour of adjacent street traffic. A total of up to 40% worker were assumed to depart during the evening peak hour.

Sun-Sun T. Murillo
7/2/20

Appendix B:

Traffic Counts

Location: Irvine
N/S: Sand Canyon Avenue
E/W: Portola Parkway

ITAM: 300
Date: 3/27/2018
Day: Tuesday

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			Portola Parkway Westbound			Sand Canyon Avenue Northbound			Portola Parkway Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
6:30 AM	0	0	0	47	26	0	10	0	28	0	92	67	270
6:45 AM	0	0	0	38	38	0	31	0	28	0	92	71	298
7:00 AM	0	0	0	58	68	0	32	0	16	0	98	82	354
7:15 AM	0	0	0	54	115	0	36	0	18	0	106	89	418
7:30 AM	0	0	0	114	223	0	69	0	29	0	82	105	622
7:45 AM	0	0	0	81	181	0	74	0	32	0	149	108	625
8:00 AM	0	0	0	72	138	0	37	0	35	0	155	87	524
8:15 AM	0	0	0	62	157	0	37	0	29	0	101	86	472
8:30 AM	0	0	0	95	140	0	43	0	32	0	117	78	505
8:45 AM	0	0	0	75	106	0	45	0	34	0	88	48	396
TOTAL VOLUMES:	0	0	0	696	1192	0	414	0	281	0	1080	821	4484

AM Peak Hr Begins at: 730 AM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	0	0	0	329	699	0	217	0	125	0	487	386	2243

PEAK HR FACTOR:	0.000	0.763	0.807	0.849	0.897

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			Portola Parkway Westbound			Sand Canyon Avenue Northbound			Portola Parkway Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
4:00 PM	0	0	0	35	124	0	99	0	67	0	72	30	427
4:15 PM	0	0	0	40	117	0	152	0	65	0	73	46	493
4:30 PM	0	0	0	36	115	0	134	0	74	0	86	45	490
4:45 PM	0	0	0	37	127	0	160	0	79	0	76	37	516
5:00 PM	0	0	0	35	109	0	170	0	71	0	89	48	522
5:15 PM	0	0	0	31	131	0	171	0	99	0	102	47	581
5:30 PM	0	0	0	32	133	0	165	0	90	0	139	55	614
5:45 PM	0	0	0	44	138	0	113	0	87	0	110	33	525
6:00 PM	0	0	0	29	109	0	130	0	103	0	108	33	512
6:15 PM	0	0	0	37	110	0	100	0	76	0	120	26	469
6:30 PM	0	0	0	33	70	0	81	0	90	0	68	21	363
6:45 PM	0	0	0	37	73	0	57	0	85	0	105	23	380
TOTAL VOLUMES:	0	0	0	426	1356	0	1532	0	986	0	1148	444	5892

PM Peak Hr Begins at: 500 PM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	0	0	0	142	511	0	619	0	347	0	440	183	2242

PEAK HR FACTOR:	0.000	0.897	0.894	0.803	0.913

Counts Unlimited
P.O. Box 1178
Corona, CA 92878
(951) 268-6268

Location:	Irvine		ITAM: 301
N/S:	Sand Canyon Avenue		Date: 3/27/2018
E/W:	Irvine Boulevard		Day: Tuesday

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			Irvine Boulevard Westbound			Sand Canyon Avenue Northbound			Irvine Boulevard Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
7:00 AM	106	137	24	102	168	31	29	43	102	10	275	46	1073
7:15 AM	107	152	12	119	238	48	18	46	111	11	280	56	1198
7:30 AM	70	191	17	143	259	58	22	41	80	17	235	50	1183
7:45 AM	64	169	12	126	149	35	15	58	89	18	230	47	1012
8:00 AM	39	95	15	112	153	33	15	53	96	15	188	31	845
8:15 AM	60	133	19	119	103	61	19	46	89	25	131	40	845
8:30 AM	57	93	13	79	120	34	16	62	69	10	140	25	718
8:45 AM	50	79	9	84	101	21	17	47	66	12	136	43	665
TOTAL VOLUMES:	553	1049	121	884	1291	321	151	396	702	118	1615	338	7539

AM Peak Hr Begins at: 700 AM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	347	649	65	490	814	172	84	188	382	56	1020	199	4466

PEAK HR FACTOR:	0.954	0.802	0.934	0.919	0.932

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			Irvine Boulevard Westbound			Sand Canyon Avenue Northbound			Irvine Boulevard Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
4:00 PM	45	64	17	107	291	105	69	173	112	40	166	29	1218
4:15 PM	31	62	21	85	368	119	52	191	126	21	177	30	1283
4:30 PM	37	59	20	116	306	93	76	184	107	44	204	38	1284
4:45 PM	30	71	18	120	293	93	78	163	121	44	196	46	1273
5:00 PM	26	56	17	108	257	90	47	163	116	43	163	44	1130
5:15 PM	26	65	8	97	279	62	42	141	113	33	196	33	1095
5:30 PM	25	67	18	71	212	66	47	121	116	40	174	35	992
5:45 PM	22	62	19	98	168	43	45	105	88	30	150	35	865
6:00 PM	18	86	11	81	121	32	50	158	112	32	145	28	874
6:15 PM	19	60	15	87	127	41	36	102	72	42	132	28	761
6:30 PM	21	55	18	53	80	31	41	83	79	40	133	30	664
6:45 PM	11	47	13	75	77	25	34	76	69	32	124	30	613
TOTAL VOLUMES:	311	754	195	1098	2579	800	617	1660	1231	441	1960	406	12052

PM Peak Hr Begins at: 400 PM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	143	256	76	428	1258	410	275	711	466	149	743	143	5058

PEAK HR FACTOR:	0.942	0.916	0.984	0.905	0.985

Counts Unlimited
P.O. Box 1178
Corona, CA 92878
(951) 268-6268

Location:	Irvine
N/S:	Sand Canyon Avenue
E/W:	Trabuco Road

ITAM: 302
Date: 3/27/2018
Day: Tuesday

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			Trabuco Road Westbound			Sand Canyon Avenue Northbound			Trabuco Road Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
5:30 AM	6	3	1	5	73	2	5	5	2	0	65	19	186
5:45 AM	5	3	4	10	106	8	13	4	0	1	92	28	274
6:00 AM	8	1	2	11	120	5	6	1	1	4	120	46	325
6:15 AM	11	18	3	9	143	7	15	2	1	1	150	73	433
6:30 AM	7	13	3	11	212	3	31	7	4	2	141	89	523
6:45 AM	10	16	1	17	251	6	27	9	5	4	160	93	599
7:00 AM	8	13	1	12	258	9	35	12	3	8	133	65	557
7:15 AM	11	14	1	13	335	24	44	12	8	10	141	39	652
7:30 AM	29	19	3	11	365	25	49	26	10	9	111	43	700
7:45 AM	19	26	4	18	400	68	46	44	11	11	110	35	792
8:00 AM	35	54	4	19	288	73	41	65	10	15	117	50	771
8:15 AM	38	53	2	38	317	55	48	55	13	11	116	56	802
8:30 AM	31	45	2	13	337	91	40	98	9	24	118	21	829
8:45 AM	49	55	3	13	360	78	47	52	8	9	118	23	815
TOTAL VOLUMES:	256	327	29	185	3386	444	429	383	83	108	1535	633	7798

AM Peak Hr Begins at: 800 AM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	153	207	11	83	1302	297	176	270	40	59	469	150	3217

PEAK HR FACTOR:	0.867	0.932	0.827	0.926	0.970

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			Trabuco Road Westbound			Sand Canyon Avenue Northbound			Trabuco Road Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
4:00 PM	32	35	8	11	132	29	20	42	15	32	312	37	705
4:15 PM	20	21	8	9	150	19	26	33	15	35	402	37	775
4:30 PM	29	23	7	11	130	20	27	27	12	38	369	49	742
4:45 PM	29	25	11	13	127	58	16	35	7	46	421	44	832
5:00 PM	50	34	6	3	167	33	19	45	13	43	430	40	883
5:15 PM	38	30	10	11	146	25	35	34	11	73	456	54	923
5:30 PM	32	29	11	5	168	46	25	43	9	84	528	63	1043
5:45 PM	38	24	7	8	159	49	28	33	8	53	455	50	912
6:00 PM	33	29	9	15	167	51	22	26	13	33	385	55	838
6:15 PM	27	24	5	9	129	27	29	23	13	39	410	67	802
6:30 PM	34	32	7	12	171	41	21	22	14	27	385	43	809
6:45 PM	29	21	1	6	166	21	22	22	10	18	310	56	682
TOTAL VOLUMES:	391	327	90	113	1812	419	290	385	140	521	4863	595	9946

PM Peak Hr Begins at: 500 PM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	158	117	34	27	640	153	107	155	41	253	1869	207	3761

PEAK HR FACTOR:	0.858	0.936	0.947	0.863	0.901

Counts Unlimited
P.O. Box 1178
Corona, CA 92878
(951) 268-6268

Location: Irvine
N/S: Sand Canyon Avenue
E/W: I-5 NB Ramps

ITAM: 303
Date: 5/22/2018
Day: Tuesday

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			I-5 NB Ramps Westbound			Sand Canyon Avenue Northbound			I-5 NB Ramps Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
7:00 AM	2	233	132	0	0	0	39	132	0	56	0	61	655
7:15 AM	1	356	152	1	1	0	41	121	1	67	0	72	813
7:30 AM	2	387	122	1	2	0	49	97	0	79	0	82	821
7:45 AM	0	447	95	0	0	0	42	111	0	73	0	131	899
8:00 AM	0	411	114	1	0	0	45	114	0	79	0	122	886
8:15 AM	0	436	105	0	0	0	42	99	1	53	0	95	831
8:30 AM	0	400	125	0	0	1	62	106	0	67	0	113	874
8:45 AM	0	428	128	0	0	0	51	120	0	49	0	102	878
TOTAL VOLUMES:	5	3098	973	3	3	1	371	900	2	523	0	778	6657

AM Peak Hr Begins at: 745 AM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	0	1694	439	1	0	1	191	430	1	272	0	461	3490

PEAK HR FACTOR:	0.984	0.500	0.926	0.898	0.971

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			I-5 NB Ramps Westbound			Sand Canyon Avenue Northbound			I-5 NB Ramps Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
4:00 PM	0	199	68	5	2	0	110	273	0	133	0	39	829
4:15 PM	0	182	53	1	1	0	107	309	0	143	0	54	850
4:30 PM	0	179	43	4	1	0	108	313	0	163	0	43	854
4:45 PM	1	181	34	0	1	0	106	275	0	202	0	61	861
5:00 PM	0	158	34	0	0	0	135	303	1	205	0	43	879
5:15 PM	0	169	49	0	0	0	149	440	0	184	0	48	1039
5:30 PM	0	166	40	0	0	0	99	348	0	219	0	48	920
5:45 PM	3	185	34	0	0	0	114	404	0	207	0	46	993
6:00 PM	0	161	52	0	0	0	123	377	0	208	0	38	959
6:15 PM	0	163	56	1	0	0	139	379	1	170	0	48	957
6:30 PM	1	147	69	2	1	0	103	326	0	199	0	41	889
6:45 PM	0	139	69	0	0	0	122	296	8	150	0	52	836
TOTAL VOLUMES:	5	2029	601	13	6	0	1415	4043	10	2183	0	561	10866

PM Peak Hr Begins at: 515 PM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	3	681	175	0	0	0	485	1569	0	818	0	180	3911

PEAK HR FACTOR:	0.967	0.000	0.872	0.934	0.941

Location: Irvine
N/S: Sand Canyon Avenue
E/W: Marine Way

ITAM: 304
Date: 5/24/2018
Day: Thursday

	Sand Canyon Avenue Southbound			Marine Way Westbound			Sand Canyon Avenue Northbound			Marine Way Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
7:00 AM	17	298	0	44	0	16	0	153	78	0	0	0	606
7:15 AM	14	345	0	45	0	23	0	143	58	0	0	0	628
7:30 AM	19	465	0	75	0	29	0	135	39	0	0	0	762
7:45 AM	24	542	0	79	0	25	0	117	38	0	0	0	825
8:00 AM	17	489	0	93	0	26	0	118	50	0	0	0	793
8:15 AM	29	584	0	108	0	30	0	86	40	0	0	0	877
8:30 AM	26	486	0	92	0	20	0	134	34	0	0	0	792
8:45 AM	23	538	0	94	0	18	0	129	41	0	0	0	843
TOTAL VOLUMES:	169	3747	0	630	0	187	0	1015	378	0	0	0	6126

AM Peak Hr Begins at: 800 AM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	95	2097	0	387	0	94	0	467	165	0	0	0	3305

PEAK HR FACTOR:	0.894	0.871	0.929	0.000	0.942

	Sand Canyon Avenue Southbound			Marine Way Westbound			Sand Canyon Avenue Northbound			Marine Way Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
4:00 PM	30	171	0	51	0	23	0	313	43	0	0	0	631
4:15 PM	16	222	0	41	0	28	0	431	48	0	0	0	786
4:30 PM	25	189	0	51	0	18	0	382	52	0	0	0	717
4:45 PM	42	205	0	33	0	24	0	431	67	0	0	0	802
5:00 PM	20	207	0	36	0	29	0	471	83	0	0	0	846
5:15 PM	23	207	0	38	0	21	0	599	68	0	0	0	956
5:30 PM	27	170	0	36	0	18	0	503	71	0	0	0	825
5:45 PM	21	258	0	37	0	23	0	451	102	0	0	0	892
6:00 PM	23	166	0	38	0	23	0	492	98	0	0	0	840
6:15 PM	24	244	0	36	0	24	0	437	92	0	0	0	857
6:30 PM	18	171	0	29	0	22	0	398	80	0	0	0	718
6:45 PM	23	218	0	49	0	40	0	409	61	0	0	0	800
TOTAL VOLUMES:	292	2428	0	475	0	293	0	5317	865	0	0	0	9670

PM Peak Hr Begins at: 500 PM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	91	842	0	147	0	91	0	2024	324	0	0	0	3519

PEAK HR FACTOR:	0.836	0.915	0.880	0.000	0.920

Counts Unlimited
P.O. Box 1178
Corona, CA 92878
(951) 268-6268

Location: Irvine
N/S: Sand Canyon Avenue
E/W: I-5 SB Ramps

ITAM: 305
Date: 5/22/2018
Day: Tuesday

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			I-5 SB Ramps Westbound			Sand Canyon Avenue Northbound			I-5 SB Ramps Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
7:00 AM	105	251	0	0	0	0	0	98	18	94	0	161	727
7:15 AM	129	337	0	0	0	0	0	96	21	82	1	203	869
7:30 AM	143	438	0	0	0	0	0	91	33	63	0	188	956
7:45 AM	161	486	0	0	0	0	0	102	34	48	0	194	1025
8:00 AM	154	455	0	0	0	0	0	83	29	51	2	255	1029
8:15 AM	175	407	0	0	0	0	0	108	22	52	1	234	999
8:30 AM	169	413	0	0	0	0	0	104	28	53	0	229	996
8:45 AM	163	439	0	0	0	0	0	118	23	44	0	221	1008
TOTAL VOLUMES:	1199	3226	0	0	0	0	0	800	208	487	4	1685	7609

AM Peak Hr Begins at: 745 AM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	659	1761	0	0	0	0	0	397	113	204	3	912	4049

