IRVINE RANCH WATER DISTRICT

2021 Cost of Service and Rate Design Study

December 7, 2021

RAFTELIS

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1. Executive Summary

1.1. Study Objectives

The Irvine Ranch Water District (District) retained the services of Raftelis Financial Consultants, Inc. (Raftelis) to conduct a Cost of Service and Rate Design Study (Study). The overarching objective of the Study was to conduct a comprehensive review of the methods used by the District to develop the rates it charges for water, sewer, and recycled water service in order to confirm compliance with Proposition 218 and other applicable legal requirements.

A synopsis of the Study objectives, as presented to the Finance and Personnel Committee of District's Board of Directors (Board) in October 2020, included determining if the rates set by the District are:

- Consistent with Proposition 218 and applicable law.
- Cost of service based and set at a level that provides adequate funding to meet the District's revenue requirement.
- Equitable, reasonable, not discriminatory, or preferential, and proportionally allocate the cost of providing service to customer classes.
- Tiered to reflect the higher cost of water that exceeds budget.
- Appropriately using fixed and variable charges to recover costs and anticipated replacement costs for future infrastructure.
- Easy to understand and administer.

Raftelis completed the Study during the period June 2020 - December 2020. As requested by the District staff, the work focused on confirming the validity of the fiscal year (FY) 2020-21 water, sewer and recycled water rates presented in the District's Proposition 218 Notice for the two-year period FY 2019-20 and FY 2020-21.

The District deferred implementation of the increase originally noticed for FY 2020-21 rates to be effective on July 1, 2020. Instead, due to concerns regarding the impact of the COVID-19 pandemic to its customers, the District kept its existing rates for FY 2019-20 in place. Although they were deferred, for the purposes of this Study the FY 2020-21 rates provided an effective baseline to assess the District's compliance with the requirements of Proposition 218.

1.2. Study Methodology

The following four-stage process was used to complete the Study objectives. A more detailed discussion of the Study methodology is presented in Section 3 of this Report.

- Stage 1: Understanding/analysis of the District's current approach to developing rates:
    - Analysis of underlying customer billing data.
    - Understanding of cost allocation and rate design methodologies.
    - Detailed review and analysis.

- Stage 2: Identification of recommended changes to cost allocation and/or rate design methodologies:
    - Recommendations for incremental enhancements to the District's water budget rate structure.
    - Recommendation for specific cost allocation and rate structure changes associated with sewer and private fireline rates.
    - Recommendations of alternatives to the District's rate structure and cost recovery approaches for future policy consideration.

- Stage 3: Testing the rate and customer bill impacts of the recommendations.
- Stage 4: Presentation of the recommendations.

1.3. Requirements of Proposition 218

The overarching objective of the Study was to assess whether the District's noticed FY 2020-21 rates are compliant with California Proposition 218. Proposition 218, reflected in the California Constitution as Article XIII D, was enacted in 1996 to ensure that rates and fees are reasonable and proportional to the cost of providing service. The principal requirements for fairness of the fees, as they relate to public water service, are as follows:

- A property-related charge (such as water rates) imposed by a public agency on a parcel shall not exceed the costs required to provide the property-related service.
- Revenues derived by the charge shall not be used for any purpose other than that for which the charge was imposed.
- The amount of the charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
- No charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.
- No charge may be imposed for general governmental services including, police, fire, and ambulance protection services, or library services, where the service is available to the public at large in substantially the same manner as it is to property owners.
- A written notice of the proposed charge shall be mailed to the record owner of each parcel at least 45 days prior to the public hearing, when the agency considers all written protests against the charge.

As stated in AWWA's Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1, 7th edition (M1 Manual), "water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers." Proposition 218 requires that rates cannot be arbitrary and capricious, meaning that the rate-setting methodology must be sound and that there must be a nexus between the costs of providing property-related service and the rates charged. This study follows industry standard rate-setting methodologies set forth by the M1 Manual, adhering to Proposition 218 requirements by developing rates that do not exceed the proportionate cost of providing water services.

1.4. District Compliance with Proposition 218

The study confirmed that the District's water, sewer, and recycled water rate structures are compliant with the requirements of Proposition 218 in that each rate structure is designed to recover revenues from customers that are no greater than the cost incurred to provide service. This general conclusion notwithstanding, Proposition 218 does not prescribe exactly how to allocate costs among customers, and this study identifies additional modifications to the calculations used to determine the District's sewer and private fireline rates that could further enhance the current alignment between revenue recovery and evolving costs.

1.4.1. RECOMMENDED MODIFICATIONS TO SEWER RATES

No change is recommended for the District's existing sewer rate structure. However, proposed modifications to the methodology used to generate the rates noticed for FY 2020-21 by the District could further enhance the alignment of evolving fixed and variable costs to rates between customers based on the volume of their estimated average sewer discharges. A more detailed discussion of sewer rates is presented in Section 5 of this report.

1.4.2. RECOMMENDED MODIFICATIONS TO PRIVATE FIRELINE RATES

The District currently collects approximately $4.4 million annually from customers who have their own private firelines. The current private fireline rates charged by the District have remained steady since 2007. As costs to provide water service, including to private firelines, continue to evolve, an updated methodology to develop private fireline rates is recommended to further enhance the alignment of costs to rates for private fire line customers. A discussion of fire line rates is presented in Section 4.3.4 of this report.

1.5. Policy Options Considered

In addition to considering the District's compliance with Proposition 218, the following policy questions were also considered. A full discussion of these policy items is presented in Section 7 of this report.

- Alternatives for targeted water conservation spending.
- Alternatives for capital replacement funding.
- Alternative water monthly meter service charges for residential customers.
- Recovery of pension and other post-employment benefit costs.

2. DISTRICT BACKGROUND

2.1. HISTORY AND SERVICE TERRITORY

The District was established in 1961 as a California Water District under the provisions of the California Water Code. The District is an independent public agency governed by a five-member, publicly-elected Board of Directors whose members are elected for staggered four-year terms. The Board's policies are administered by the General Manager. As a special district, the District focuses on four primary services:

- Providing potable water.
- Collecting and treating sewage.
- Producing and distributing recycled water.
- Implementing urban runoff source control and treatment programs.

The District serves a 181-square-mile area that includes all of the City of Irvine and portions of the cities of Tustin, Newport Beach, Costa Mesa, Orange, and Lake Forest, as well as certain unincorporated areas of Orange County. Extending from the Pacific Coast to the foothills of Eastern Orange County, the region served by the District is semi-arid with a mild climate and an average annual rainfall of approximately 12 inches. The total estimated daytime population served is approximately 600,000 people through approximately 118,000 water and 113,000 sewer service and recycled water connections. The number of service connections has increased by 21% over the last 10 years.

The District builds and maintains capital infrastructure to serve customers. It is organized into improvement districts to allocate funding responsibility for capital facilities to the area that will benefit from such capital facilities and to separate areas based on the projected timing of development. Expenditures for growth-related capital improvements are funded by the District via ad valorem taxes (property taxes) and connection fees that are collected from the developers and property owners. Expenditures for the replacement and repair of capital facilities are funded by the rates paid by customers.

2.2. BUDGETING AND RATE-SETTING PROCESS

The District adopts operating expense and capital expenditure budgets on a biennial basis. The budgets for FY 2019-20 and FY 2020-21 were adopted by the District on April 22, 2019. As an outcome of the biennial budgeting process, the District determines the water, sewer, and recycled water rates that must be paid by customers for the upcoming two-year period. In May 2019, the District issued Proposition 218 notices with rates noticed to become effective on July 1, 2019 and July 1, 2020, respectively.

The District elected to defer the noticed FY 2020-21 rates that were to be effective on July 1, 2020 due to concerns regarding the financial impact of the COVID-19 pandemic on its customers. Although they were not implemented, for the purposes of this Study, the FY 2020-21 rates provided an effective baseline to assess the District's compliance with the requirements of Proposition 218.

2.3. WATER SYSTEM DESCRIPTION

2.3.1. WATER SUPPLY

The District's water supply consists of three primary sources: groundwater originating in the Orange County Groundwater Basin via arrangements with the Orange County Water District (OCWD), recycled water produced from sewer treatment plant effluent, and imported water purchased from the Metropolitan Water District of

Southern California (MWD) through its member agency, the Metropolitan Water District of Orange County (MWDOC). In addition, The District uses surface water (runoff capture) from Irvine Lake (Santiago Creek Reservoir) as a source of untreated water. The District also has an active water banking program to store low-cost water during wet hydrological periods in order to ensure reliable supplies during dry years.

2.3.2. GROUNDWATER

The District's groundwater supplies are obtained from the Orange County Groundwater Basin in accordance with the policies and procedures set by the OCWD. These include the setting of replenishment assessments, basin production percentages of total water demand by agencies pumping basin groundwater, and basin equity assessments. The District also has separate contractual arrangements with OCWD to pump groundwater that is not specifically governed by OCWD's basin production percentages and equity assessments. The primary sources are the Dyer Road Well Field (up to 28,000 acre feet per year), Deep Aquifer Treatment System, and Irvine Desalter Potable Water. The District's sources of groundwater supply for the fiscal year ending June 30, 2020 are shown in Table 1.

Table 1: FY 2020 Groundwater Supply in Acre Feet

Groundwater Source	Acre Feet
Dyer Road Well Field	28,000
Deep Aquifer Treatment System	8,489
Irvine Desalter Project	7,054
Wells 21 and 22	2,279
Other	1,988
Total	**47,810**

2.3.3. RECYCLED WATER

The District processes and treats sewer effluent from customers to create recycled water supplies. During the fiscal year ending on June 30, 2020, the District supplied 31,119 acre feet of recycled water and 1,009 acre feet of other non-potable water to customers via its recycled water system. The District has approximately 5,400 recycled water customers who are served via 570 miles of recycled water mains. The District also has approximately 5,250 acre feet of recycled water storage.

2.3.4. IMPORTED WATER

The District purchases treated and untreated water from the MWD though its member agency, MWDOC. These supplies originate in the Colorado River and Northern California. During the fiscal year ending June 30, 2020, the District purchased 12,081 treated and 921 untreated acre feet of water from MWDOC.

2.3.5. SURFACE WATER

Native water is rainwater that is captured by Irvine Lake (Santiago Creek Reservoir) and is used by both the District and Serrano Water District to store water for the benefit of local farms and urban areas. As a source, native water is dependent upon rain. When available, the District utilizes this water for non-drinking purposes, such as agricultural irrigation, and as a source of water to be treated by the Baker Water Treatment Plant, which creates drinking water for the surrounding community. During the fiscal year ending June 30, 2020, Irvine Lake supplied the District with 6,524 acre feet of water.

2.3.6. WATER BANKING

In addition to developing groundwater and recycled water systems (discussed below), the District has also sought to enhance its water supply reliability by developing water banking facilities in Kern County, California. These projects allow the District to capture and store low-cost water during wet hydrological periods for use during later dry years. In March 2020, IRWD completed a Water Supply Reliability Evaluation that affirmed the need for

water banking programs to meet District demands during future droughts and major supply interruptions. Current demand projections indicate that IRWD has a long-term need to store supplemental water that could be called upon during drought conditions or major supply interruptions. IRWD has constructed a fully operational water banking program that makes it possible for IRWD and its banking partners to store excess water during "wet" hydrologic periods. The stored water is then available for use during "dry" periods to offset reduced water supplies under periods of severe drought or during periods of supply interruptions for imported water demands on the system from customers in the wasteful tier. Table 2 provides a summary of the District's water banking storage for the fiscal year ending on June 30, 2020.

Table 2: Water Banking for the FY Ending on June 30, 2020 (Acre Feet)

Facility	Total Capacity	Total Water in Storage	District Share of Total Water in Storage
Strand Ranch	50,000	37,460	34,492
Stockdale West	26,000	1,459	1,459
District Acquired Storage Account	50,000		
Kern	9,495	4,215	4,215
Total	**135,495**	**43,134**	**40,166**

2.3.7. SUMMARY OF WATER SUPPLIES

During the fiscal year ending June 30, 2020, the District had total water supply deliveries of 91,963 acre feet. Table 3 details these supplies.

Table 3: Water Supplies for the FY Ending on June 30, 2020 (Acre Feet)

Source of Supply	Acre Feet
Local Groundwater	47,810
Recycled Water	24,627
Imported Water	13,002
Runoff Capture (surface water)	6,524
Total	**91,963**

2.3.8. POTABLE AND RECYCLED WATER INFRASTRUCTURE

The District has approximately 2,525 miles of water mains in its potable and recycled water systems and storage capacity of approximately 24,000 acre feet, including the District's share of Irvine Lake, a 25,000 acre feet untreated water reservoir, and the District's Sand Canyon, Rattlesnake Canyon, Syphon, and San Joaquin Reservoirs, which are recycled water reservoirs with capacities of 800 acre feet, 1,100 acre feet, 450 acre feet, and 2,900 acre feet respectively. The District's groundwater and treatment facilities include:

Dyer Road Well Field: The Dyer Road Well Field (DRWF) produces groundwater from the principal aquifer of the Orange County Groundwater Basin. Generally, the water quality exceeds potable water quality standards and does not require treatment other than chlorination. The Dyer Road Well Field has a capacity of producing up to 28,000 acre feet per year.

Deep Aquifer Treatment System: The Deep Aquifer Treatment System (DATS) purifies drinking water from deep within the Orange County Groundwater Basin. The process removes impurities left from ancient vegetation in the bedrock and produces 24.5 acre feet of drinking water per day.