PEAK HR FACTOR:	0.935	0.000	0.938	0.908	0.984

TOTAL VEHICLES

	Sand Canyon Avenue Southbound			I-5 SB Ramps Westbound			Sand Canyon Avenue Northbound			I-5 SB Ramps Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
4:00 PM	87	193	0	0	0	0	0	341	81	69	0	38	809
4:15 PM	73	181	0	0	0	0	0	358	94	82	2	55	845
4:30 PM	78	162	0	0	0	0	0	367	83	93	2	74	859
4:45 PM	64	155	0	0	0	0	0	351	78	84	1	75	808
5:00 PM	71	141	0	0	0	0	0	409	119	125	0	71	936
5:15 PM	66	123	0	0	0	0	0	474	113	133	2	77	988
5:30 PM	73	131	0	0	0	0	0	429	92	118	0	75	918
5:45 PM	62	154	0	0	0	0	0	396	76	163	0	59	910
6:00 PM	81	146	0	0	0	0	0	377	63	150	0	64	881
6:15 PM	82	166	0	0	0	0	0	395	54	123	0	55	875
6:30 PM	75	124	0	0	0	0	0	339	57	149	0	59	803
6:45 PM	78	117	0	0	0	0	0	315	44	195	0	61	810
TOTAL VOLUMES:	890	1793	0	0	0	0	0	4551	954	1484	7	763	10442

PM Peak Hr Begins at: 500 PM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	272	549	0	0	0	0	0	1708	400	539	2	282	3752

PEAK HR FACTOR:	0.950	0.000	0.898	0.927	0.949

Counts Unlimited
P.O. Box 1178
Corona, CA 92878
(951) 268-6268

Location: Irvine
N/S: SR-133 SB Ramps
E/W: Irvine Boulevard

ITAM: 316
Date: 3/29/2017
Day: Thursday

	SR-133 SB Ramps Southbound			Irvine Boulevard Westbound			SR-133 SB Ramps Northbound			Irvine Boulevard Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
7:00 AM	63	0	42	54	220	0	0	0	0	0	278	35	692
7:15 AM	38	0	54	70	241	0	0	0	0	0	267	36	706
7:30 AM	27	0	76	77	316	0	0	0	0	0	415	50	961
7:45 AM	37	1	71	76	354	0	0	0	0	0	396	79	1014
8:00 AM	38	0	48	91	439	0	0	0	0	0	262	70	948
8:15 AM	19	0	49	82	301	0	0	0	0	0	339	87	877
8:30 AM	27	1	32	76	258	0	0	0	0	0	284	70	748
8:45 AM	32	1	45	68	236	0	0	0	0	0	341	76	799
TOTAL VOLUMES:	281	3	417	594	2365	0	0	0	0	0	2582	503	6745

AM Peak Hr Begins at: 730 AM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	121	1	244	326	1410	0	0	0	0	0	1412	286	3800

PEAK HR FACTOR:	0.839	0.819	0.000	0.894	0.937

	SR-133 SB Ramps Southbound			Irvine Boulevard Westbound			SR-133 SB Ramps Northbound			Irvine Boulevard Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
4:00 PM	15	0	41	37	419	0	0	0	0	0	300	31	843
4:15 PM	9	0	30	27	448	0	0	0	0	0	267	29	810
4:30 PM	13	0	23	29	446	0	0	0	0	0	286	24	821
4:45 PM	11	1	20	29	524	0	0	0	0	0	311	27	923
5:00 PM	7	0	34	23	481	0	0	0	0	0	294	23	862
5:15 PM	8	0	45	35	585	0	0	0	0	0	305	36	1014
5:30 PM	12	0	36	41	525	0	0	0	0	0	293	26	933
5:45 PM	18	1	37	31	505	0	0	0	0	0	320	36	948
6:00 PM	9	1	35	24	460	0	0	0	0	0	304	25	858
6:15 PM	5	1	15	12	406	0	0	0	0	0	295	15	749
6:30 PM	7	0	27	25	303	0	0	0	0	0	276	22	660
6:45 PM	8	1	22	18	286	0	0	0	0	0	263	19	617
TOTAL VOLUMES:	122	5	365	331	5388	0	0	0	0	0	3514	313	10038

PM Peak Hr Begins at: 500 PM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	45	1	152	130	2096	0	0	0	0	0	1212	121	3757

PEAK HR FACTOR:	0.884	0.898	0.000	0.936	0.926

Counts Unlimited
P.O. Box 1178
Corona, CA 92878
(951) 268-6268

Location: Irvine
N/S: SR-133 NB Ramps
E/W: Irvine Boulevard

ITAM: 317
Date: 3/29/2018
Day: Thursday

	SR-133 NB Ramps Southbound			Irvine Boulevard Westbound			SR-133 NB Ramps Northbound			Irvine Boulevard Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
7:00 AM	0	0	0	0	264	17	13	0	21	0	311	37	663
7:15 AM	0	0	0	0	269	25	30	0	31	0	274	29	658
7:30 AM	0	0	0	0	394	23	27	0	22	0	403	33	902
7:45 AM	0	0	0	0	440	16	28	0	32	0	425	29	970
8:00 AM	0	0	0	0	487	21	22	0	23	0	278	36	867
8:15 AM	0	0	0	0	346	19	18	0	20	0	315	25	743
8:30 AM	0	0	0	0	305	21	24	0	20	0	272	30	672
8:45 AM	0	0	0	0	257	27	19	0	17	0	327	28	675
TOTAL VOLUMES:	0	0	0	0	2762	169	181	0	186	0	2605	247	6150

AM Peak Hr Begins at: 730 AM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	0	0	0	0	1667	79	95	0	97	0	1421	123	3482

PEAK HR FACTOR:	0.000	0.859	0.800	0.850	0.897

	SR-133 NB Ramps Southbound			Irvine Boulevard Westbound			SR-133 NB Ramps Northbound			Irvine Boulevard Eastbound			
	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
4:00 PM	0	0	0	0	406	37	46	0	42	0	234	63	828
4:15 PM	0	0	0	0	410	31	58	0	39	0	210	57	805
4:30 PM	0	0	0	0	492	34	44	0	51	0	240	55	916
4:45 PM	0	0	0	0	470	48	59	0	38	0	251	48	914
5:00 PM	0	0	0	0	461	37	55	0	58	0	249	49	909
5:15 PM	0	0	0	0	543	40	83	0	55	0	260	51	1032
5:30 PM	0	0	0	0	493	33	63	0	61	0	258	49	957
5:45 PM	0	0	0	0	429	31	64	0	54	0	313	48	939
6:00 PM	0	0	0	0	447	27	49	0	67	0	276	51	917
6:15 PM	0	0	0	0	376	28	52	0	55	0	290	38	839
6:30 PM	0	0	0	0	316	20	52	0	43	0	241	28	700
6:45 PM	0	0	0	0	301	18	28	0	53	0	229	35	664
TOTAL VOLUMES:	0	0	0	0	5144	384	653	0	616	0	3051	572	10420

PM Peak Hr Begins at: 515 PM

	SL	ST	SR	WL	WT	WR	NL	NT	NR	EL	ET	ER	TOTAL
PEAK VOLUMES:	0	0	0	0	1912	131	259	0	237	0	1107	199	3845

PEAK HR FACTOR:	0.000	0.876	0.899	0.904	0.931

Appendix C:
LOS Calculation Worksheets

Existing (2020) Conditions

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro — Scenario 1 Base AM

Report File: N:\...\2020 EX Base AM.pdf — 8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.366	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.580	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.496	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.538	-	A
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.596	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.600	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.556	-	A
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.465	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.366

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	1	0	1	2	0
Pocket Length [ft]	280.00	500.00	100.00	300.00	380.00	100.00
Speed [mph]	50.00		50.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	226	130	507	402	342	727
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	130	507	402	342	727
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	33	127	101	86	182
Total Analysis Volume [veh/h]	226	130	507	402	342	727
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Overlap	Permissive	Unsignalized	Protected	Permissive
Signal Group	6	0	8	0	7	4
Auxiliary Signal Groups						
Lead / Lag	Lag	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.15	0.00	0.10	0.21
Intersection LOS	A					
Intersection V/C	0.366					

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.580

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	87	196	397	361	675	68	58	1061	207	510	847	179
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	196	397	361	675	68	58	1061	207	510	847	179
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	49	99	90	169	17	15	265	52	128	212	45
Total Analysis Volume [veh/h]	87	196	397	361	675	68	58	1061	207	510	847	179
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.04	0.00	0.11	0.20	0.04	0.02	0.16	0.12	0.15	0.17	0.11
Intersection LOS	A											
Intersection V/C	0.580											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.496

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	70	11	40	54	3	15	122	39	22	339	77
Total Analysis Volume [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.06	0.00	0.05	0.04	0.01	0.02	0.10	0.00	0.03	0.33	0.33
Intersection LOS	A											
Intersection V/C	0.496											

Intersection Level Of Service Report

Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.538

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	112	0	0	441	114	71	0	120	0	0	0
Total Analysis Volume [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.09	0.09	0.00	0.35	0.27	0.08	0.00	0.00	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.538											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.596

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	486	172	99	2182	403	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	486	172	99	2182	403	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	122	43	25	546	101	25
Total Analysis Volume [veh/h]	486	172	99	2182	403	98
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.10	0.03	0.43	0.12	0.06
Intersection LOS	A					
Intersection V/C	0.596					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.600

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	103	30	172	458	0	53	0	237	0	0	0
Total Analysis Volume [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.06	0.07	0.20	0.27	0.00	0.04	0.00	0.17	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.600											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.556

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	32	0	64	0	367	75	85	367	0
Total Analysis Volume [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.07	0.00	0.26	0.26	0.10	0.43	0.00
Intersection LOS	A											
Intersection V/C	0.556											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.465

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	0	25	0	0	0	0	370	0	0	434	21
Total Analysis Volume [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.36	0.36
Intersection LOS	A											
Intersection V/C	0.465											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro
Scenario 2 Base PM

Report File: N:\...\2020 EX Base PM.pdf
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.418	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.541	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.519	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.622	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.547	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.520	-	A
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.738	-	C
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.625	-	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.418

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	1	0	1	2	0
Pocket Length [ft]	280.00	500.00	100.00	300.00	380.00	100.00
Speed [mph]	50.00		50.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	644	361	458	190	148	532
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	644	361	458	190	148	532
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	161	90	115	48	37	133
Total Analysis Volume [veh/h]	644	361	458	190	148	532
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Overlap	Permissive	Unsignalized	Protected	Permissive
Signal Group	6	0	8	0	7	4
Auxiliary Signal Groups						
Lead / Lag	Lag	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.13	0.00	0.04	0.16
Intersection LOS	A					
Intersection V/C	0.418					

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.541

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	286	740	485	149	266	79	155	773	149	445	1309	427
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	286	740	485	149	266	79	155	773	149	445	1309	427
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	72	185	121	37	67	20	39	193	37	111	327	107
Total Analysis Volume [veh/h]	286	740	485	149	266	79	155	773	149	445	1309	427
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.15	0.00	0.04	0.08	0.05	0.05	0.11	0.09	0.13	0.26	0.25
Intersection LOS	A											
Intersection V/C	0.541											

Intersection Level Of Service Report

Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.519

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	40	11	41	31	9	66	486	54	7	167	40
Total Analysis Volume [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.03	0.00	0.05	0.02	0.02	0.08	0.38	0.00	0.01	0.16	0.16
Intersection LOS	A											
Intersection V/C	0.519											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.622

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	126	408	0	1	177	46	213	0	47	0	0	0
Total Analysis Volume [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.32	0.00	0.00	0.14	0.11	0.25	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.622											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.547

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2106	337	95	876	153	95
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2106	337	95	876	153	95
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	527	84	24	219	38	24
Total Analysis Volume [veh/h]	2106	337	95	876	153	95
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.41	0.20	0.03	0.17	0.05	0.06
Intersection LOS	A					
Intersection V/C	0.547					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.520

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	444	104	71	143	0	140	0	73	0	0	0
Total Analysis Volume [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.26	0.24	0.08	0.08	0.00	0.11	0.00	0.13	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.520											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.738

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	12	0	40	0	315	32	34	545	0
Total Analysis Volume [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.20	0.20	0.04	0.64	0.00
Intersection LOS	C											
Intersection V/C	0.738											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.625

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	0	62	0	0	0	0	288	0	0	497	34
Total Analysis Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.00	0.15	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.42	0.42
Intersection LOS	B											
Intersection V/C	0.625											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro
Report File: N:\...\2020 EX PP AM_Route 1A through I-5 N.pdf

Scenario 3 Base Route 1A AM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.396	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.588	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.505	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.538	-	A
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.596	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.600	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.556	-	A
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.465	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report

Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.396

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	0	130	0	0	0	0	507	402	342	727	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	45	130	0	27	0	0	507	402	342	727	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	11	33	0	7	0	0	127	101	86	182	0
Total Analysis Volume [veh/h]	226	45	130	0	27	0	0	507	402	342	727	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.08	0.00	0.00	0.02	0.00	0.00	0.15	0.00	0.10	0.21	0.00
Intersection LOS	A											
Intersection V/C	0.396											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.588

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	87	196	397	361	675	68	58	1061	207	510	847	179
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	241	397	361	702	68	58	1061	207	510	847	179
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	60	99	90	176	17	15	265	52	128	212	45
Total Analysis Volume [veh/h]	87	241	397	361	702	68	58	1061	207	510	847	179
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.11	0.21	0.04	0.02	0.16	0.12	0.15	0.17	0.11
Intersection LOS	A											
Intersection V/C	0.588											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.505

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	183	326	42	159	242	11	61	488	156	86	1355	309
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	82	11	40	61	3	15	122	39	22	339	77
Total Analysis Volume [veh/h]	183	326	42	159	242	11	61	488	156	86	1355	309
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.06	0.00	0.05	0.05	0.01	0.02	0.10	0.00	0.03	0.33	0.33
Intersection LOS	A											
Intersection V/C	0.505											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.538

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	0	27	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	199	492	1	0	1762	484	283	0	480	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	123	0	0	441	121	71	0	120	0	0	0
Total Analysis Volume [veh/h]	199	492	1	0	1762	484	283	0	480	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.10	0.10	0.00	0.35	0.28	0.08	0.00	0.00	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.538											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.596

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	486	172	99	2182	403	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	531	172	99	2182	403	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	133	43	25	546	101	25
Total Analysis Volume [veh/h]	531	172	99	2182	403	98
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

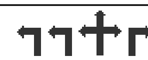
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.10	0.03	0.43	0.12	0.06
Intersection LOS	A					
Intersection V/C	0.596					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.600

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	413	118	686	1832	0	257	0	949	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	103	30	172	458	0	64	0	237	0	0	0
Total Analysis Volume [veh/h]	0	413	118	686	1832	0	257	0	949	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.06	0.07	0.20	0.27	0.00	0.05	0.00	0.18	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.600											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.556

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	32	0	64	0	367	75	85	367	0
Total Analysis Volume [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.07	0.00	0.26	0.26	0.10	0.43	0.00
Intersection LOS	A											
Intersection V/C	0.556											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.465

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	0	25	0	0	0	0	370	0	0	434	21
Total Analysis Volume [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.36	0.36
Intersection LOS	A											
Intersection V/C	0.465											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro

Report File: N:\...\2020 EX PP PM_Route 1A through I-5 N.pdf

Scenario 4 Base Route 1A PM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.429	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.541	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.519	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.622	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.547	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.520	-	A
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.738	-	C
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.625	-	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.429

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	644	0	361	0	0	0	0	458	190	148	532	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	644	0	361	0	18	0	0	458	190	148	532	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	161	0	90	0	5	0	0	115	48	37	133	0
Total Analysis Volume [veh/h]	644	0	361	0	18	0	0	458	190	148	532	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.00	0.00	0.01	0.00	0.00	0.13	0.00	0.04	0.16	0.00
Intersection LOS	A											
Intersection V/C	0.429											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.541

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	286	740	485	149	266	79	155	773	149	445	1309	427
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	286	740	485	149	284	79	155	773	149	445	1309	427
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	72	185	121	37	71	20	39	193	37	111	327	107
Total Analysis Volume [veh/h]	286	740	485	149	284	79	155	773	149	445	1309	427
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.15	0.00	0.04	0.08	0.05	0.05	0.11	0.09	0.13	0.26	0.25
Intersection LOS	A											
Intersection V/C	0.541											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.519

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	111	161	43	164	140	35	263	1945	215	28	666	159
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	40	11	41	35	9	66	486	54	7	167	40
Total Analysis Volume [veh/h]	111	161	43	164	140	35	263	1945	215	28	666	159
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.03	0.00	0.05	0.03	0.02	0.08	0.38	0.00	0.01	0.16	0.16
Intersection LOS	A											
Intersection V/C	0.519											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.622

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	18	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	505	1632	0	3	709	200	851	0	187	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	126	408	0	1	177	50	213	0	47	0	0	0
Total Analysis Volume [veh/h]	505	1632	0	3	709	200	851	0	187	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.32	0.00	0.00	0.14	0.12	0.25	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.622											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.547

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2106	337	95	876	153	95
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2106	337	95	876	153	95
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	527	84	24	219	38	24
Total Analysis Volume [veh/h]	2106	337	95	876	153	95
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.41	0.20	0.03	0.17	0.05	0.06
Intersection LOS	A					
Intersection V/C	0.547					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.520

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	444	104	71	143	0	140	0	73	0	0	0
Total Analysis Volume [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.26	0.24	0.08	0.08	0.00	0.11	0.00	0.13	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.520											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.738

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	12	0	40	0	315	32	34	545	0
Total Analysis Volume [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.20	0.20	0.04	0.64	0.00
Intersection LOS	C											
Intersection V/C	0.738											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.625

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	0	62	0	0	0	0	288	0	0	497	34
Total Analysis Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.00	0.15	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.42	0.42
Intersection LOS	B											
Intersection V/C	0.625											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro

Report File: N:\...\2020 EX PP AM_Route 1B through I-5 S.pdf

Scenario 5 Base Route 1B AM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.396	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.588	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.505	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.556	-	A
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.602	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.608	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.556	-	A
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.465	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.396

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	0	130	0	0	0	0	507	402	342	727	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	45	130	0	27	0	0	507	402	342	727	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	11	33	0	7	0	0	127	101	86	182	0
Total Analysis Volume [veh/h]	226	45	130	0	27	0	0	507	402	342	727	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.08	0.00	0.00	0.02	0.00	0.00	0.15	0.00	0.10	0.21	0.00
Intersection LOS	A											
Intersection V/C	0.396											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.588

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	87	196	397	361	675	68	58	1061	207	510	847	179
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	241	397	361	702	68	58	1061	207	510	847	179
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	60	99	90	176	17	15	265	52	128	212	45
Total Analysis Volume [veh/h]	87	241	397	361	702	68	58	1061	207	510	847	179
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.11	0.21	0.04	0.02	0.16	0.12	0.15	0.17	0.11
Intersection LOS	A											
Intersection V/C	0.588											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.505

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	183	326	42	159	242	11	61	488	156	86	1355	309
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	82	11	40	61	3	15	122	39	22	339	77
Total Analysis Volume [veh/h]	183	326	42	159	242	11	61	488	156	86	1355	309
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.06	0.00	0.05	0.05	0.01	0.02	0.10	0.00	0.03	0.33	0.33
Intersection LOS	A											
Intersection V/C	0.505											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.556

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	27	0	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	199	447	1	0	1789	457	328	0	480	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	112	0	0	447	114	82	0	120	0	0	0
Total Analysis Volume [veh/h]	199	447	1	0	1789	457	328	0	480	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.09	0.09	0.00	0.35	0.27	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.556											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.602

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	486	172	99	2182	403	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	486	172	99	2209	403	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	122	43	25	552	101	25
Total Analysis Volume [veh/h]	486	172	99	2209	403	98
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.10	0.03	0.43	0.12	0.06
Intersection LOS	B					
Intersection V/C	0.602					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.608

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	413	118	713	1832	0	212	0	949	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	103	30	178	458	0	53	0	237	0	0	0
Total Analysis Volume [veh/h]	0	413	118	713	1832	0	212	0	949	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.06	0.07	0.21	0.27	0.00	0.04	0.00	0.17	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.608											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.556

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	32	0	64	0	367	75	85	367	0
Total Analysis Volume [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.07	0.00	0.26	0.26	0.10	0.43	0.00
Intersection LOS	A											
Intersection V/C	0.556											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.465

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	0	25	0	0	0	0	370	0	0	434	21
Total Analysis Volume [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.36	0.36
Intersection LOS	A											
Intersection V/C	0.465											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro

Report File: N:\...\2020 EX PP PM_Route 1B through I-5 S.pdf

Scenario 6 Base Route 1B PM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.429	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.541	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.519	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.622	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.547	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.525	-	A
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.738	-	C
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.625	-	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.429

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	644	0	361	0	0	0	0	458	190	148	532	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	644	0	361	0	18	0	0	458	190	148	532	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	161	0	90	0	5	0	0	115	48	37	133	0
Total Analysis Volume [veh/h]	644	0	361	0	18	0	0	458	190	148	532	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.00	0.00	0.01	0.00	0.00	0.13	0.00	0.04	0.16	0.00
Intersection LOS	A											
Intersection V/C	0.429											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.541

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	286	740	485	149	266	79	155	773	149	445	1309	427
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	286	740	485	149	284	79	155	773	149	445	1309	427
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	72	185	121	37	71	20	39	193	37	111	327	107
Total Analysis Volume [veh/h]	286	740	485	149	284	79	155	773	149	445	1309	427
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.15	0.00	0.04	0.08	0.05	0.05	0.11	0.09	0.13	0.26	0.25
Intersection LOS	A											
Intersection V/C	0.541											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.519

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	111	161	43	164	140	35	263	1945	215	28	666	159
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	40	11	41	35	9	66	486	54	7	167	40
Total Analysis Volume [veh/h]	111	161	43	164	140	35	263	1945	215	28	666	159
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.03	0.00	0.05	0.03	0.02	0.08	0.38	0.00	0.01	0.16	0.16
Intersection LOS	A											
Intersection V/C	0.519											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.622

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	505	1632	0	3	727	182	851	0	187	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	126	408	0	1	182	46	213	0	47	0	0	0
Total Analysis Volume [veh/h]	505	1632	0	3	727	182	851	0	187	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.32	0.00	0.00	0.14	0.11	0.25	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.622											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.547

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2106	337	95	876	153	95
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2106	337	95	894	153	95
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	527	84	24	224	38	24
Total Analysis Volume [veh/h]	2106	337	95	894	153	95
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.41	0.20	0.03	0.18	0.05	0.06
Intersection LOS	A					
Intersection V/C	0.547					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.525

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1777	416	301	571	0	561	0	293	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	444	104	75	143	0	140	0	73	0	0	0
Total Analysis Volume [veh/h]	0	1777	416	301	571	0	561	0	293	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.26	0.24	0.09	0.08	0.00	0.11	0.00	0.13	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.525											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.738

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	12	0	40	0	315	32	34	545	0
Total Analysis Volume [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.20	0.20	0.04	0.64	0.00
Intersection LOS	C											
Intersection V/C	0.738											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.625

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	0	62	0	0	0	0	288	0	0	497	34
Total Analysis Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.00	0.15	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.42	0.42
Intersection LOS	B											
Intersection V/C	0.625											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro

Report File: N:\...\2020 EX PP AM_Route 2A through SR-133 N.pdf

Scenario 7 Base Route 2A AM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.396	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.580	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.496	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.538	-	A
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.596	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.600	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.569	-	A
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.465	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.396

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	0	130	0	0	0	0	507	402	342	727	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	45	130	0	27	0	0	507	402	342	727	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	11	33	0	7	0	0	127	101	86	182	0
Total Analysis Volume [veh/h]	226	45	130	0	27	0	0	507	402	342	727	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.08	0.00	0.00	0.02	0.00	0.00	0.15	0.00	0.10	0.21	0.00
Intersection LOS	A											
Intersection V/C	0.396											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.580

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	87	196	397	361	675	68	58	1061	207	510	847	179
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	45
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	196	397	388	675	68	58	1061	207	510	847	224
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	49	99	97	169	17	15	265	52	128	212	56
Total Analysis Volume [veh/h]	87	196	397	388	675	68	58	1061	207	510	847	224
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.04	0.00	0.11	0.20	0.04	0.02	0.16	0.12	0.15	0.17	0.13
Intersection LOS	A											
Intersection V/C	0.580											

Intersection Level Of Service Report

Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.496

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	70	11	40	54	3	15	122	39	22	339	77
Total Analysis Volume [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.06	0.00	0.05	0.04	0.01	0.02	0.10	0.00	0.03	0.33	0.33
Intersection LOS	A											
Intersection V/C	0.496											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.538

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	112	0	0	441	114	71	0	120	0	0	0
Total Analysis Volume [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.09	0.09	0.00	0.35	0.27	0.08	0.00	0.00	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.538											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.596

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	486	172	99	2182	403	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	486	172	99	2182	403	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	122	43	25	546	101	25
Total Analysis Volume [veh/h]	486	172	99	2182	403	98
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.10	0.03	0.43	0.12	0.06
Intersection LOS	A					
Intersection V/C	0.596					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.600

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	103	30	172	458	0	53	0	237	0	0	0
Total Analysis Volume [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.06	0.07	0.20	0.27	0.00	0.04	0.00	0.17	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.600											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.569

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	45	0	27	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	126	0	299	0	1496	298	339	1467	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	32	0	75	0	374	75	85	367	0
Total Analysis Volume [veh/h]	0	0	0	126	0	299	0	1496	298	339	1467	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.09	0.00	0.26	0.26	0.10	0.43	0.00
Intersection LOS	A											
Intersection V/C	0.569											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.465

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	0	25	0	0	0	0	370	0	0	434	21
Total Analysis Volume [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.36	0.36
Intersection LOS	A											
Intersection V/C	0.465											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro

Report File: N:\...\2020 EX PP PM_Route 2A through SR-133 N.pdf

Scenario 8 Base Route 2A PM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.429	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.546	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.519	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.622	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.547	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.520	-	A
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.738	-	C
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.625	-	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.429

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	644	0	361	0	0	0	0	458	190	148	532	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	644	0	361	0	18	0	0	458	190	148	532	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	161	0	90	0	5	0	0	115	48	37	133	0
Total Analysis Volume [veh/h]	644	0	361	0	18	0	0	458	190	148	532	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.00	0.00	0.01	0.00	0.00	0.13	0.00	0.04	0.16	0.00
Intersection LOS	A											
Intersection V/C	0.429											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.546

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	286	740	485	149	266	79	155	773	149	445	1309	427
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	286	740	485	167	266	79	155	773	149	445	1309	427
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	72	185	121	42	67	20	39	193	37	111	327	107
Total Analysis Volume [veh/h]	286	740	485	167	266	79	155	773	149	445	1309	427
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.15	0.00	0.05	0.08	0.05	0.05	0.11	0.09	0.13	0.26	0.25
Intersection LOS	A											
Intersection V/C	0.546											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.519

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	40	11	41	31	9	66	486	54	7	167	40
Total Analysis Volume [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.03	0.00	0.05	0.02	0.02	0.08	0.38	0.00	0.01	0.16	0.16
Intersection LOS	A											
Intersection V/C	0.519											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.622

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	126	408	0	1	177	46	213	0	47	0	0	0
Total Analysis Volume [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.32	0.00	0.00	0.14	0.11	0.25	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.622											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.547

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2106	337	95	876	153	95
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2106	337	95	876	153	95
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	527	84	24	219	38	24
Total Analysis Volume [veh/h]	2106	337	95	876	153	95
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.41	0.20	0.03	0.17	0.05	0.06
Intersection LOS	A					
Intersection V/C	0.547					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.520

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	444	104	71	143	0	140	0	73	0	0	0
Total Analysis Volume [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.26	0.24	0.08	0.08	0.00	0.11	0.00	0.13	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.520											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.738

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	18	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	47	0	158	0	1279	126	135	2181	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	12	0	40	0	320	32	34	545	0
Total Analysis Volume [veh/h]	0	0	0	47	0	158	0	1279	126	135	2181	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.21	0.21	0.04	0.64	0.00
Intersection LOS	C											
Intersection V/C	0.738											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.625

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	0	62	0	0	0	0	288	0	0	497	34
Total Analysis Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.00	0.15	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.42	0.42
Intersection LOS	B											
Intersection V/C	0.625											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro
Report File: N:\...\2020 EX PP AM_Route 2B through SR-133 S.pdf

Scenario 9 Base Route 2B AM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.396	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.580	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.496	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.538	-	A
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.596	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.600	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.569	-	A
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.491	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.396

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	0	130	0	0	0	0	507	402	342	727	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	45	130	0	27	0	0	507	402	342	727	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	11	33	0	7	0	0	127	101	86	182	0
Total Analysis Volume [veh/h]	226	45	130	0	27	0	0	507	402	342	727	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.08	0.00	0.00	0.02	0.00	0.00	0.15	0.00	0.10	0.21	0.00
Intersection LOS	A											
Intersection V/C	0.396											

Intersection Level Of Service Report

Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.580

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	87	196	397	361	675	68	58	1061	207	510	847	179
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	45
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	196	397	388	675	68	58	1061	207	510	847	224
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	49	99	97	169	17	15	265	52	128	212	56
Total Analysis Volume [veh/h]	87	196	397	388	675	68	58	1061	207	510	847	224
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.04	0.00	0.11	0.20	0.04	0.02	0.16	0.12	0.15	0.17	0.13
Intersection LOS	A											
Intersection V/C	0.580											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.496

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	70	11	40	54	3	15	122	39	22	339	77
Total Analysis Volume [veh/h]	183	281	42	159	215	11	61	488	156	86	1355	309
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.06	0.00	0.05	0.04	0.01	0.02	0.10	0.00	0.03	0.33	0.33
Intersection LOS	A											
Intersection V/C	0.496											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.538

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	112	0	0	441	114	71	0	120	0	0	0
Total Analysis Volume [veh/h]	199	447	1	0	1762	457	283	0	480	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.09	0.09	0.00	0.35	0.27	0.08	0.00	0.00	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.538											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.596

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	486	172	99	2182	403	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	486	172	99	2182	403	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	122	43	25	546	101	25
Total Analysis Volume [veh/h]	486	172	99	2182	403	98
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.10	0.03	0.43	0.12	0.06
Intersection LOS	A					
Intersection V/C	0.596					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.600

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	103	30	172	458	0	53	0	237	0	0	0
Total Analysis Volume [veh/h]	0	413	118	686	1832	0	212	0	949	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.06	0.07	0.20	0.27	0.00	0.04	0.00	0.17	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.600											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.569

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	126	0	254	0	1469	298	339	1467	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	27	0	45	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	126	0	254	0	1469	325	339	1512	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	32	0	64	0	367	81	85	378	0
Total Analysis Volume [veh/h]	0	0	0	126	0	254	0	1469	325	339	1512	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.07	0.00	0.26	0.26	0.10	0.44	0.00
Intersection LOS	A											
Intersection V/C	0.569											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.491

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	99	0	101	0	0	0	0	1478	0	0	1734	82
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	144	0	101	0	0	0	0	1478	0	0	1734	82
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	36	0	25	0	0	0	0	370	0	0	434	21
Total Analysis Volume [veh/h]	144	0	101	0	0	0	0	1478	0	0	1734	82
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.06	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.36	0.36
Intersection LOS	A											
Intersection V/C	0.491											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2020 EX_Version 2.vistro

Report File: N:\...\2020 EX PP PM_Route 2B through SR-133 S.pdf

Scenario 10 Base Route 2B PM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.429	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.546	-	A
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.519	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.622	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.547	-	A
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.520	-	A
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.738	-	C
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.625	-	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.429

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	644	0	361	0	0	0	0	458	190	148	532	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	644	0	361	0	18	0	0	458	190	148	532	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	161	0	90	0	5	0	0	115	48	37	133	0
Total Analysis Volume [veh/h]	644	0	361	0	18	0	0	458	190	148	532	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.00	0.00	0.01	0.00	0.00	0.13	0.00	0.04	0.16	0.00
Intersection LOS	A											
Intersection V/C	0.429											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.546