Irvine Desalter Project: The Irvine Desalter Project (IDP) consists of five wells located near the I-5 Freeway in Irvine in the Orange County Groundwater Basin. Salty water is pumped from these wells and sent to the IDP treatment facility. The treatment process removes salts from local groundwater. IDP's purified water provides approximately 5,100 acre feet or 1.6 billion gallons of drinking water per year, enough for 50,000 people.

Wells 21 and 22 Project: The Wells 21 and 22 Project recovers and treats local impaired groundwater for use in the District's potable water system. The Wells 21 and 22 Project can produce approximately 6,300 acre feet per year of potable water for the District's service area.

El Toro Groundwater Remediation Program: The El Toro Groundwater Remediation Program was initiated in 1985. Trichloroethylene, also known as TCE, was found in portions of the groundwater basin beneath the former El Toro Marine Corps Air Station and central Irvine. TCE is a volatile organic compound, or VOC, that was widely used as a solvent for aircraft cleaning. As a result, a one-by-three-mile plume of contamination now extends off the base. The contamination is about 150 feet deep beneath the base and 300-700 feet deep in the community area. In January 2007, the District, the OCWD, and the United States Department of the Navy began a joint operation, now called the El Toro Groundwater Remediation Program, designed to clean up the TCE plume. This operation pumps water from the plume and removes the TCE. The resulting treated water is used for non-drinking purposes only. Each year this program provides 3,990 acre feet of clean water, enough to irrigate 1,300 acres of landscaping.

Baker Water Treatment Plant: The Baker Water Treatment Plant is a joint regional project owned by five South Orange County water districts that provides 28.1 million gallons per day (mgd) of drinking water, which is equivalent to approximately 63,000 single family residential dwelling units. The District's share of this capacity is 24.2% or 20.9 acre feet per day.

Michelson Water Recycling Plant: The Michelson Water Recycling Plant with a capacity of 28 mgd, converts millions of gallons of sewage into recycled water each day. The recycled water is used for landscape irrigation, industrial uses, and toilet flushing. The plant was built in 1961, produces 21,000 acre feet, and is the District's primary source of recycled water.

Los Alisos Water Recycling Plant. The Los Alisos Water Recycling Plant treats an average of seven mgd and, based on demand, produces at least 2,000 acre feet of recycled water per year. The recycled water is used for landscape irrigation and other non-drinking uses. The plant was built in 1964 and, along with the Michelson Water Recycling Plant, provides the District's recycled water supply.

2.4. SEWER SYSTEM DESCRIPTION

The District has an extensive network of gravity sewers, force mains, and sewer lift stations that convey sewage to two District-owned treatment locations and the Orange County Sanitation District (OCSD). In FY 2019-20, approximately 84% of the District's sewage was treated at its Michelson and Los Alisos Water Recycling Plants. The remainder of the sewage collected by the District was treated by the OCSD. As noted previously in the discussion of recycled water, both the Michelson and the Los Alisos Water Recycling Plants produce significant volumes of recycled water in addition to treating sewage.

2.5. SUMMARY OF DISTRICT INFRASTRUCTURE

Table 4 below provides a summary of the District's potable water, sewer, and recycled/non-potable water systems as of the fiscal year ending on June 30, 2020.

Table 4: FY 2020 System Infrastructure

Potable Water System	
Miles of Water Line	1,955
Number of Storage Tanks	37
Maximum Storage Capacity (acre feet)	467
Number of Pumping Stations	39
Number of Wells	27
Well Production Capacity (cubic feet per second)	118
Water Banking Storage Capacity (acre feet)	126,000
Potable Treatment Plants	5
Recycled and Non-Potable Water Systems	
Miles of Recycled Line	570
Number of Storage Tanks	12
Number of Open Reservoirs	5
Maximum Storage Capacity (acre feet)	24,155
Number of Pumping Plants	19
Number of Wells	5
Well Production Capacity (cubic feet per second)	10
Sewer System	
Miles of Sewer Line	1,143
Number of Lift Stations	13
Treatment Plants	2
Tertiary Treatment Capacity (millions of gallons per day)	33.5
Sewage Flows to Michelson Plant	72%
Sewage Flows to Los Alisos Plant	12%
Sewage Flows to Orange County Sanitation District	16%

3. STUDY METHODOLOGY

A four-stage methodology was used to complete the Study objectives. A summary of the work process in each of these stages is presented below.

Stage 1: Understanding/Analysis of the Current Approach to Developing Rates. This stage consisted of understanding and analyzing the District's current approach to develop water, sewer, and recycled water rates. Stage 1 included the following primary analytical steps:

- **Analysis of Underlying Customer Billing Data**. The analysis used District-provided billing data from the customer information system (i.e., billing system) for FY 2018-19 and FY 2019-20. The billing data was configured in a Microsoft Excel format in order to analyze the water consumption characteristics of the District's residential customers, assess the appropriateness of monthly water budgets established for residential water customers in each consumption tier, and verify that actual rate revenue recovery approximately aligned with the District's underlying projected rate revenue requirements.

- **Understanding of Cost Allocation and Rate Design Methodologies**. In this step, a preliminary understanding of the District's approach to the development of water, sewer, and recycled water rates was gained. For example, the composition of the District's FY 2020-21 revenue requirement was reviewed with an emphasis on understanding how the District determines "fixed costs" that are appropriate for recovery through monthly charges versus "variable costs" that are appropriate for recovery through usage-based commodity rates. As part of this process, emphasis was placed on understanding the underlying cost-of-service rationale for the variable commodity rates charged in each tier of the District's water budget rate structure and fixed monthly charges in each block of the District's sewer rate structure.

- **Detailed Review of the Cost Allocations and Rate Design Methodologies**. In this step, a detailed review of the cost allocations used to develop the District's FY 2020-21 water, sewer, and recycled water rates as presented in its Proposition 218 Notice for the two-year period FY 2019-20 and FY 2020-21 was completed (as noted previously, the District's Board elected to defer the noticed FY 2020-21 rates). This included an audit and, as appropriate, development of potential adjustments to the cost allocation and rate design methodologies contained in the District's cost of service model.

Stage 2: Identification of Recommended Changes to Cost Allocation and/or Rate Design Methodologies. In Stage 2, conclusions were drawn regarding the District's compliance with Proposition 218 and a set of recommendations for consideration by the District's Board was developed. Recognizing that Proposition 218 does not detail exactly how to allocate costs, the focus in developing these recommendations was to ensure that the District's rates have a clearly identifiable correlation to underlying costs, and thus be compliant with Proposition 218 and fundamental cost-of-service equity. The resulting recommendations fell into three categories:

- Incremental enhancements to the District's water budget rate structure.
- Policy considerations for the District's future rate structure on cost recovery.
- Specific cost allocation and rate structure changes associated with sewer and private fire line rates.

Stage 3: Testing of the Rate Impacts and Customer Bill Impacts of the Raftelis Recommendations. For each of the specific recommendations made in Stage 2, estimates of how FY 2020-21 rates would change from those originally noticed by the District were developed and the potential impact of these rate changes on the bills of single family residential customers were determined. As part of this rate sensitivity process, bill impacts for a typical single family residential customer were estimated for each incremental recommendation and on an aggregate basis, which reflected the cumulative impact of all of the recommendations.

Stage 4: Presentation of the Recommendations. In this final stage of the Study, findings and recommendations were presented to the Finance and Personnel Committee on October 5, 2020, December 8, 2020 and March 2, 2021.

4. POTABLE WATER COST OF SERVICE

4.1. Water Budget Rate Structure

Proposition 218 specifies general principles governing property-related fees but does not prescribe exactly how to structure water service rates. As a result, water utilities have a wide range of options for recovering fixed and variable costs of providing service. For example, water utilities have a variety of options for the recovery of variable costs via commodity rates. Some utilities employ a simple uniform rate structure featuring a single commodity rate assessed on all customers regardless of their actual volume of usage. Other utilities develop specific commodity rates for each clearly definable customer class that use an inclining tier rate structure with specific fixed consumption tiers. Depending on the unique characteristics of the utility in question, the commodity rates charged under these and other rate-structure options can be cost-based and therefore compliant with requirements of Proposition 218.

The District uses a "budget-based" rate structure to recover the variable costs of providing potable and recycled water service to customers. Under this approach, a customized monthly budget (i.e., monthly water usage allocation) is developed for each customer. The commodity rates charged by the District in each consumption tier are designed to:

- Reflect and recover the increased cost of meeting consumption demands within each tier.
- Fund demand reduction and reliability programs.
- Mitigate for costs arising from customers' wasteful use that causes urban runoff requiring treatment by the Natural Treatment System (NTS).

4.1.1. RESIDENTIAL WATER BUDGET STRUCTURE

The District recovers the annual variable cost of providing water service to residential customers through a water budget-based rate structure that features four consumption tiers. The amount of water included in each customer's monthly water budget is based on an assessment of efficient water use as determined by factors that include:

- Household occupancy per housing type (based on census data).
- Irrigated landscape area.
- Daily weather characteristics during each month of the year.
- Unique characteristics such as the presence of a pool, medical needs, or livestock.

The commodity rates ($/ccf) paid in each consumption tier are designed to recover the District's variable cost of producing/purchasing water supplies. Customers with water usage that stays within their monthly budget allocation (the low volume and base tiers) pay commodity rates that reflect the lowest-cost sources of water supply. Customers with water usage in excess of their monthly budget allocation (the inefficient and wasteful tiers) pay commodity rates that reflect the District's higher-cost sources of water, such as potable imported water purchased from MWDOC.

Customers in the inefficient and wasteful tiers who exceed their monthly budget allocation impose higher costs on the District to meet their excess water demand. Thus, the commodity rates charged in these two upper tiers are designed to recover the cost of more expensive water supplies and to recover the additional costs of:

- Targeted conservation programs designed to reduce water use among customers in the wasteful tier.
- Water banking operational costs to enhance water supply reliability to supplement imported water supply to meet demand from customers in the wasteful tier.
- Programs designed to achieve long-term improvements in water use efficiency for customers in the inefficient and wasteful tiers.

- Natural treatment system programs used to control urban runoff sources (e.g., overspray and overwatering from landscape irrigation) due to customers who use water in the inefficient and wasteful tiers.

Table 5 shows the District's residential water budget consumption tiers and noticed FY 2020-21 commodity rates for residential customers.

Table 5: FY 2020-21 Residential Water Budget Consumption Tiers

Usage Tier	Single Family Residential (includes Condos)	Multi-Family Residential (Apartments)	FY 2020-21 Rates ($/ccf) (Noticed but Not Implemented)
Tier 1: Low Volume	0 - 40% of budget	0 - 50% of budget	$1.54
Tier 2: Base	41 - 100% of budget	51 - 100% of budget	$2.12
Tier 3: Inefficient	101 - 140% of budget	101 - 120% of budget	$4.91
Tier 4: Wasteful	141% + of budget	121% + of budget	$13.65

4.1.2. SINGLE FAMILY RESIDENTIAL WATER BUDGET CALCULATION

The monthly water budget developed for each individual customer features an indoor usage component and an outdoor usage component. The sum of these two components reflects the District's determination of efficient monthly water usage based on the unique requirements of each customer. As shown in Table 5 above, 40% to 50% of a customer's total monthly budget is billed at the lowest commodity rate in the low volume tier. The remaining portion of a customer's total monthly budget is billed in the base tier. Usage above a customer's total water budget is billed in the inefficient and wasteful tiers at the highest commodity rates.

The general formula used to determine a customer's indoor water budget is shown below. The approach used by the District is a reasonable method for quantifying efficient indoor water usage and no modifications are recommended.

Single Family Residential Indoor Budget (ccf) =
*Persons per Household (1) * 50 gallons per person (2) * Days in the Billing Cycle ÷ 748 Conversion Factor (3)*

(1) The default assumption used is four persons per household. Customers can request a variance to adjust this factor.
(2) 748 is a factor to convert gallons to one hundred cubic feet (ccf).
(3) Although Water Code section 10609.4 sets a current State of California standard at 55 gallons per person per day, the state standard is slated to decrease to 52.5 gallons per person per day in 2025 and to 50 gallons per person per day in 2030. The typical District customer uses approximately 50 gallons per person per day.

The fundamental metric used in the District's calculation of efficient outdoor water usage is the evapotranspiration (ET) rate of landscape plants. Evapotranspiration is the process by which water is lost to the atmosphere through evaporation and transpiration. ET rates are measured at three monitoring stations located throughout the District's service territory. Having established the ET rate for each day of the monthly billing cycle based on actual weather conditions, the District applies an adjustment factor. The District's ET Adjustment Factor (ETAF) of 0.75 is based on the typical residential landscape plant mix and the efficiency of a typical residential irrigation system. Typical residential landscapes in IRWD's service area are primarily turf (approximately 60% of the landscape) usually with borders or other landscape features that can include trees, shrubs and other plants (approximately 40%). Different plants have different watering requirements, called plant factors, which can be quantified compared to a reference crop such as cool-season turf, which requires 100% of ET. Warm season grass has a plant factor of 0.65, or requires 65% of ET, and drought tolerant and lower water use plants are assumed to have a plant factor of 0.5, or 50% of ET. A weighted average, based on 60% warm-season grass and 40% drought tolerant plants results in an average plant factor of 0.6. The irrigation system is assumed to be 80% efficient, or 0.8. ETAF = Plant Factor/Irrigation Efficiency. Dividing the plant factor by the irrigation efficiency (0.6/0.8) = 0.75. This can also

be calculated as follows using Plant Factor = 0.6 and Irrigation Efficiency = 1/0.8 = 1.25. Therefore, ETAF = 0.6 x 1.25 = 0.75.