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	286	740	485	149	266	79	155	773	149	445	1309	427
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	286	740	485	167	266	79	155	773	149	445	1309	427
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	72	185	121	42	67	20	39	193	37	111	327	107
Total Analysis Volume [veh/h]	286	740	485	167	266	79	155	773	149	445	1309	427
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.15	0.00	0.05	0.08	0.05	0.05	0.11	0.09	0.13	0.26	0.25
Intersection LOS	A											
Intersection V/C	0.546											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.519

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	40	11	41	31	9	66	486	54	7	167	40
Total Analysis Volume [veh/h]	111	161	43	164	122	35	263	1945	215	28	666	159
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.03	0.00	0.05	0.02	0.02	0.08	0.38	0.00	0.01	0.16	0.16
Intersection LOS	A											
Intersection V/C	0.519											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.622

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	126	408	0	1	177	46	213	0	47	0	0	0
Total Analysis Volume [veh/h]	505	1632	0	3	709	182	851	0	187	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.32	0.00	0.00	0.14	0.11	0.25	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.622											

Intersection Level Of Service Report

Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.547

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2106	337	95	876	153	95
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2106	337	95	876	153	95
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	527	84	24	219	38	24
Total Analysis Volume [veh/h]	2106	337	95	876	153	95
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.41	0.20	0.03	0.17	0.05	0.06
Intersection LOS	A					
Intersection V/C	0.547					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.520

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	444	104	71	143	0	140	0	73	0	0	0
Total Analysis Volume [veh/h]	0	1777	416	283	571	0	561	0	293	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.26	0.24	0.08	0.08	0.00	0.11	0.00	0.13	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.520											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.738

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	47	0	158	0	1261	126	135	2181	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	18	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	47	0	158	0	1261	144	135	2181	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	12	0	40	0	315	36	34	545	0
Total Analysis Volume [veh/h]	0	0	0	47	0	158	0	1261	144	135	2181	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.21	0.21	0.04	0.64	0.00
Intersection LOS	C											
Intersection V/C	0.738											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.625

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	0	62	0	0	0	0	288	0	0	497	34
Total Analysis Volume [veh/h]	269	0	247	0	0	0	0	1152	0	0	1989	136
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.00	0.15	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.42	0.42
Intersection LOS	B											
Intersection V/C	0.625											

Interim Year (2023) Approved Project Conditions

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Report File: N:\...\2023 APP NB AM.pdf

Scenario 1 2023 APP NB AM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.426	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.681	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.580	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.630	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.700	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.704	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.652	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.544	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.426

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	1	0	1	2	0
Pocket Length [ft]	280.00	500.00	100.00	300.00	380.00	100.00
Speed [mph]	50.00		50.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	268	155	602	477	407	865
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	268	155	602	477	407	865
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	39	151	119	102	216
Total Analysis Volume [veh/h]	268	155	602	477	407	865
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Overlap	Permissive	Unsignalized	Protected	Permissive
Signal Group	6	0	8	0	7	4
Auxiliary Signal Groups						
Lead / Lag	Lag	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.18	0.00	0.12	0.25
Intersection LOS	A					
Intersection V/C	0.426					

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.681

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	104	233	472	429	803	80	69	1262	246	606	1007	213
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	104	233	472	429	803	80	69	1262	246	606	1007	213
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	58	118	107	201	20	17	316	62	152	252	53
Total Analysis Volume [veh/h]	104	233	472	429	803	80	69	1262	246	606	1007	213
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.13	0.24	0.05	0.02	0.19	0.14	0.18	0.20	0.13
Intersection LOS	B											
Intersection V/C	0.681											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.580

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	55	84	12	47	64	4	18	145	47	26	403	92
Total Analysis Volume [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.07	0.00	0.06	0.05	0.01	0.02	0.11	0.00	0.03	0.39	0.39
Intersection LOS	A											
Intersection V/C	0.580											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.630

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	59	133	0	0	524	136	84	0	143	0	0	0
Total Analysis Volume [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.10	0.10	0.00	0.41	0.32	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.630											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.700

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	578	204	117	2594	479	116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	578	204	117	2594	479	116
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	145	51	29	649	120	29
Total Analysis Volume [veh/h]	578	204	117	2594	479	116
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.12	0.03	0.51	0.14	0.07
Intersection LOS	B					
Intersection V/C	0.700					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.704

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	123	35	204	545	0	63	0	282	0	0	0
Total Analysis Volume [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.08	0.24	0.32	0.00	0.05	0.00	0.20	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.704											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.652

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	38	0	76	0	437	89	101	436	0
Total Analysis Volume [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.31	0.31	0.12	0.51	0.00
Intersection LOS	B											
Intersection V/C	0.652											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.544

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	0	30	0	0	0	0	440	0	0	516	25
Total Analysis Volume [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.42	0.42
Intersection LOS	A											
Intersection V/C	0.544											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Report File: N:\...\2023 APP NB PM.pdf

Scenario 2 2023 APP NB PM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.488	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.635	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.609	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.731	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.641	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.610	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.869	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.735	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.488

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	1	0	1	2	0
Pocket Length [ft]	280.00	500.00	100.00	300.00	380.00	100.00
Speed [mph]	50.00		50.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	767	430	545	227	176	633
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	767	430	545	227	176	633
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	192	108	136	57	44	158
Total Analysis Volume [veh/h]	767	430	545	227	176	633
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Overlap	Permissive	Unsignalized	Protected	Permissive
Signal Group	6	0	8	0	7	4
Auxiliary Signal Groups						
Lead / Lag	Lag	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.16	0.00	0.05	0.19
Intersection LOS	A					
Intersection V/C	0.488					

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.635

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	341	881	577	177	317	94	185	920	177	530	1558	508
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	341	881	577	177	317	94	185	920	177	530	1558	508
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	85	220	144	44	79	24	46	230	44	133	390	127
Total Analysis Volume [veh/h]	341	881	577	177	317	94	185	920	177	530	1558	508
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.17	0.00	0.05	0.09	0.06	0.05	0.14	0.10	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.635											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.609

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	48	13	49	36	11	78	579	64	8	198	48
Total Analysis Volume [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.02	0.09	0.45	0.00	0.01	0.19	0.19
Intersection LOS	B											
Intersection V/C	0.609											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.731

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	486	0	1	211	54	253	0	56	0	0	0
Total Analysis Volume [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.38	0.00	0.00	0.17	0.13	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.731											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.641

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2507	401	113	1043	182	113
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2507	401	113	1043	182	113
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	627	100	28	261	46	28
Total Analysis Volume [veh/h]	2507	401	113	1043	182	113
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.49	0.24	0.03	0.20	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.641					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.610

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	529	124	84	170	0	167	0	87	0	0	0
Total Analysis Volume [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.31	0.29	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.610											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.869

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	47	0	375	38	40	649	0
Total Analysis Volume [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.24	0.24	0.05	0.76	0.00
Intersection LOS	D											
Intersection V/C	0.869											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.735

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	80	0	74	0	0	0	0	343	0	0	592	41
Total Analysis Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.17	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.735											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro

Report File: N:\...\2023 APP PP Route 1A AM.pdf

Scenario 3 2023 APP PP Route 1A AM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.456	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.689	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.589	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.630	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.700	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.704	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.652	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.544	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.456

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	268	0	155	0	0	0	0	602	477	407	865	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	268	45	155	0	27	0	0	602	477	407	865	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	11	39	0	7	0	0	151	119	102	216	0
Total Analysis Volume [veh/h]	268	45	155	0	27	0	0	602	477	407	865	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.09	0.00	0.00	0.02	0.00	0.00	0.18	0.00	0.12	0.25	0.00
Intersection LOS	A											
Intersection V/C	0.456											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.689

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	104	233	472	429	803	80	69	1262	246	606	1007	213
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	104	278	472	429	830	80	69	1262	246	606	1007	213
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	70	118	107	208	20	17	316	62	152	252	53
Total Analysis Volume [veh/h]	104	278	472	429	830	80	69	1262	246	606	1007	213
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.13	0.24	0.05	0.02	0.19	0.14	0.18	0.20	0.13
Intersection LOS	B											
Intersection V/C	0.689											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.589

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	218	379	49	189	283	14	73	580	186	103	1610	367
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	55	95	12	47	71	4	18	145	47	26	403	92
Total Analysis Volume [veh/h]	218	379	49	189	283	14	73	580	186	103	1610	367
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.07	0.00	0.06	0.06	0.01	0.02	0.11	0.00	0.03	0.39	0.39
Intersection LOS	A											
Intersection V/C	0.589											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.630

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	0	27	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	236	577	1	0	2095	570	336	0	570	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	59	144	0	0	524	143	84	0	143	0	0	0
Total Analysis Volume [veh/h]	236	577	1	0	2095	570	336	0	570	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.11	0.11	0.00	0.41	0.34	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.630											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.700

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	578	204	117	2594	479	116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	623	204	117	2594	479	116
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	156	51	29	649	120	29
Total Analysis Volume [veh/h]	623	204	117	2594	479	116
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.12	0.03	0.51	0.14	0.07
Intersection LOS	B					
Intersection V/C	0.700					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.704

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	491	140	815	2178	0	297	0	1128	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	123	35	204	545	0	74	0	282	0	0	0
Total Analysis Volume [veh/h]	0	491	140	815	2178	0	297	0	1128	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.08	0.24	0.32	0.00	0.06	0.00	0.21	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.704											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.652

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	38	0	76	0	437	89	101	436	0
Total Analysis Volume [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.31	0.31	0.12	0.51	0.00
Intersection LOS	B											
Intersection V/C	0.652											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.544

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	0	30	0	0	0	0	440	0	0	516	25
Total Analysis Volume [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.42	0.42
Intersection LOS	A											
Intersection V/C	0.544											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro

Report File: N:\...\2023 APP PP Route 1A PM.pdf

Scenario 4 2023 APP PP Route 1A PM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.499	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.635	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.609	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.731	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.641	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.610	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.869	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.735	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.499

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	767	0	430	0	0	0	0	545	227	176	633	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	767	0	430	0	18	0	0	545	227	176	633	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	192	0	108	0	5	0	0	136	57	44	158	0
Total Analysis Volume [veh/h]	767	0	430	0	18	0	0	545	227	176	633	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.05	0.19	0.00
Intersection LOS	A											
Intersection V/C	0.499											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.635

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	341	881	577	177	317	94	185	920	177	530	1558	508
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	341	881	577	177	335	94	185	920	177	530	1558	508
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	85	220	144	44	84	24	46	230	44	133	390	127
Total Analysis Volume [veh/h]	341	881	577	177	335	94	185	920	177	530	1558	508
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.17	0.00	0.05	0.10	0.06	0.05	0.14	0.10	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.635											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.609

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	133	192	51	196	163	42	313	2315	256	33	793	190
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	48	13	49	41	11	78	579	64	8	198	48
Total Analysis Volume [veh/h]	133	192	51	196	163	42	313	2315	256	33	793	190
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.02	0.09	0.45	0.00	0.01	0.19	0.19
Intersection LOS	B											
Intersection V/C	0.609											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.731

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	18	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	601	1944	0	4	844	235	1013	0	223	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	486	0	1	211	59	253	0	56	0	0	0
Total Analysis Volume [veh/h]	601	1944	0	4	844	235	1013	0	223	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.38	0.00	0.00	0.17	0.14	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.731											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.641

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2507	401	113	1043	182	113
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2507	401	113	1043	182	113
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	627	100	28	261	46	28
Total Analysis Volume [veh/h]	2507	401	113	1043	182	113
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.49	0.24	0.03	0.20	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.641					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.610

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	529	124	84	170	0	167	0	87	0	0	0
Total Analysis Volume [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.31	0.29	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.610											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.869

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	47	0	375	38	40	649	0
Total Analysis Volume [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.24	0.24	0.05	0.76	0.00
Intersection LOS	D											
Intersection V/C	0.869											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.735

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	80	0	74	0	0	0	0	343	0	0	592	41
Total Analysis Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.17	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.735											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Report File: N:\...\2023 APP PP Route 1B AM.pdf

Scenario 5 2023 APP PP Route 1B AM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.456	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.689	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.589	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.648	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.705	-	C
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.712	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.652	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.544	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.456

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	268	0	155	0	0	0	0	602	477	407	865	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	268	45	155	0	27	0	0	602	477	407	865	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	11	39	0	7	0	0	151	119	102	216	0
Total Analysis Volume [veh/h]	268	45	155	0	27	0	0	602	477	407	865	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.09	0.00	0.00	0.02	0.00	0.00	0.18	0.00	0.12	0.25	0.00
Intersection LOS	A											
Intersection V/C	0.456											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.689

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	104	233	472	429	803	80	69	1262	246	606	1007	213
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	104	278	472	429	830	80	69	1262	246	606	1007	213
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	70	118	107	208	20	17	316	62	152	252	53
Total Analysis Volume [veh/h]	104	278	472	429	830	80	69	1262	246	606	1007	213
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.13	0.24	0.05	0.02	0.19	0.14	0.18	0.20	0.13
Intersection LOS	B											
Intersection V/C	0.689											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.589

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	218	379	49	189	283	14	73	580	186	103	1610	367
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	55	95	12	47	71	4	18	145	47	26	403	92
Total Analysis Volume [veh/h]	218	379	49	189	283	14	73	580	186	103	1610	367
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.07	0.00	0.06	0.06	0.01	0.02	0.11	0.00	0.03	0.39	0.39
Intersection LOS	A											
Intersection V/C	0.589											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.648

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	27	0	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	236	532	1	0	2122	543	381	0	570	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	59	133	0	0	531	136	95	0	143	0	0	0
Total Analysis Volume [veh/h]	236	532	1	0	2122	543	381	0	570	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.10	0.10	0.00	0.42	0.32	0.11	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.648											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.705

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	578	204	117	2594	479	116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	578	204	117	2621	479	116
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	145	51	29	655	120	29
Total Analysis Volume [veh/h]	578	204	117	2621	479	116
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.12	0.03	0.51	0.14	0.07
Intersection LOS	C					
Intersection V/C	0.705					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.712

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	491	140	842	2178	0	252	0	1128	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	123	35	211	545	0	63	0	282	0	0	0
Total Analysis Volume [veh/h]	0	491	140	842	2178	0	252	0	1128	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.08	0.25	0.32	0.00	0.05	0.00	0.20	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.712											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.652

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	38	0	76	0	437	89	101	436	0
Total Analysis Volume [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.31	0.31	0.12	0.51	0.00
Intersection LOS	B											
Intersection V/C	0.652											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.544

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	0	30	0	0	0	0	440	0	0	516	25
Total Analysis Volume [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.42	0.42
Intersection LOS	A											
Intersection V/C	0.544											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Scenario 6 2023 APP PP Route 1B PM

Report File: N:\...\2023 APP PP Route 1B PM.pdf
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.499	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.635	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.609	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.731	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.641	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.615	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.869	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.735	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.499

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	767	0	430	0	0	0	0	545	227	176	633	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	767	0	430	0	18	0	0	545	227	176	633	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	192	0	108	0	5	0	0	136	57	44	158	0
Total Analysis Volume [veh/h]	767	0	430	0	18	0	0	545	227	176	633	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.05	0.19	0.00
Intersection LOS	A											
Intersection V/C	0.499											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.635

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	341	881	577	177	317	94	185	920	177	530	1558	508
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	341	881	577	177	335	94	185	920	177	530	1558	508
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	85	220	144	44	84	24	46	230	44	133	390	127
Total Analysis Volume [veh/h]	341	881	577	177	335	94	185	920	177	530	1558	508
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.17	0.00	0.05	0.10	0.06	0.05	0.14	0.10	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.635											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.609

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	133	192	51	196	163	42	313	2315	256	33	793	190
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	48	13	49	41	11	78	579	64	8	198	48
Total Analysis Volume [veh/h]	133	192	51	196	163	42	313	2315	256	33	793	190
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.02	0.09	0.45	0.00	0.01	0.19	0.19
Intersection LOS	B											
Intersection V/C	0.609											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.731