A simplified representation of the general formula used to determine a customer's outdoor water budget is shown below. The approach used to quantify efficient outdoor water usage is based on horticultural science, is reasonable, and no modifications are recommended.

Single Family Residential Outdoor Budget (ccf) =
*Irrigated Landscape Area (1) * Evapotranspiration (ET) Rate (2) * 0.75 ET Adjustment Factor (3) * 36.3 Conversion Factor (4)*

(1) Area measured in acres.
(2) Evapotranspiration rate during each day of the monthly billing cycle based on actual temperature, humidity, and other factors.
(3) Adjustment factor assuming 60% efficient warm season turf, 40% drought tolerant plants and 20% irrigation system inefficiency.
(4) 36.3 is a factor to convert acre-inches of water to one hundred cubic feet (ccf).

The typical single family residential customer served by the District has an average monthly usage of 12 ccf. Table 6 provides an example of the calculation of the indoor, outdoor, and total monthly water budgets for this average customer.

Table 6: Example Calculation of a Single Family Residential Monthly Water Budget

Example Monthly Water Budget Calculation for an Average Single Family Residential Customer (Default Household Occupancy of 4 persons and 0.3 acres of Irrigated Landscape)		
Line	**Indoor Water Budget Calculation**	
1	Default Persons per Household	4.0
2	Required Gallons per Person per Day	50.0
3	Days in Billing Cycle	30
4	Monthly Indoor Water Budget (gallons)	6,000 (Lines 1 * 2 * 3)
5	Monthly Indoor Water Budget (ccf)	8.0 (Line 4 / 748 Conversion Factor)
	Outdoor Water Budget Calculation	
6	Average Daily ET Rate During the Billing Cycle Based on Measured Temperature, Humidity and other factors (Inches)	0.136986
7	Adjustment for 60% warm season turf & 40% drought tolerant landscaping	0.6
8	Adjustment for Irrigation System Efficiency	0.8
9	ET Adjustment Factor	0.75 (Line 6 / Line 8)
10	Adjusted Daily ET Rate	0.10274 (Line 6 * Line 9)
11	Customer Irrigated Landscape Area (acres)	0.03
12	Required Inches of Water per Acre	0.003082 (Line 10 * Line 11)
13	Days in Billing Cycle	30.0
14	Required Inches per Acre	0.092466 (Line 12 * Line 13)
15	Monthly Outdoor Water Budget (ccf)	3.4 (Line 14 * 36.3 Conversion Factor)
	Total Water Budget	
16	Total Monthly Water Budget Before Rounding (ccf)	11.4 (Line 5 + Line 15)
17	Total Monthly Water Budget Used in Customer Billing (ccf)	12.0

4.1.3. SINGLE FAMILY RESIDENTIAL CONSUMPTION TIERS

Water utilities that employ inclining tier rate structures develop their tiers based on the cost of the amount of water allocated for use in each consumption tier. For example, tier 1 (the lowest commodity rate) may be defined as the

winter water usage of an average single family residential customer, which typically represents interior water use because exterior irrigation needs normally are minimal during the typical winter wet season. Tier 2 may reflect the addition of estimated outdoor watering needs for single family residential customers with an average size lot. Finally, tier 3 represents additional demands from 100% warm season turf for a customer with an average sized lot and tier 4 (the highest commodity rate) may be defined as any amount of usage in excess of tier 3.

The District takes a more sophisticated approach to developing cost-justified consumption tiers. Instead of using "one-size-fits-all" fixed consumption tiers, the District calculates custom, individualized water budgets that fairly allocate the lower-cost and higher-cost components of the District's water supply across a broad spectrum of customer types. To ensure equity in the bills paid by customers, a common definition of the usage allowed in each tier is expressed on a percentage rather than a specific fixed level of consumption.

The example in Table 6 above showed the calculation of a 12 ccf monthly water budget for a hypothetical single family residential customer. Table 7 shows how this single family residential customer would be billed under the water budget tier structure if their actual water usage equaled 18 ccf and no variance was submitted.

Table 7: Allocation Usage Between Consumption Tiers (based on a 12 ccf Budget)

Usage Tier	Single Family Residential Consumption Tiers	Amount Billed in Each Tier Based on Usage of 18 ccf
Tier 1: Low Volume	0 - 40% of budget	5 ccf =12 ccf total budget * 40%
Tier 2: Base	41 - 100% of budget	7 ccf =12 ccf total budget * 60%
Tier 3: Inefficient	101 - 140% of budget	5 ccf =12 ccf total budget * 140%
Tier 4: Wasteful	141% + of budget	1 ccf =18 ccf actual usage - 17 ccf allocated in Tiers 1 - 3

40% Breakpoint Between the Low Volume and Base Tiers: The District's current basis for the 40% tier breakpoint assumes a health and safety level of use of 30 gallons per person per day with no allocation for outdoor irrigation. The breakpoint definition has been modified to represent an allocation for both indoor and outdoor demands that provides for health and safety and is fair and equitable. The District has now defined the 40% breakpoint between the low volume and base tiers as follows:

> "The low volume tier, which reflects usage between 0 - 40% of each customer's total monthly water budget, is designed to provide all customers, with an amount of indoor water usage equivalent to 20 gallons per person per day in order to meet minimum health and safety requirements plus an amount of water for outdoor irrigation adequate to sustain outdoor landscaping, regardless of the size of a customer's irrigated landscaped area."

The 40% breakpoint is appropriate because it ensures that all single family residential customers, regardless of the irrigated area, receive an allocation of the lowest cost water that is adequate to sustain their basic indoor and outdoor usage requirements.

100% Breakpoint Between the Base and Inefficient Tiers: Under the District's water budget rate structure, 100% of a customer's total monthly water budget is allocated to the low volume and base tiers. Thus, usage in excess of the base tier is, by definition, associated with a 100% breakpoint.

140% Breakpoint Between the Inefficient and Wasteful Tiers: The 140% breakpoint between the inefficient and wasteful tiers is based on the customer exceeding a 40% factor that accounts for a combination of leaks and

inefficient irrigation and/or devices. Table 8 illustrates this calculation. The 40% is an average derived from various end-use studies on residential water use.[1] No changes are recommended to this approach.

Table 8: Derivation of the 140% Inefficient Tier/Wasteful Tier Breakpoint

Single Family Residential - Default Household Occupancy of 4 persons and 0.3 acres of Irrigated Landscaping Water Budget		
Water Budget Metric	**Efficient Use**	**Inefficient Use**
Indoor Water Use	8.29	11.49
Outdoor Water Use	3.68	5.15
Total Monthly Water Use Before Rounding (ccf)	11.97	16.64
Total Monthly Water Budget Used in Customer Billing (ccf)	12.0	17.0
Ratio of Efficient to Inefficient Before Rounding		139%
Ratio of Efficient to Inefficient After Rounding		140%

4.1.4. MULTI-FAMILY RESIDENTIAL CONSUMPTION TIERS

Similar to the single family, the breakpoint definition represents an allocation for both indoor and outdoor demands that provides for health and safety and is fair and equitable. The District has now defined the 40% breakpoint between the low volume and base tiers as follows:

> "The low volume tier, which reflects usage between 0 - 40% of each customer's total monthly water budget, is designed to provide all customers with an amount of indoor water usage equivalent to 20 gallons per person per day in order to meet minimum health and safety requirements plus an amount of water for outdoor irrigation, as applicable, adequate to sustain outdoor landscaping, regardless of the size of a customer's irrigated landscaped area."

The 40% breakpoint is appropriate because it ensures that all residential customers, regardless of the irrigated area, receive an allocation of the lowest cost water that is adequate to sustain their basic usage requirements.

Multi-Family Condominiums

When calculating water budgets for multi-family condominiums (condo), the District assumes a default occupancy of 3 persons per household and 435 square feet of outdoor irrigation. Assuming that a customer does not request a variance, this results in an average total monthly water budget of 8 ccf per condo. The proposed 140% breakpoint between the inefficient and wasteful tiers is based on the customer exceeding a 40% factor that accounts for a combination of leaks and inefficient irrigation and/or devices. The 40% is an average derived from various end-use studies on residential water use.

Multi-Family Apartments

When calculating water budgets for multi-family apartment customers, the District assumes a default occupancy of 2 persons per household with no outdoor irrigation demands. Assuming that a customer does not request a variance, this results in a total monthly water budget of 5 ccf per apartment. At present, there is a slight differential in the tier breakpoints applied to single family and multi-family apartment customers.

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[1] *California Single Family Water Use Efficiency Study*, 2011, De Oreo et al.
Future Potential Water Efficiency Study, 2019, IRWD, Prepared by EKI Environment & Water, Inc.
Residential End Uses of Water Version 2, 2016, Water Research Foundation

It is recommended that the District synchronize the water budget tier breakpoints for these two types of residential customers as shown in Table 9. This proposed change will have an immaterial impact on overall revenue recovery and multi-family apartment customer bills. This will ensure a fair and equitable allocation of water supply costs to all residential customers regardless of their dwelling type. The proposed 140% breakpoint between the inefficient and wasteful tiers for multi-family apartments is based on the customer exceeding a 40 % factor that accounts for a combination of leaks and inefficient devices. The 40% is an average derived from various end-use studies on residential water use.

Table 9: Recommended Multi-Family Apartment Consumption Tiers

Usage Tier	Single Family Residential (includes Condos)	Multi-Family Residential (Apartments)	Proposed Multi-Family Residential
Tier 1: Low Volume	0 - 40% of budget	0 - 50% of budget	0 - 40% of budget
Tier 2: Base	41 - 100% of budget	51 - 100% of budget	41 - 100% of budget
Tier 3: Inefficient	101 - 140% of budget	101 - 120% of budget	101 - 140% of budget
Tier 4: Wasteful	141% + of budget	121%+ of budget	141% + of budget

4.1.5. WATER BUDGET RATE STRUCTURE FOR LANDSCAPE CUSTOMERS

Landscape customers are served by potable water or recycled water connections that are solely used for the purposes of meeting outdoor irrigation. Similar to residential customers, the District recovers the annual variable cost of providing water service to landscape customers through a water-budget-based rate structure that features four consumption tiers. However, the amount of water included in each customer's monthly water budget does not include an allowance for any indoor consumption. Instead, it is based on the District's assessment of efficient water use, based on principles of horticultural science as determined by the irrigated landscaped area.

A representation of the general formula used to determine the water budget for a landscape customer served by a potable water connection is shown below. The approach used by the District for quantifying efficient outdoor water usage is reasonable and no modifications are recommended. The low volume tier allocation for landscape customers assumes the demand necessary to sustain the landscape as defined in the table below.

Landscape Customer Served by a Potable Water Connection (ccf) =
*Irrigated Landscape Area (1) * Evapotranspiration (ET) Rate (2) * 0.75 ET Adjustment Factor (3) * 36.3 Conversion Factor (4)*

(1) Area measured in acres.
(2) Evapotranspiration rate during each day of the monthly billing cycle based on actual temperature, humidity, and other factors.
(3) Adjustment factor assuming 60% efficient warm season turf, 40% drought tolerant plants and 20% irrigation system inefficiency.
(4) 36.3 is a factor that converts acre-inches of water to one hundred cubic feet (ccf).

A representation of the general formula used to determine the water budget for a landscape customer served by a recycled water connection is shown below. Note that the ET adjustment factor of 0.75 used for potable water has been modified to 0.87. This is because landscape customers served by a recycled water connection are assumed to have 100% warm season turf and 0% drought tolerant plants and would be more likely to require the use of less efficient overhead spray irrigation. The low volume tier allocation for landscape customers assumes the water necessary to sustain 100% warm season turf. Prior to 2019, the potable inefficient tier allocation was set at 160% and was based on leaks, cool season turf and inefficient landscape irrigation. The District has provided rebates for customers to transition to more water efficient landscapes since 2009. In 2019, the inefficient tier was modified to exclude the use of cool season turf and was adjusted to 140% based only on leaks and inefficient irrigation. As a result, the proposed inefficient tier does not incorporate the use of cool season turf. The proposed inefficient tier includes water use exceeding budget by 40%, or up to 140%. This is based on leaks and inefficient landscape irrigation. This change provides a fair and equitable allocation for all landscape customers.

Landscape Customer Served by a Recycled Water Connection (ccf) =
*Irrigated Landscape Area (1) * Evapotranspiration (ET) Rate (2) * 0.87 ET Adjustment Factor (3) * 36.3 Conversion Factor (4)*

(1) Area measured in acres.
(2) Evapotranspiration rate during each day of the monthly billing cycle based on actual temperature, humidity, and other factors.
(3) Adjustment factor assuming 100% efficient warm season turf, and 25% irrigation system inefficiency.
(4) 36.3 is a factor that converts acre-inches of water to one hundred cubic feet (ccf).

Table 10 shows the water budget consumption tiers and noticed FY 2020-21 commodity rates for landscape customers.