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	601	1944	0	4	862	217	1013	0	223	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	486	0	1	216	54	253	0	56	0	0	0
Total Analysis Volume [veh/h]	601	1944	0	4	862	217	1013	0	223	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.38	0.00	0.00	0.17	0.13	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.731											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.641

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2507	401	113	1043	182	113
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2507	401	113	1061	182	113
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	627	100	28	265	46	28
Total Analysis Volume [veh/h]	2507	401	113	1061	182	113
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.49	0.24	0.03	0.21	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.641					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.615

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2116	496	355	680	0	668	0	349	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	529	124	89	170	0	167	0	87	0	0	0
Total Analysis Volume [veh/h]	0	2116	496	355	680	0	668	0	349	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.31	0.29	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.615											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.869

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	47	0	375	38	40	649	0
Total Analysis Volume [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.24	0.24	0.05	0.76	0.00
Intersection LOS	D											
Intersection V/C	0.869											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.735

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	80	0	74	0	0	0	0	343	0	0	592	41
Total Analysis Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.17	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.735											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro

Report File: N:\...\2023 APP PP Route 2A AM.pdf

Scenario 7 2023 APP PP Route 2A AM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.456	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.681	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.580	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.630	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.700	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.704	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.665	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.544	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.456

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	268	0	155	0	0	0	0	602	477	407	865	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	268	45	155	0	27	0	0	602	477	407	865	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	11	39	0	7	0	0	151	119	102	216	0
Total Analysis Volume [veh/h]	268	45	155	0	27	0	0	602	477	407	865	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.09	0.00	0.00	0.02	0.00	0.00	0.18	0.00	0.12	0.25	0.00
Intersection LOS	A											
Intersection V/C	0.456											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.681

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	104	233	472	429	803	80	69	1262	246	606	1007	213
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	45
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	104	233	472	456	803	80	69	1262	246	606	1007	258
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	58	118	114	201	20	17	316	62	152	252	65
Total Analysis Volume [veh/h]	104	233	472	456	803	80	69	1262	246	606	1007	258
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.13	0.24	0.05	0.02	0.19	0.14	0.18	0.20	0.15
Intersection LOS	B											
Intersection V/C	0.681											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.580

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	55	84	12	47	64	4	18	145	47	26	403	92
Total Analysis Volume [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.07	0.00	0.06	0.05	0.01	0.02	0.11	0.00	0.03	0.39	0.39
Intersection LOS	A											
Intersection V/C	0.580											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.630

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	59	133	0	0	524	136	84	0	143	0	0	0
Total Analysis Volume [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.10	0.10	0.00	0.41	0.32	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.630											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.700

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	578	204	117	2594	479	116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	578	204	117	2594	479	116
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	145	51	29	649	120	29
Total Analysis Volume [veh/h]	578	204	117	2594	479	116
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.12	0.03	0.51	0.14	0.07
Intersection LOS	B					
Intersection V/C	0.700					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.704

Intersection Setup

Name												
Approach		Northbound			Southbound			Eastbound			Westbound	
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]		50.00			50.00			50.00			30.00	
Grade [%]		0.00			0.00			0.00			0.00	
Crosswalk		Yes			Yes			Yes			Yes	

Volumes

Name												
Base Volume Input [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	123	35	204	545	0	63	0	282	0	0	0
Total Analysis Volume [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Pedestrian Volume [ped/h]		0			0			0			0	
Bicycle Volume [bicycles/h]		0			0			0			0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.08	0.24	0.32	0.00	0.05	0.00	0.20	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.704											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.665

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	45	0	27	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	150	0	347	0	1773	354	403	1744	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	38	0	87	0	443	89	101	436	0
Total Analysis Volume [veh/h]	0	0	0	150	0	347	0	1773	354	403	1744	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.10	0.00	0.31	0.31	0.12	0.51	0.00
Intersection LOS	B											
Intersection V/C	0.665											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.544

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	0	30	0	0	0	0	440	0	0	516	25
Total Analysis Volume [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.42	0.42
Intersection LOS	A											
Intersection V/C	0.544											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro

Scenario 8 2023 APP PP Route 2A PM

Report File: N:\...\2023 APP PP Route 2A PM.pdf

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.499	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.640	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.609	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.731	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.641	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.610	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.869	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.735	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.499

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	767	0	430	0	0	0	0	545	227	176	633	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	767	0	430	0	18	0	0	545	227	176	633	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	192	0	108	0	5	0	0	136	57	44	158	0
Total Analysis Volume [veh/h]	767	0	430	0	18	0	0	545	227	176	633	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.05	0.19	0.00
Intersection LOS	A											
Intersection V/C	0.499											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.640

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	341	881	577	177	317	94	185	920	177	530	1558	508
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	341	881	577	195	317	94	185	920	177	530	1558	508
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	85	220	144	49	79	24	46	230	44	133	390	127
Total Analysis Volume [veh/h]	341	881	577	195	317	94	185	920	177	530	1558	508
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.17	0.00	0.06	0.09	0.06	0.05	0.14	0.10	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.640											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.609

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	48	13	49	36	11	78	579	64	8	198	48
Total Analysis Volume [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.02	0.09	0.45	0.00	0.01	0.19	0.19
Intersection LOS	B											
Intersection V/C	0.609											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.731

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	486	0	1	211	54	253	0	56	0	0	0
Total Analysis Volume [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.38	0.00	0.00	0.17	0.13	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.731											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.641

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2507	401	113	1043	182	113
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2507	401	113	1043	182	113
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	627	100	28	261	46	28
Total Analysis Volume [veh/h]	2507	401	113	1043	182	113
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.49	0.24	0.03	0.20	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.641					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.610

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	529	124	84	170	0	167	0	87	0	0	0
Total Analysis Volume [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.31	0.29	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.610											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.869

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	18	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	56	0	188	0	1519	150	161	2596	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	47	0	380	38	40	649	0
Total Analysis Volume [veh/h]	0	0	0	56	0	188	0	1519	150	161	2596	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.25	0.25	0.05	0.76	0.00
Intersection LOS	D											
Intersection V/C	0.869											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.735

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	80	0	74	0	0	0	0	343	0	0	592	41
Total Analysis Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.17	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.735											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Report File: N:\...\2023 APP PP Route 2B AM.pdf

Scenario 9 2023 APP PP Route 2B AM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.456	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.681	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.580	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.630	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.700	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.704	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.665	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.569	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report

Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.456

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	268	0	155	0	0	0	0	602	477	407	865	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	268	45	155	0	27	0	0	602	477	407	865	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	11	39	0	7	0	0	151	119	102	216	0
Total Analysis Volume [veh/h]	268	45	155	0	27	0	0	602	477	407	865	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.09	0.00	0.00	0.02	0.00	0.00	0.18	0.00	0.12	0.25	0.00
Intersection LOS	A											
Intersection V/C	0.456											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.681

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	104	233	472	429	803	80	69	1262	246	606	1007	213
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	45
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	104	233	472	456	803	80	69	1262	246	606	1007	258
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	58	118	114	201	20	17	316	62	152	252	65
Total Analysis Volume [veh/h]	104	233	472	456	803	80	69	1262	246	606	1007	258
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.13	0.24	0.05	0.02	0.19	0.14	0.18	0.20	0.15
Intersection LOS	B											
Intersection V/C	0.681											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.580

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	55	84	12	47	64	4	18	145	47	26	403	92
Total Analysis Volume [veh/h]	218	334	49	189	256	14	73	580	186	103	1610	367
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.07	0.00	0.06	0.05	0.01	0.02	0.11	0.00	0.03	0.39	0.39
Intersection LOS	A											
Intersection V/C	0.580											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.630

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	59	133	0	0	524	136	84	0	143	0	0	0
Total Analysis Volume [veh/h]	236	532	1	0	2095	543	336	0	570	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.10	0.10	0.00	0.41	0.32	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.630											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.700

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	578	204	117	2594	479	116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	578	204	117	2594	479	116
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	145	51	29	649	120	29
Total Analysis Volume [veh/h]	578	204	117	2594	479	116
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.12	0.03	0.51	0.14	0.07
Intersection LOS	B					
Intersection V/C	0.700					

Intersection Level Of Service Report

Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.704

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	123	35	204	545	0	63	0	282	0	0	0
Total Analysis Volume [veh/h]	0	491	140	815	2178	0	252	0	1128	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.08	0.24	0.32	0.00	0.05	0.00	0.20	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.704											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.665

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	150	0	302	0	1746	354	403	1744	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	27	0	45	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	150	0	302	0	1746	381	403	1789	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	38	0	76	0	437	95	101	447	0
Total Analysis Volume [veh/h]	0	0	0	150	0	302	0	1746	381	403	1789	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.31	0.31	0.12	0.53	0.00
Intersection LOS	B											
Intersection V/C	0.665											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.569

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	117	0	120	0	0	0	0	1758	0	0	2062	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	162	0	120	0	0	0	0	1758	0	0	2062	98
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	41	0	30	0	0	0	0	440	0	0	516	25
Total Analysis Volume [veh/h]	162	0	120	0	0	0	0	1758	0	0	2062	98
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.00	0.07	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.42	0.42
Intersection LOS	A											
Intersection V/C	0.569											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Report File: N:\...\2023 APP PP Route 2B PM.pdf

Scenario 10 2023 APP PP Route 2B PM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.499	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.640	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.609	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.731	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.641	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.610	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.869	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.735	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.499

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	767	0	430	0	0	0	0	545	227	176	633	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	767	0	430	0	18	0	0	545	227	176	633	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	192	0	108	0	5	0	0	136	57	44	158	0
Total Analysis Volume [veh/h]	767	0	430	0	18	0	0	545	227	176	633	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.05	0.19	0.00
Intersection LOS	A											
Intersection V/C	0.499											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.640

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	341	881	577	177	317	94	185	920	177	530	1558	508
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	341	881	577	195	317	94	185	920	177	530	1558	508
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	85	220	144	49	79	24	46	230	44	133	390	127
Total Analysis Volume [veh/h]	341	881	577	195	317	94	185	920	177	530	1558	508
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.17	0.00	0.06	0.09	0.06	0.05	0.14	0.10	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.640											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.609

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	48	13	49	36	11	78	579	64	8	198	48
Total Analysis Volume [veh/h]	133	192	51	196	145	42	313	2315	256	33	793	190
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.02	0.09	0.45	0.00	0.01	0.19	0.19
Intersection LOS	B											
Intersection V/C	0.609											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.731

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	486	0	1	211	54	253	0	56	0	0	0
Total Analysis Volume [veh/h]	601	1944	0	4	844	217	1013	0	223	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.38	0.00	0.00	0.17	0.13	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.731											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.641

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2507	401	113	1043	182	113
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2507	401	113	1043	182	113
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	627	100	28	261	46	28
Total Analysis Volume [veh/h]	2507	401	113	1043	182	113
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.49	0.24	0.03	0.20	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.641					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.610

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	529	124	84	170	0	167	0	87	0	0	0
Total Analysis Volume [veh/h]	0	2116	496	337	680	0	668	0	349	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.31	0.29	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.610											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.869

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	56	0	188	0	1501	150	161	2596	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	18	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	56	0	188	0	1501	168	161	2596	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	47	0	375	42	40	649	0
Total Analysis Volume [veh/h]	0	0	0	56	0	188	0	1501	168	161	2596	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.25	0.25	0.05	0.76	0.00
Intersection LOS	D											
Intersection V/C	0.869											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.735

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	80	0	74	0	0	0	0	343	0	0	592	41
Total Analysis Volume [veh/h]	321	0	294	0	0	0	0	1371	0	0	2369	162
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.17	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.735											

Interim Year (2023) Pending Project Conditions

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Report File: N:\...\2023 PEN NB AM.pdf

Scenario 1 2023 PEN NB AM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.439	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.704	-	C
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.600	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.651	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.723	-	C
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.728	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.674	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.562	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.439

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	1	0	1	2	0
Pocket Length [ft]	280.00	500.00	100.00	300.00	380.00	100.00
Speed [mph]	50.00		50.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	278	160	624	495	422	896
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	278	160	624	495	422	896
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	70	40	156	124	106	224
Total Analysis Volume [veh/h]	278	160	624	495	422	896
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Overlap	Permissive	Unsignalized	Protected	Permissive
Signal Group	6	0	8	0	7	4
Auxiliary Signal Groups						
Lead / Lag	Lag	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.18	0.00	0.12	0.26
Intersection LOS	A					
Intersection V/C	0.439					

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.704

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	108	241	490	445	832	83	72	1308	255	628	1044	221
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	108	241	490	445	832	83	72	1308	255	628	1044	221
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	60	123	111	208	21	18	327	64	157	261	55
Total Analysis Volume [veh/h]	108	241	490	445	832	83	72	1308	255	628	1044	221
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.13	0.24	0.05	0.02	0.19	0.15	0.18	0.20	0.13
Intersection LOS	C											
Intersection V/C	0.704											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.600

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	87	13	49	66	4	19	150	48	27	417	95
Total Analysis Volume [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.07	0.00	0.06	0.05	0.01	0.02	0.12	0.00	0.03	0.40	0.40
Intersection LOS	A											
Intersection V/C	0.600											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	61	138	0	0	543	141	87	0	148	0	0	0
Total Analysis Volume [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.11	0.11	0.00	0.43	0.33	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.651											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.723

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	599	212	122	2689	496	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	599	212	122	2689	496	121
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	53	31	672	124	30
Total Analysis Volume [veh/h]	599	212	122	2689	496	121
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.12	0.04	0.53	0.15	0.07
Intersection LOS	C					
Intersection V/C	0.723					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.728

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	127	36	211	565	0	66	0	292	0	0	0
Total Analysis Volume [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.09	0.25	0.33	0.00	0.05	0.00	0.21	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.728											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.674

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	39	0	78	0	453	92	105	452	0
Total Analysis Volume [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.32	0.32	0.12	0.53	0.00
Intersection LOS	B											
Intersection V/C	0.674											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.562

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	31	0	31	0	0	0	0	456	0	0	534	25
Total Analysis Volume [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.44	0.44
Intersection LOS	A											
Intersection V/C	0.562											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro

Report File: N:\...\2023 PEN NB PM.pdf

Scenario 2 2023 PEN NB PM

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.495	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.644	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.618	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.743	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.651	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.619	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.883	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.746	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.495

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	1	0	1	2	0
Pocket Length [ft]	280.00	500.00	100.00	300.00	380.00	100.00
Speed [mph]	50.00		50.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	780	437	554	230	179	644
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	780	437	554	230	179	644
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	109	139	58	45	161
Total Analysis Volume [veh/h]	780	437	554	230	179	644
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Overlap	Permissive	Unsignalized	Protected	Permissive
Signal Group	6	0	8	0	7	4
Auxiliary Signal Groups						
Lead / Lag	Lag	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.16	0.00	0.05	0.19
Intersection LOS	A					
Intersection V/C	0.495					

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.644

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	346	895	587	180	322	96	188	936	180	539	1584	516
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	346	895	587	180	322	96	188	936	180	539	1584	516
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	87	224	147	45	81	24	47	234	45	135	396	129
Total Analysis Volume [veh/h]	346	895	587	180	322	96	188	936	180	539	1584	516
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.18	0.00	0.05	0.09	0.06	0.06	0.14	0.11	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.644											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.618

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	49	13	50	37	11	80	589	65	9	202	48
Total Analysis Volume [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.03	0.09	0.46	0.00	0.01	0.20	0.20
Intersection LOS	B											
Intersection V/C	0.618											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.743

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	153	494	0	1	215	55	258	0	57	0	0	0
Total Analysis Volume [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.39	0.00	0.00	0.17	0.13	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.743											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2549	408	115	1060	185	115
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2549	408	115	1060	185	115
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	637	102	29	265	46	29
Total Analysis Volume [veh/h]	2549	408	115	1060	185	115
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.50	0.24	0.03	0.21	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.651					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.619