Table 10: FY 2020-21 Landscape Water Budget Rate Structure and Commodity Rates

	Potable Water		Recycled Water	
Usage Tier	Consumption Tiers	FY 2020-21 Rates ($/ccf) (Noticed but Not Implemented) (1)	Consumption Tiers	FY 2020-21 Rates ($/ccf) (Noticed but Not Implemented) (1)
Tier 1: Low Volume	0 - 40% of budget	$1.54	0 - 40% of budget	$1.25
Tier 2: Base	41 - 100% of budget	$2.12	41 - 100% of budget	$1.72
Tier 3: Inefficient	101 - 140% of budget	$4.91	101 - 140% of budget	$3.28
Tier 4: Wasteful	141% + of budget	$13.65	141% + of budget	$6.97

(1) Development of the rates is covered beginning in Section 4.3.1

4.1.6. WATER BUDGET RATE STRUCTURE FOR COMMERCIAL CUSTOMERS

Given the diversity of water usage characteristics, it is virtually impossible to develop customized water budgets for commercial customers based on standardized metrics regarding efficient indoor and outdoor water use. For this reason, the District establishes an individualized water budget for each customer based on an analysis of business water use needs. This may include an on-site assessment. This allows the water budget of each commercial customer to be tailored to their specific needs and requirements.

Because the water budgets are tailored to each commercial customer, their usage is either efficient or not. Rather than using four consumption tiers, the commodity rates of commercial customers are assessed over two consumption tiers. The base consumption tier reflects 100% of the customer's total monthly water budget. The wasteful tier reflects all usage above the monthly budget allocation. Table 11 shows the FY 2020-21 commercial customer rate structure.

Table 11: FY 2020-21 Commercial Water Budget Structure and Commodity Rates

	Potable Water		Recycled Water	
Usage Tier	Consumption Tiers	FY 2020-21 Rates ($/ccf) (Noticed but Not Implemented) (1)	Consumption Tiers	FY 2020-21 Rates ($/ccf) (Noticed but Not Implemented) (1)
Tier 1: Base	0 - 100% of budget	$2.12 (2)	0 - 100% of budget	$1.25 (4)
Tier 2: Wasteful	100% + of budget	$13.65 (3)	100% + of budget	$6.97 (5)

(1) Development of rates is covered beginning in Section 4.3.1
(2) Reflects the Tier 2 potable rate paid by residential and landscape customers.
(3) Reflects the Tier 4 potable rate paid by residential and landscape customers.
(4) Reflects the Tier 1 recycled rate paid by landscape customers.
(5) Reflects the Tier 4 recycled rate paid by landscape customers.

4.2. District Approach to Cost Recovery

The District separates the components of its annual revenue requirement from rates into three specific types of costs: variable costs recovered from commodity rates, fixed operating costs recovered through monthly meter charges, and replacement and enhancement costs which are also recovered from monthly meter charges. No modifications are recommended to this approach.

Variable Operating Costs: Variable operating costs are those operations and maintenance costs that vary with the volume of water consumed by customers. These costs are recovered through commodity rates assessed on a $/ccf basis.

Fixed Operating Costs: Fixed operating costs are those operations and maintenance costs that, in the short-term, do not vary with the volume of water consumed by customers. These costs are recovered through monthly service charges.

Replacement and Enhancement Capital Costs: Capital costs incurred by the District to replace and repair existing infrastructure and to update existing infrastructure to meet new regulatory requirements are referred to as "Replacement and Enhancement Capital Costs." Replacement and enhancement capital costs do not increase the capacity of the water utility system to serve demand growth from new customers. The District pays for a portion of its replacement and enhancement capital costs via ad valorem property tax assessments. The remainder is funded by operational cash flows provided by rate revenues.

The District's growth-related capital costs (i.e., capital costs that increase system capacity to serve new customers) are not recovered through recurring water rates. Instead, they are recovered via ad valorem property tax assessments and connection fees. A review of the growth-related capital costs and their recovery was not included as part of this Study. Table 12 summarizes the process used to allocate and recover its annual water utility revenue requirement from water service rates including an allocation of general and administrative expense based on direct labor charges.

Table 12: District Cost Allocation and Revenue Recovery Philosophy

Type of Cost	Description of Cost	Cost Recovery Mechanism
Variable Operating Costs	Direct cost of producing/purchasing water supplies including water treatment costs that vary. Allocated indirect general and administrative overhead costs.	Commodity rates ($/ccf) for each applicable consumption tier.
Fixed Operating Costs	Direct operations and maintenance costs that do not vary based on customer consumption. Allocated indirect general and administrative overhead costs.	Monthly meter service charge based on meter size.
Replacement and Enhancement Capital Costs	Direct costs incurred to replace and repair existing infrastructure and meet new regulatory requirements	Included in the monthly meter service charge based on meter size.

4.3. FY 2020-21 Water Revenue Requirement

The FY 2020-21 water revenue requirement was determined to be $92,152,238 (see tables 13 and 14). Of this amount, $58,518,855 (63.5%) is associated with variable costs that are incurred to acquire and treat water supplies. These costs vary with the amount of water used by customers and are recovered through commodity rates. Note that the variable cost revenue requirement includes $12,303,326 in costs for universal conservation, targeted conservation, water banking operations, and the District's natural treatment system used to control runoff from customers who use water in the inefficient and wasteful tiers. Table 13 provides detail of the FY 2020-21 variable revenue requirement.

Table 13: FY 2020-21 Potable Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Dyer Road Wellfield	$18,980,596
Baker Treatment Facilities	$10,654,247
Imported Water Purchases Irvine Ranch	$8,321,800
Deep Aquifer Treatment System	$6,669,397
Irvine Desalter Domestic	$4,375,645
Wells 21 & 22 Desalter Treatment Plant	$2,601,409
Other Water Production Facilities	$1,198,798
Irvine Desalter Plant W115	$743,660
Orange Park Acres Well 1	$57,633
Total Gross Water Supply Costs	**$53,603,185**
Revenue Requirement Offsets to Water Supply Costs	
Revenue from Partners	$4,517,655
Revenue from Sinking Fund	$1,700,000
Revenue from Water Banking Operations	$1,170,000
Total Revenue Requirement Offsets	**$7,387,655**
Net Revenue Requirement for Water Supply Costs	**$46,215,530**
Conservation and Supply Reliability	
Targeted Conservation	$6,624,810
Natural Treatment System	$3,282,150
Water Banking	$1,539,111
Universal Conservation	$857,254
Total Conservation and Supply Reliability Costs	**$12,303,326**
Net Variable Cost Revenue Requirement	**$58,518,855**

Fixed costs do not vary with the volume of water by customers. The fixed cost portion of the total FY 2020-21 revenue requirement was $33,633,882 (36.5%) as shown in Table 14. Of these fixed costs, $8,775,735 were associated with expenditures for replacement and enhancement capital costs that do not increase the capacity of the water utility system to serve new customer demand growth. Table 14 provides a detail of the FY 2020-21 fixed revenue requirement.