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	538	126	86	173	0	170	0	89	0	0	0
Total Analysis Volume [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.32	0.30	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.619											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.883

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	48	0	382	38	41	660	0
Total Analysis Volume [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.25	0.25	0.05	0.78	0.00
Intersection LOS	D											
Intersection V/C	0.883											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.746

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	82	0	75	0	0	0	0	349	0	0	602	41
Total Analysis Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.18	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.746											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro

Scenario 3 2023 PEN PP Route 1A AM

Report File: N:\...\2023 PEN PP Route 1A AM.pdf

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.470	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.711	-	C
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.609	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.651	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.723	-	C
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.728	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.674	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.562	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.470

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	278	0	160	0	0	0	0	624	495	422	896	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	278	45	160	0	27	0	0	624	495	422	896	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	70	11	40	0	7	0	0	156	124	106	224	0
Total Analysis Volume [veh/h]	278	45	160	0	27	0	0	624	495	422	896	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.10	0.00	0.00	0.02	0.00	0.00	0.18	0.00	0.12	0.26	0.00
Intersection LOS	A											
Intersection V/C	0.470											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.711

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	108	241	490	445	832	83	72	1308	255	628	1044	221
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	108	286	490	445	859	83	72	1308	255	628	1044	221
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	72	123	111	215	21	18	327	64	157	261	55
Total Analysis Volume [veh/h]	108	286	490	445	859	83	72	1308	255	628	1044	221
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.06	0.00	0.13	0.25	0.05	0.02	0.19	0.15	0.18	0.20	0.13
Intersection LOS	C											
Intersection V/C	0.711											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.609

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	391	51	196	292	14	76	601	192	106	1669	381
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	98	13	49	73	4	19	150	48	27	417	95
Total Analysis Volume [veh/h]	226	391	51	196	292	14	76	601	192	106	1669	381
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.08	0.00	0.06	0.06	0.01	0.02	0.12	0.00	0.03	0.40	0.40
Intersection LOS	B											
Intersection V/C	0.609											

Intersection Level Of Service Report

Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	0	27	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	245	596	1	0	2172	590	349	0	591	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	61	149	0	0	543	148	87	0	148	0	0	0
Total Analysis Volume [veh/h]	245	596	1	0	2172	590	349	0	591	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.12	0.12	0.00	0.43	0.35	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.651											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.723

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	599	212	122	2689	496	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	644	212	122	2689	496	121
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	161	53	31	672	124	30
Total Analysis Volume [veh/h]	644	212	122	2689	496	121
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.13	0.12	0.04	0.53	0.15	0.07
Intersection LOS	C					
Intersection V/C	0.723					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.728

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	509	145	845	2258	0	307	0	1169	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	127	36	211	565	0	77	0	292	0	0	0
Total Analysis Volume [veh/h]	0	509	145	845	2258	0	307	0	1169	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.09	0.25	0.33	0.00	0.06	0.00	0.22	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.728											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.674

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	39	0	78	0	453	92	105	452	0
Total Analysis Volume [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.32	0.32	0.12	0.53	0.00
Intersection LOS	B											
Intersection V/C	0.674											

Intersection Level Of Service Report

Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.562

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	31	0	31	0	0	0	0	456	0	0	534	25
Total Analysis Volume [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.44	0.44
Intersection LOS	A											
Intersection V/C	0.562											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Report File: N:\...\2023 PEN PP Route 1A PM.pdf

Scenario 4 2023 PEN PP Route 1A PM
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.506	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.644	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.618	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.743	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.651	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.619	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.883	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.746	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.506

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	780	0	437	0	0	0	0	554	230	179	644	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	780	0	437	0	18	0	0	554	230	179	644	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	0	109	0	5	0	0	139	58	45	161	0
Total Analysis Volume [veh/h]	780	0	437	0	18	0	0	554	230	179	644	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.05	0.19	0.00
Intersection LOS	A											
Intersection V/C	0.506											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.644

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	346	895	587	180	322	96	188	936	180	539	1584	516
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	346	895	587	180	340	96	188	936	180	539	1584	516
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	87	224	147	45	85	24	47	234	45	135	396	129
Total Analysis Volume [veh/h]	346	895	587	180	340	96	188	936	180	539	1584	516
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.18	0.00	0.05	0.10	0.06	0.06	0.14	0.11	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.644											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.618

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	135	195	52	199	165	43	319	2354	261	34	806	193
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	49	13	50	41	11	80	589	65	9	202	48
Total Analysis Volume [veh/h]	135	195	52	199	165	43	319	2354	261	34	806	193
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.03	0.09	0.46	0.00	0.01	0.20	0.20
Intersection LOS	B											
Intersection V/C	0.618											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.743

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	18	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	611	1976	0	4	858	238	1030	0	227	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	153	494	0	1	215	60	258	0	57	0	0	0
Total Analysis Volume [veh/h]	611	1976	0	4	858	238	1030	0	227	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.39	0.00	0.00	0.17	0.14	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.743											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2549	408	115	1060	185	115
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2549	408	115	1060	185	115
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	637	102	29	265	46	29
Total Analysis Volume [veh/h]	2549	408	115	1060	185	115
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.50	0.24	0.03	0.21	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.651					

Intersection Level Of Service Report

Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.619

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	538	126	86	173	0	170	0	89	0	0	0
Total Analysis Volume [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.32	0.30	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.619											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.883

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	48	0	382	38	41	660	0
Total Analysis Volume [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.25	0.25	0.05	0.78	0.00
Intersection LOS	D											
Intersection V/C	0.883											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.746

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	82	0	75	0	0	0	0	349	0	0	602	41
Total Analysis Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.18	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.746											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Scenario 5 2023 PEN PP Route 1B AM

Report File: N:\...\2023 PEN PP Route 1B AM.pdf
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.470	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.711	-	C
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.609	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.670	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.728	-	C
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.736	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.674	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.562	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.470

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	278	0	160	0	0	0	0	624	495	422	896	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	278	45	160	0	27	0	0	624	495	422	896	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	70	11	40	0	7	0	0	156	124	106	224	0
Total Analysis Volume [veh/h]	278	45	160	0	27	0	0	624	495	422	896	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.10	0.00	0.00	0.02	0.00	0.00	0.18	0.00	0.12	0.26	0.00
Intersection LOS	A											
Intersection V/C	0.470											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.711

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	108	241	490	445	832	83	72	1308	255	628	1044	221
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	108	286	490	445	859	83	72	1308	255	628	1044	221
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	72	123	111	215	21	18	327	64	157	261	55
Total Analysis Volume [veh/h]	108	286	490	445	859	83	72	1308	255	628	1044	221
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.06	0.00	0.13	0.25	0.05	0.02	0.19	0.15	0.18	0.20	0.13
Intersection LOS	C											
Intersection V/C	0.711											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.609

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	391	51	196	292	14	76	601	192	106	1669	381
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	98	13	49	73	4	19	150	48	27	417	95
Total Analysis Volume [veh/h]	226	391	51	196	292	14	76	601	192	106	1669	381
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.08	0.00	0.06	0.06	0.01	0.02	0.12	0.00	0.03	0.40	0.40
Intersection LOS	B											
Intersection V/C	0.609											

Intersection Level Of Service Report

Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.670

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	27	0	45	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	245	551	1	0	2199	563	394	0	591	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	61	138	0	0	550	141	99	0	148	0	0	0
Total Analysis Volume [veh/h]	245	551	1	0	2199	563	394	0	591	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.11	0.11	0.00	0.43	0.33	0.12	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.670											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.728

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	599	212	122	2689	496	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	599	212	122	2716	496	121
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	53	31	679	124	30
Total Analysis Volume [veh/h]	599	212	122	2716	496	121
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.12	0.04	0.53	0.15	0.07
Intersection LOS	C					
Intersection V/C	0.728					

Intersection Level Of Service Report

Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.736

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	509	145	872	2258	0	262	0	1169	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	127	36	218	565	0	66	0	292	0	0	0
Total Analysis Volume [veh/h]	0	509	145	872	2258	0	262	0	1169	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.09	0.26	0.33	0.00	0.05	0.00	0.21	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.736											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.674

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	39	0	78	0	453	92	105	452	0
Total Analysis Volume [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.32	0.32	0.12	0.53	0.00
Intersection LOS	B											
Intersection V/C	0.674											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.562

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	31	0	31	0	0	0	0	456	0	0	534	25
Total Analysis Volume [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.44	0.44
Intersection LOS	A											
Intersection V/C	0.562											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro

Scenario 6 2023 PEN PP Route 1B PM

Report File: N:\...\2023 PEN PP Route 1B PM.pdf

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.506	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.644	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.618	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.743	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.651	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.625	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.883	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.746	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.506

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	780	0	437	0	0	0	0	554	230	179	644	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	780	0	437	0	18	0	0	554	230	179	644	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	0	109	0	5	0	0	139	58	45	161	0
Total Analysis Volume [veh/h]	780	0	437	0	18	0	0	554	230	179	644	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.05	0.19	0.00
Intersection LOS	A											
Intersection V/C	0.506											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.644

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	346	895	587	180	322	96	188	936	180	539	1584	516
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	346	895	587	180	340	96	188	936	180	539	1584	516
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	87	224	147	45	85	24	47	234	45	135	396	129
Total Analysis Volume [veh/h]	346	895	587	180	340	96	188	936	180	539	1584	516
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.18	0.00	0.05	0.10	0.06	0.06	0.14	0.11	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.644											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.618

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	135	195	52	199	165	43	319	2354	261	34	806	193
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	49	13	50	41	11	80	589	65	9	202	48
Total Analysis Volume [veh/h]	135	195	52	199	165	43	319	2354	261	34	806	193
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.03	0.09	0.46	0.00	0.01	0.20	0.20
Intersection LOS	B											
Intersection V/C	0.618											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.743

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	611	1976	0	4	876	220	1030	0	227	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	153	494	0	1	219	55	258	0	57	0	0	0
Total Analysis Volume [veh/h]	611	1976	0	4	876	220	1030	0	227	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.39	0.00	0.00	0.17	0.13	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.743											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2549	408	115	1060	185	115
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2549	408	115	1078	185	115
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	637	102	29	270	46	29
Total Analysis Volume [veh/h]	2549	408	115	1078	185	115
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.50	0.24	0.03	0.21	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.651					

Generated with PTV VISTRO | Irvine Ranch Water District | Scenario 6: 6 2023 PEN PP Route 1B PM
Version 7.00-06

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.625

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2151	504	361	691	0	679	0	355	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	538	126	90	173	0	170	0	89	0	0	0
Total Analysis Volume [veh/h]	0	2151	504	361	691	0	679	0	355	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.32	0.30	0.11	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.625											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.883

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	48	0	382	38	41	660	0
Total Analysis Volume [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.25	0.25	0.05	0.78	0.00
Intersection LOS	D											
Intersection V/C	0.883											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.746

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	82	0	75	0	0	0	0	349	0	0	602	41
Total Analysis Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.18	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.746											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro Scenario 7 2023 PEN Route 2A AM

Report File: N:\...\2023 PEN PP Route 2A AM.pdf 8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.470	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.704	-	C
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.600	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.651	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.723	-	C
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.728	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.687	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.562	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.470

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	278	0	160	0	0	0	0	624	495	422	896	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	278	45	160	0	27	0	0	624	495	422	896	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	70	11	40	0	7	0	0	156	124	106	224	0
Total Analysis Volume [veh/h]	278	45	160	0	27	0	0	624	495	422	896	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.10	0.00	0.00	0.02	0.00	0.00	0.18	0.00	0.12	0.26	0.00
Intersection LOS	A											
Intersection V/C	0.470											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.704

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	108	241	490	445	832	83	72	1308	255	628	1044	221
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	45
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	108	241	490	472	832	83	72	1308	255	628	1044	266
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	60	123	118	208	21	18	327	64	157	261	67
Total Analysis Volume [veh/h]	108	241	490	472	832	83	72	1308	255	628	1044	266
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.14	0.24	0.05	0.02	0.19	0.15	0.18	0.20	0.16
Intersection LOS	C											
Intersection V/C	0.704											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.600

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	87	13	49	66	4	19	150	48	27	417	95
Total Analysis Volume [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.07	0.00	0.06	0.05	0.01	0.02	0.12	0.00	0.03	0.40	0.40
Intersection LOS	A											
Intersection V/C	0.600											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	61	138	0	0	543	141	87	0	148	0	0	0
Total Analysis Volume [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.11	0.11	0.00	0.43	0.33	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.651											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.723

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	599	212	122	2689	496	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	599	212	122	2689	496	121
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	53	31	672	124	30
Total Analysis Volume [veh/h]	599	212	122	2689	496	121
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.12	0.04	0.53	0.15	0.07
Intersection LOS	C					
Intersection V/C	0.723					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.728

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	127	36	211	565	0	66	0	292	0	0	0
Total Analysis Volume [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.09	0.25	0.33	0.00	0.05	0.00	0.21	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.728											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.687

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	45	0	27	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	155	0	358	0	1837	367	418	1808	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	39	0	90	0	459	92	105	452	0
Total Analysis Volume [veh/h]	0	0	0	155	0	358	0	1837	367	418	1808	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.11	0.00	0.32	0.32	0.12	0.53	0.00
Intersection LOS	B											
Intersection V/C	0.687											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.562

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	31	0	31	0	0	0	0	456	0	0	534	25
Total Analysis Volume [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.44	0.44
Intersection LOS	A											
Intersection V/C	0.562											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro Scenario 8 2023 PEN PP Route 2A PM

Report File: N:\...\2023 PEN PP Route 2A PM.pdf 8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.506	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.650	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.618	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.743	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.651	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.619	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.883	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.746	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.506

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	780	0	437	0	0	0	0	554	230	179	644	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	780	0	437	0	18	0	0	554	230	179	644	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	0	109	0	5	0	0	139	58	45	161	0
Total Analysis Volume [veh/h]	780	0	437	0	18	0	0	554	230	179	644	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.05	0.19	0.00
Intersection LOS	A											
Intersection V/C	0.506											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.650

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	346	895	587	180	322	96	188	936	180	539	1584	516
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	346	895	587	198	322	96	188	936	180	539	1584	516
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	87	224	147	50	81	24	47	234	45	135	396	129
Total Analysis Volume [veh/h]	346	895	587	198	322	96	188	936	180	539	1584	516
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.18	0.00	0.06	0.09	0.06	0.06	0.14	0.11	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.650											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.618

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	49	13	50	37	11	80	589	65	9	202	48
Total Analysis Volume [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.03	0.09	0.46	0.00	0.01	0.20	0.20
Intersection LOS	B											
Intersection V/C	0.618											

Intersection Level Of Service Report

Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.743

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	153	494	0	1	215	55	258	0	57	0	0	0
Total Analysis Volume [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.39	0.00	0.00	0.17	0.13	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.743											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2549	408	115	1060	185	115
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2549	408	115	1060	185	115
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	637	102	29	265	46	29
Total Analysis Volume [veh/h]	2549	408	115	1060	185	115
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.50	0.24	0.03	0.21	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.651					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.619

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	538	126	86	173	0	170	0	89	0	0	0
Total Analysis Volume [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.32	0.30	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.619											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.883

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	18	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	57	0	191	0	1544	152	164	2640	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	48	0	386	38	41	660	0
Total Analysis Volume [veh/h]	0	0	0	57	0	191	0	1544	152	164	2640	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.25	0.25	0.05	0.78	0.00
Intersection LOS	D											
Intersection V/C	0.883											

Intersection Level Of Service Report

Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.746

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	82	0	75	0	0	0	0	349	0	0	602	41
Total Analysis Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.18	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.746											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro

Scenario 9 2023 PEN PP Route 2B AM

Report File: N:\...\2023 PEN PP Route 2B AM.pdf

8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	WB Thru	0.470	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	SB Thru	0.704	-	C
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	WB Thru	0.600	-	A
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	SB Thru	0.651	-	B
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	SB Thru	0.723	-	C
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	SB Thru	0.728	-	C
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.687	-	B
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Right	0.587	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report

Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.470

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	278	0	160	0	0	0	0	624	495	422	896	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	0	0	27	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	278	45	160	0	27	0	0	624	495	422	896	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	70	11	40	0	7	0	0	156	124	106	224	0
Total Analysis Volume [veh/h]	278	45	160	0	27	0	0	624	495	422	896	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.10	0.00	0.00	0.02	0.00	0.00	0.18	0.00	0.12	0.26	0.00
Intersection LOS	A											
Intersection V/C	0.470											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.704

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	108	241	490	445	832	83	72	1308	255	628	1044	221
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	27	0	0	0	0	0	0	0	45
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	108	241	490	472	832	83	72	1308	255	628	1044	266
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	60	123	118	208	21	18	327	64	157	261	67
Total Analysis Volume [veh/h]	108	241	490	472	832	83	72	1308	255	628	1044	266
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.05	0.00	0.14	0.24	0.05	0.02	0.19	0.15	0.18	0.20	0.16
Intersection LOS	C											
Intersection V/C	0.704											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.600

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	87	13	49	66	4	19	150	48	27	417	95
Total Analysis Volume [veh/h]	226	346	51	196	265	14	76	601	192	106	1669	381
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.07	0.00	0.06	0.05	0.01	0.02	0.12	0.00	0.03	0.40	0.40
Intersection LOS	A											
Intersection V/C	0.600											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	61	138	0	0	543	141	87	0	148	0	0	0
Total Analysis Volume [veh/h]	245	551	1	0	2172	563	349	0	591	1	0	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.11	0.11	0.00	0.43	0.33	0.10	0.00	0.00	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.651											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.723

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	599	212	122	2689	496	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	599	212	122	2689	496	121
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	150	53	31	672	124	30
Total Analysis Volume [veh/h]	599	212	122	2689	496	121
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.12	0.04	0.53	0.15	0.07
Intersection LOS	C					
Intersection V/C	0.723					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.728

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	127	36	211	565	0	66	0	292	0	0	0
Total Analysis Volume [veh/h]	0	509	145	845	2258	0	262	0	1169	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.07	0.09	0.25	0.33	0.00	0.05	0.00	0.21	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.728											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.687

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	155	0	313	0	1810	367	418	1808	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	27	0	45	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	155	0	313	0	1810	394	418	1853	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	39	0	78	0	453	99	105	463	0
Total Analysis Volume [veh/h]	0	0	0	155	0	313	0	1810	394	418	1853	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.32	0.32	0.12	0.55	0.00
Intersection LOS	B											
Intersection V/C	0.687											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.587

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	122	0	124	0	0	0	0	1822	0	0	2137	101
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	167	0	124	0	0	0	0	1822	0	0	2137	101
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	0	31	0	0	0	0	456	0	0	534	25
Total Analysis Volume [veh/h]	167	0	124	0	0	0	0	1822	0	0	2137	101
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.00	0.07	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.44	0.44
Intersection LOS	A											
Intersection V/C	0.587											

Irvine Ranch Water District

Vistro File: N:\...\IRWD 2023 APP.vistro
Scenario 10 2023 PEN PP Route 2B PM

Report File: N:\...\2023 PEN PP Route 2B PM.pdf
8/19/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Sand Canyon Ave and Portola Pkwy	Signalized	ICU 1	NB Left	0.506	-	A
2	Sand Canyon Ave and Irvine Blvd	Signalized	ICU 1	WB Thru	0.650	-	B
3	Sand Canyon Ave and Trabuco Rd	Signalized	ICU 1	EB Thru	0.618	-	B
4	Sand Canyon Ave and I-5 NB Ramps	Signalized	ICU 1	NB Thru	0.743	-	C
5	Sand Canyon Ave and Marine Way	Signalized	ICU 1	NB Thru	0.651	-	B
6	Sand Canyon Ave and I-5 SB Ramps	Signalized	ICU 1	NB Thru	0.619	-	B
7	SR-133 SB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.883	-	D
8	SR-133 NB Ramps and Irvine Blvd	Signalized	ICU 1	WB Thru	0.746	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Sand Canyon Ave and Portola Pkwy

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.506

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	0	0	0	0	0	1	2	0	0
Pocket Length [ft]	280.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	300.00	380.00	100.00	100.00
Speed [mph]	50.00			30.00			50.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name												
Base Volume Input [veh/h]	780	0	437	0	0	0	0	554	230	179	644	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	18	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	780	0	437	0	18	0	0	554	230	179	644	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	0	109	0	5	0	0	139	58	45	161	0
Total Analysis Volume [veh/h]	780	0	437	0	18	0	0	554	230	179	644	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Split	Split	Overla	Split	Split	Split	Permis	Permis	Unsign	Protect	Permis	Permis
Signal Group	6	6	0	0	2	0	0	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.05	0.19	0.00
Intersection LOS	A											
Intersection V/C	0.506											

Intersection Level Of Service Report
Intersection 2: Sand Canyon Ave and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.650

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	2	2	0	1	2	0	1	2	0	1
Pocket Length [ft]	200.00	100.00	350.00	170.00	100.00	310.00	150.00	100.00	310.00	280.00	100.00	350.00
Speed [mph]	50.00			50.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	346	895	587	180	322	96	188	936	180	539	1584	516
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	18	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	346	895	587	198	322	96	188	936	180	539	1584	516
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	87	224	147	50	81	24	47	234	45	135	396	129
Total Analysis Volume [veh/h]	346	895	587	198	322	96	188	936	180	539	1584	516
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Overla	Protect	Permis	Permis	Protect	Permis	Permis	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.18	0.00	0.06	0.09	0.06	0.06	0.14	0.11	0.16	0.31	0.30
Intersection LOS	B											
Intersection V/C	0.650											

Intersection Level Of Service Report
Intersection 3: Sand Canyon Ave and Trabuco Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.618

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	2	0	1	2	0	1	2	0	0
Pocket Length [ft]	250.00	100.00	100.00	200.00	100.00	280.00	150.00	100.00	430.00	320.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	49	13	50	37	11	80	589	65	9	202	48
Total Analysis Volume [veh/h]	135	195	52	199	147	43	319	2354	261	34	806	193
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protect	Permis	Unsign	Protect	Permis	Permis	Protect	Permis	Unsign	Protect	Permis	Permis
Signal Group	1	6	0	5	2	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.00	0.06	0.03	0.03	0.09	0.46	0.00	0.01	0.20	0.20
Intersection LOS	B											
Intersection V/C	0.618											

Intersection Level Of Service Report
Intersection 4: Sand Canyon Ave and I-5 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.743

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	1	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	190.00	100.00	220.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	153	494	0	1	215	55	258	0	57	0	0	0
Total Analysis Volume [veh/h]	611	1976	0	4	858	220	1030	0	227	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Split	Split	Overla	Split	Split	Split
Signal Group	0	6	0	0	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.39	0.00	0.00	0.17	0.13	0.30	0.00	0.00	0.00	0.00	0.00
Intersection LOS	C											
Intersection V/C	0.743											

Intersection Level Of Service Report
Intersection 5: Sand Canyon Ave and Marine Way

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name						
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	1	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	380.00	100.00
Speed [mph]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2549	408	115	1060	185	115
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2549	408	115	1060	185	115
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	637	102	29	265	46	29
Total Analysis Volume [veh/h]	2549	408	115	1060	185	115
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	6	0	0	2	4	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lag	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.50	0.24	0.03	0.21	0.05	0.07
Intersection LOS	B					
Intersection V/C	0.651					

Intersection Level Of Service Report
Intersection 6: Sand Canyon Ave and I-5 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.619

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	538	126	86	173	0	170	0	89	0	0	0
Total Analysis Volume [veh/h]	0	2151	504	343	691	0	679	0	355	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	6	0	5	2	0	0	8	0	0	0	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.32	0.30	0.10	0.10	0.00	0.13	0.00	0.15	0.00	0.00	0.00
Intersection LOS	B											
Intersection V/C	0.619											

Intersection Level Of Service Report
Intersection 7: SR-133 SB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.883

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	530.00	100.00	100.00	100.00	140.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	57	0	191	0	1526	152	164	2640	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	18	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	57	0	191	0	1526	170	164	2640	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	14	0	48	0	382	43	41	660	0
Total Analysis Volume [veh/h]	0	0	0	57	0	191	0	1526	170	164	2640	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	0	0	0	4	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.25	0.25	0.05	0.78	0.00
Intersection LOS	D											
Intersection V/C	0.883											

Intersection Level Of Service Report
Intersection 8: SR-133 NB Ramps and Irvine Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.746

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name												
Base Volume Input [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	82	0	75	0	0	0	0	349	0	0	602	41
Total Analysis Volume [veh/h]	326	0	298	0	0	0	0	1394	0	0	2408	165
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal Group	8	2	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.00	0.18	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.50	0.50
Intersection LOS	C											
Intersection V/C	0.746											

Appendix F

Tribal Cultural Resources Consultation (AB 52 Letters)

ESA

Irvine Ranch
WATER DISTRICT

May 24, 2019

Andrew Salas, Chairman
Gabrieleño Band of Mission Indians – Kizh Nation
P.O. Box 393
Covina, CA 91723

Subject: Assembly Bill 52 Consultation for Irvine Ranch Water District Syphon Reservoir Improvement Project, Orange County, California

Dear Mr. Salas:

Pursuant to the provisions of Assembly Bill (AB) 52 and Section 21080.3.1(d) of the Public Resources Code, this notification serves to extend an invitation to enter consultation for the Syphon Reservoir Improvement Project (project). Irvine Ranch Water District (IRWD) is the lead agency for the proposed project under the California Environmental Quality Act (CEQA, Public Resources Code 21000 et. seq.), and for Native American consultation per AB 52. IRWD seeks your input on tribal cultural resources that could be impacted by the project.

PROJECT DESCRIPTION

Syphon Reservoir is an existing recycled water storage reservoir located in Orange County, California (see Map 1, Project Location). IRWD acquired Syphon Reservoir in 2010 from the Irvine Company. In 2012, IRWD implemented the Syphon Reservoir Interim Facilities project, which made minor improvements to integrate the reservoir into IRWD's recycled water system. IRWD proposes to implement the Syphon Reservoir Improvement Project, which would increase the reservoir storage capacity by replacing the existing 59-foot high dam with a new embankment dam that would be up to approximately 136 feet high. By replacing the dam, the storage capacity at Syphon Reservoir would increase from 535 acre feet (AF) to approximately 5,000 AF. Existing onsite strainer and disinfection facilities would be replaced with larger facilities, and well as other supporting facilities to distribute water within IRWD's service area. The project location is shown on the attached project site map. Refer to Map 1, Project Location.

Please note that IRWD contacted you in November 2018 regarding the Syphon Reservoir Geotechnical Investigations Project, which led to the preparation of an Initial Study/Mitigated Negative Declaration. While the current project would be located at the same site as the geotechnical investigation, a separate CEQA document will be prepared, and IRWD is conducting separate AB 52 outreach.

PREVIOUS CULTURAL RESOURCES STUDY

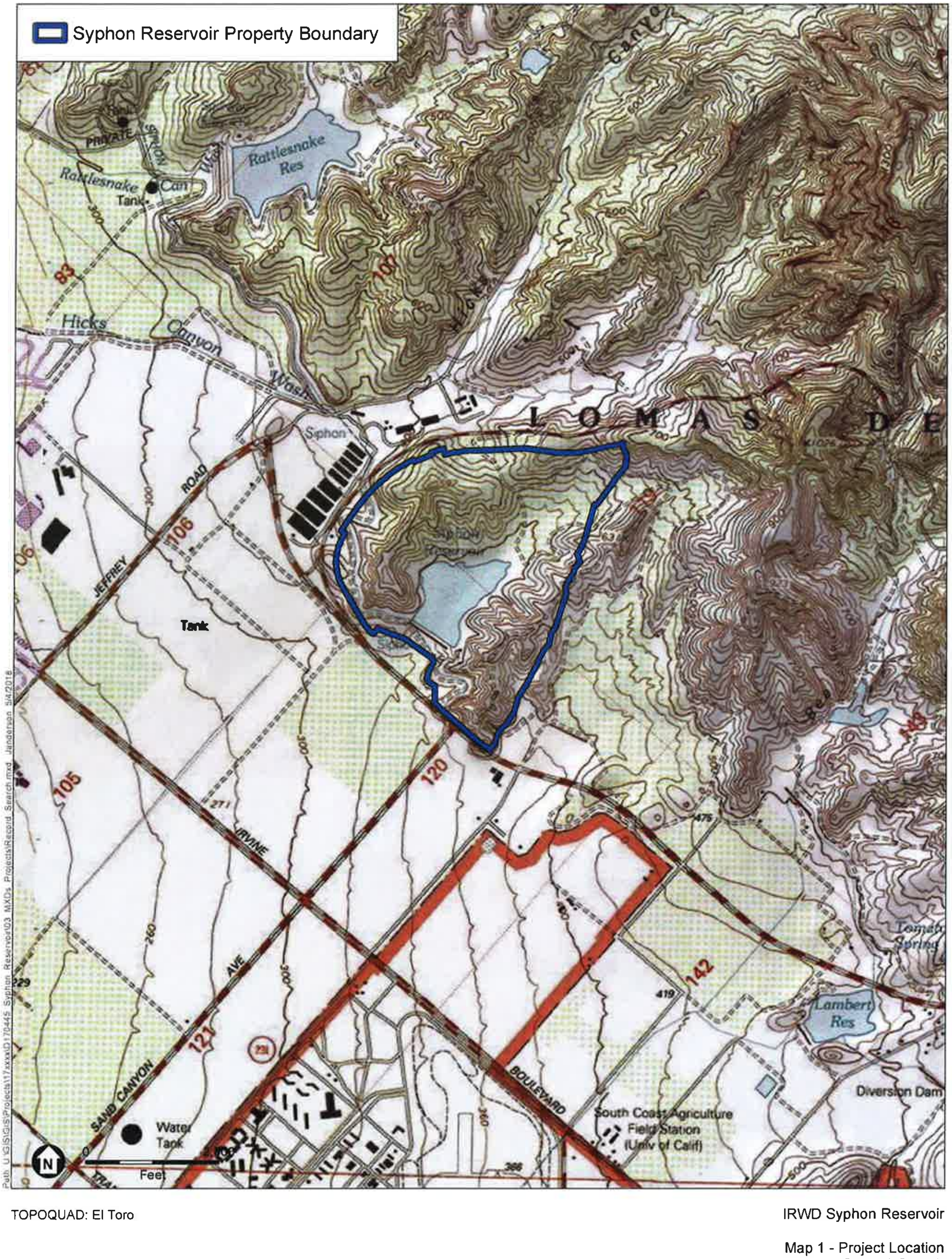
As part of a geotechnical investigation, a Phase I Cultural Resources Technical Report for the full project area was prepared in January 2019, in accordance with both CEQA and Section 106 requirements. The report included a project description; regulatory and cultural/historical background contexts; methods and results of archival research and field studies; and recommendations for mitigation or any additional studies that might be required. Because both prehistoric and historic-period archaeological resources are known to occur within the project site, archaeological and Native American monitoring are included as recommended mitigation. The report will be used as the basis for the cultural resources section of the CEQA environmental document, following Appendix G of the CEQA Guidelines.

Your participation in this local planning process is important. If you have any knowledge of tribal cultural resources, Native American Sacred Lands, or other cultural resources on or near the study area, or would like to consult on the project, please contact me **within 30 days** of receipt of this letter at (949) 453-5300 or via email at corey@irwd.com, with the subject line referencing the "Syphon Reservoir Improvement Project".

Sincerely,

Jo Ann Corey
Environmental Compliance Specialist
Water Resources & Environmental Compliance

Attachment: Map 1, Project Location



TOPOQUAD: El Toro

IRWD Syphon Reservoir

Map 1 - Project Location
Record Search

ESA

Irvine Ranch
WATER DISTRICT

May 24, 2019

Joyce Stanfield Perry, Tribal Manager
Juaneño Band of Mission Indians – Acjachemen Nation
4955 Paseo Segovia
Irvine, CA 92603

Subject: Assembly Bill 52 Consultation for Irvine Ranch Water District Syphon Reservoir Improvement Project, Orange County, California

Dear Ms. Perry:

Pursuant to the provisions of Assembly Bill (AB) 52 and Section 21080.3.1(d) of the Public Resources Code, this notification serves to extend an invitation to enter consultation for the Syphon Reservoir Improvement Project (project). Irvine Ranch Water District (IRWD) is the lead agency for the proposed project under the California Environmental Quality Act (CEQA, Public Resources Code 21000 et. seq.), and for Native American consultation per AB 52. IRWD seeks your input on tribal cultural resources that could be impacted by the project.

PROJECT DESCRIPTION

Syphon Reservoir is an existing recycled water storage reservoir located in Orange County, California (see Map 1, Project Location). IRWD acquired Syphon Reservoir in 2010 from the Irvine Company. In 2012, IRWD implemented the Syphon Reservoir Interim Facilities project, which made minor improvements to integrate the reservoir into IRWD's recycled water system. IRWD proposes to implement the Syphon Reservoir Improvement Project, which would increase the reservoir storage capacity by replacing the existing 59-foot high dam with a new embankment dam that would be up to approximately 136 feet high. By replacing the dam, the storage capacity at Syphon Reservoir would increase from 535 acre feet (AF) to approximately 5,000 AF. Existing onsite strainer and disinfection facilities would be replaced with larger facilities, and well as other supporting facilities to distribute water within IRWD's service area. The project location is shown on the attached project site map. Refer to Map 1, Project Location.

Please note that IRWD contacted you in November 2018 regarding the Syphon Reservoir Geotechnical Investigations Project, which led to the preparation of an Initial Study/Mitigated Negative Declaration. While the current project would be located at the same site as the geotechnical investigation, a separate CEQA document will be prepared, and IRWD is conducting separate AB 52 outreach.

PREVIOUS CULTURAL RESOURCES STUDY

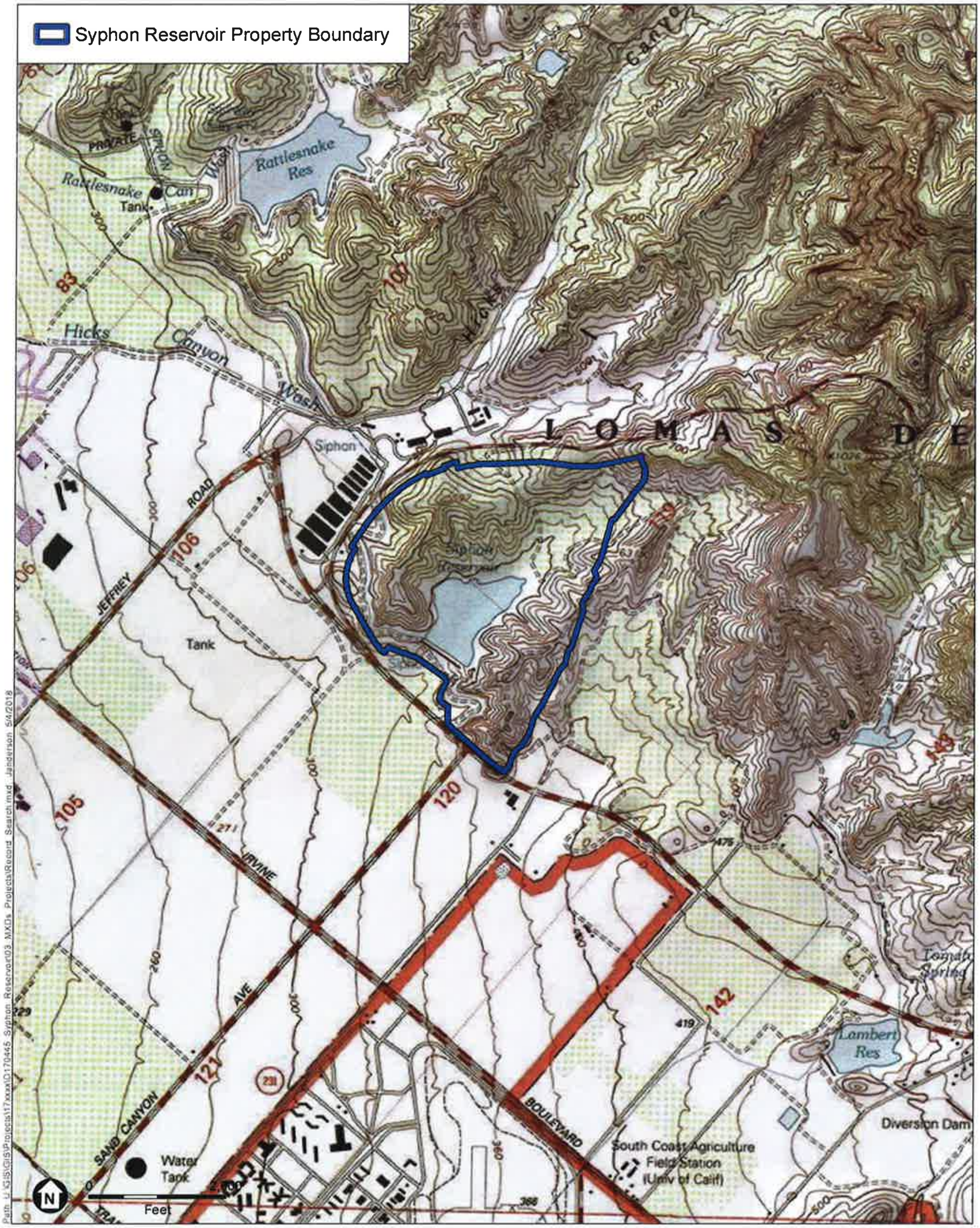
As part of a geotechnical investigation, a Phase I Cultural Resources Technical Report for the full project area was prepared in January 2019, in accordance with both CEQA and Section 106 requirements. At your request, during AB 52 consultation for the Syphon Reservoir Geotechnical Investigations Project Initial Study/Mitigated Declaration, this report was provided to you on January 3, 2019. The report included a project description; regulatory and cultural/historical background contexts; methods and results of archival research and field studies; and recommendations for mitigation or any additional studies that might be required. Because both prehistoric and historic-period archaeological resources are known to occur within the project site, archaeological and Native American monitoring are included as recommended mitigation. The report will be used as the basis for the cultural resources section of the CEQA environmental document, following Appendix G of the CEQA Guidelines.

Your participation in this local planning process is important. If you have any knowledge of tribal cultural resources, Native American Sacred Lands, or other cultural resources on or near the study area, or would like to consult on the project, please contact me **within 30 days** of receipt of this letter at (949) 453-5300 or via email at corey@irwd.com, with the subject line referencing the "Syphon Reservoir Improvement Project".

Sincerely,

Jo Ann Corey
Environmental Compliance Specialist
Water Resources & Environmental Compliance

Attachment: Map 1, Project Location



TOPOQUAD: El Toro

IRWD Syphon Reservoir

Map 1 - Project Location
Record Search

ESA

May 24, 2019

Michael Mirelez, Cultural Resource Coordinator
Torres Martinez Desert Cahuilla Indians
P.O. Box 1160
Thermal, CA 92274

Subject: Assembly Bill 52 Consultation for Irvine Ranch Water District Syphon Reservoir Improvement Project, Orange County, California

Dear Mr. Mirelez:

Pursuant to the provisions of Assembly Bill (AB) 52 and Section 21080.3.1(d) of the Public Resources Code, this notification serves to extend an invitation to enter consultation for the Syphon Reservoir Improvement Project (project). Irvine Ranch Water District (IRWD) is the lead agency for the proposed project under the California Environmental Quality Act (CEQA, Public Resources Code 21000 et. seq.), and for Native American consultation per AB 52. IRWD seeks your input on tribal cultural resources that could be impacted by the project.

PROJECT DESCRIPTION

Syphon Reservoir is an existing recycled water storage reservoir located in Orange County, California (see Map 1, Project Location). IRWD acquired Syphon Reservoir in 2010 from the Irvine Company. In 2012, IRWD implemented the Syphon Reservoir Interim Facilities project, which made minor improvements to integrate the reservoir into IRWD's recycled water system. IRWD proposes to implement the Syphon Reservoir Improvement Project, which would increase the reservoir storage capacity by replacing the existing 59-foot high dam with a new embankment dam that would be up to approximately 136 feet high. By replacing the dam, the storage capacity at Syphon Reservoir would increase from 535 acre feet (AF) to approximately 5,000 AF. Existing onsite strainer and disinfection facilities would be replaced with larger facilities, and well as other supporting facilities to distribute water within IRWD's service area. The project location is shown on the attached project site map. Refer to Map 1, Project Location.

Please note that IRWD contacted you in November 2018 regarding the Syphon Reservoir Geotechnical Investigations Project, which led to the preparation of an Initial Study/Mitigated Negative Declaration. While the current project would be located at the same site as the geotechnical investigation, a separate CEQA document will be prepared, and IRWD is conducting separate AB 52 outreach.

PREVIOUS CULTURAL RESOURCES STUDY

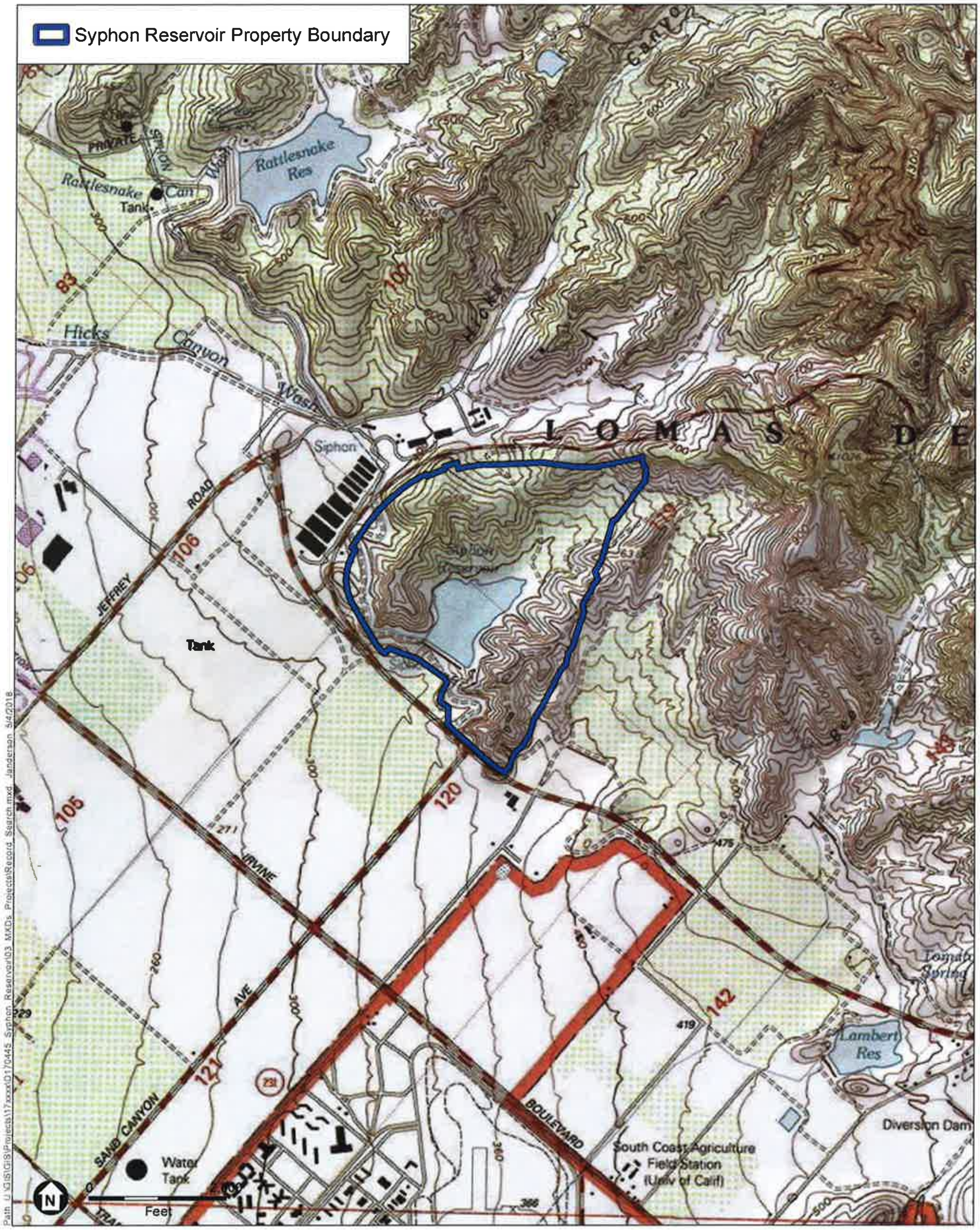
As part of a geotechnical investigation, a Phase I Cultural Resources Technical Report for the full project area was prepared in January 2019, in accordance with both CEQA and Section 106 requirements. The report included a project description; regulatory and cultural/historical background contexts; methods and results of archival research and field studies; and recommendations for mitigation or any additional studies that might be required. Because both prehistoric and historic-period archaeological resources are known to occur within the project site, archaeological and Native American monitoring are included as recommended mitigation. The report will be used as the basis for the cultural resources section of the CEQA environmental document, following Appendix G of the CEQA Guidelines.

Your participation in this local planning process is important. If you have any knowledge of tribal cultural resources, Native American Sacred Lands, or other cultural resources on or near the study area, or would like to consult on the project, please contact me **within 30 days** of receipt of this letter at (949) 453-5300 or via email at corey@irwd.com, with the subject line referencing the "Syphon Reservoir Improvement Project".

Sincerely,

Jo Ann Corey
Environmental Compliance Specialist
Water Resources & Environmental Compliance

Attachment: Map 1, Project Location



TOPOQUAD: El Toro

IRWD Syphon Reservoir

Map 1 - Project Location
Record Search

ESA

TORRES MARTINEZ DESERT CAHUILLA INDIANS
P.O. Box 1160
Thermal, CA 92274
(760) 397-0300 – FAX (760) 397-8146

MAU - WAL - MAH
SU-KUTT MENYIL

June 6, 2019

Attn: Jo Ann Corey

Re: Irvine Ranch Water District Syphon Reservoir Improvement Project, Orange County Ca.

The Torres – Martinez Desert Cahuilla appreciates your response to our AB52 notification request. And in light of said information concerning your agencies location, the Tribe wishes to defer all future project notifications to Tribes that are closer to your area.

Respectfully,

Michael Mirelez
Cultural Resource Coordinator
Torres-Martinez Desert Cahuilla Indians
Office: 760-397-0300 Ext: 1213
Cell: 760-399-0022
Email: mmirelez@tmdci.org

GABRIELENO BAND OF MISSION INDIANS - KIZH NATION
Historically known as The San Gabriel Band of Mission Indians
recognized by the State of California as the aboriginal tribe of the Los Angeles basin

Project County Name: Irvine Ranch Water District Syphon Reservoir Improvement Project Orange County

Dear Jo Ann Corey,

Thank you for your letter dated May 24,2019 regarding AB52 consultation. The above proposed project location is within our Ancestral Tribal Territory; therefore, our Tribal Government requests to schedule a consultation with you as the lead agency, to discuss the project and the surrounding location in further detail .

Please contact us at your earliest convenience. ***Please Note :AB 52, "consultation" shall have the same meaning as provided in SB 18 (Govt. Code Section 65352.4).***

Thank you for your time,

Andrew Salas, Chairman
Gabrieleno Band of Mission Indians – Kizh Nation
1(844)390-0787