Table 14: FY 2020-21 Potable Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Domestic Water System Maintenance	$12,261,383
General and Administrative Expenses	$9,817,107
Customer Service	$4,538,091
Fleet	$1,262,430
General Plant	$1,016,214
Building Maintenance	$873,488
Water System Mitigation Monitoring	$8,000
Total Fixed Operating Costs	**$29,776,712**
Replacement and Enhancement Capital Costs	
Replacement	$6,540,958
Enhancement	$2,234,777
Total Capital Costs	**$8,775,735**
Gross Fixed Cost Revenue Requirement	**$38,552,447**
Revenue Requirement Offsets	
Fireline Revenues	$2,872,318
Miscellaneous Revenue	$1,259,262
Pumping Surcharge Revenue	$787,485
Total Revenue Requirement Offsets	**$4,919,064**
Net Fixed Cost Revenue Requirement from Rates	**$33,633,383**

4.3.1. VARIABLE COST RECOVERY - COMMODITY RATES

The District recovers water supply costs through commodity rates with the lowest cost water supplies being recovered in the low volume and base consumption tiers and the highest cost water supplies being recovered in the inefficient and wasteful tiers. The District's method for recovering variable costs is compliant with Proposition 218 because of the direct linkage between the revenue recovered in each tier to the costs incurred to provide service to customers with demand in each consumption tier.

The District also recovers the cost of water conservation programs through its commodity rates with targeted costs being allocated to customers with consumption in the inefficient and wasteful tiers. This approach is reasonable because customers who exceed their monthly water budget allocation impose higher costs on the District. Thus, the commodity rates charged in these two upper tiers are designed to not only recover the cost of more expensive water supplies, but also the additional costs of:

- Targeted conservation programs designed to reduce excessive use.
- Water banking operational costs to enhance water supply reliability.
- Rebates for long-term improvements in customer water use efficiency.
- Urban runoff source control programs referred to as the NTS, which treats runoff from customers who use water in the inefficient and wasteful tiers.

In FY 2020-21, the District projected total water demand of 53,939 acre feet based on historical averages by tier, adjusted for customer account growth and other relevant factors. This reflects a 2.5% increase over the 52,624 acre feet of water demand projected in FY 2019-20. Table 15 details the FY 2020-21 unit cost of water supplies ($/ccf) from each supply source as determined using cost and demand data provided by the District.

Table 15: Unit Cost of FY 2020-21 Water Supplies

Metric	Dyer Road Wellfield	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Total Cost and Acre Feet
Net Cost (1)	$17,856,588	$5,720,487	$7,335,389	$4,560,817	$2,364,028	$8,321,800	$56,420	$46,215,530
Demand in Acre Feet (net)	26,600	7,820	7,018	4,603	1,956	5,931	10	53,939
CCF (2)	11,595,187	3,405,052	3,056,412	2,009,170	853,440	2,584,410	4,537	
Unit Cost per ccf (1) divided by (2)	$1.54	$1.68	$2.40	$2.27	$2.77	$3.22	$12.95	

(1) From Table 13

(2) Acre feet is multiplied by 435.6 to convert to CCF

The District allocates the water supply in the order of cost for each source. The higher cost water supplies are appropriately allocated to the inefficient and wasteful tiers. Table 16 details this allocation for FY 2020-21 using cost and demand data provided by the District.

Table 16: Allocation of Potable Water Supplies to Consumption Tiers for Unit Costs

Metric	Dyer Road Wellfield (1)	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Total Acre Feet	Unit Cost by Tier ($ /ccf) (2)
Unit Cost	$1.54	$1.68	$2.40	$2.27	$2.77	$3.22	$12.95		
T1: Low Volume	19,112	-	-	-	-	-	-	19,112	$1.54
T2: Base	7,488	7,820	7,018	4,603	1,956	792	10	29,688	$2.02
T3: Inefficient	-	-	-	-	-	2,887	-	2,887	$3.22
T4: Wasteful	-	-	-	-	-	2,252	-	2,252	$3.22

(1) 19,112 acre feet are used to meet projected low volume demand estimated based on historic demand as adjusted for customer account growth and other relevant factors. The remainder (7,488 acre feet) is allocated to partially meet the base demand.

(2) The Unit Cost by Tier is the blended cost of the sources. Example: T2 =((7,488*435.6*1.54)+(7,820*435.6*1.68)+(7,018*435.6*2.40)+(4,603*435.6*2.27)+(1,956*435.6*2.77)+(792*435.6*3.22)+(10*435.6*12.95))/(29,688*435.6) = $2.02

Having determined the unit cost of water supplies by consumption tier as shown in Table 16 above, the District then allocates the cost of conservation programs and supply reliability programs to the water budget tiers as described below:

Universal Conservation: Universal conservation costs are incurred to encourage customers to use water as efficiently as possible. Universal program costs are added to the commodity rate in the base, inefficient, and wasteful tiers. This cost is not included in the low volume rate since customers who remain in this usage tier do not need assistance to efficiently use water.

Targeted Conservation: Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage exceeds their water budgets. Therefore, these costs are added to the commodity rates of customers in the inefficient and wasteful tiers. Based on a historical estimate of customers who have been provided assistance in these programs, approximately 75% of the customers are in the wasteful tier with the remainder of customers being in the inefficient tier. Therefore, 75% of the targeted conservation costs are allocated to the wasteful tier with the remaining 25% of the costs being allocated to the inefficient tier.

NTS Costs: These costs are incurred by the District to deal with urban water runoff produced by customers whose usage exceeds their water budgets. These costs are added to the commodity rates of customers in the inefficient and wasteful tiers because their excessive water usage creates urban water runoff. The allocation is based on an estimate

of the historic mix of urban runoff created by customers in the inefficient and wasteful tiers primarily from hosing down hardscape and excess irrigation running off the landscape into the storm drains. The District estimates 85% of NTS costs are created by customers in the wasteful tier because wasteful outdoor demand flows to NTS sites. The remaining 15% of urban runoff costs results from inefficient customers overwatering drought tolerant landscape.

Water Banking: Water banking costs are incurred to support the reliability of the District's water supplies. These costs are added to the commodity rates of customers in the wasteful tier because their excessive water usage creates the need for enhanced reliability of costly imported water supplies as previously discussed.

Table 17 shows the outcome of derivation of the unit costs for the District's conservation and supply reliability programs.

Table 17: FY 2020-21 Conservation and Supply Reliability Unit Costs ($/ccf)

Program	FY 2020-2021 Revenue Requirement (1) (A)	FY 2020-21 Units of Demand (ccf) (2) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2020-21 Adjusted Units of Demand B x C = (D)	Unit Cost Included in FY 2020-21 Commodity Rates A ÷ D = (E)
Universal Conservation	$857,254	15,170,668	100%	15,170,668	$0.06
Water Banking					
Wasteful tier	$1,539,111	980,928	90%	882,835	$1.74
Targeted Conservation					
Inefficient tier (75%)	$1,518,186	1,257,748	90%	1,131,974	$1.34
Wasteful tier (25%)	$5,106,625	980,928	90%	882,835	$5.78
Natural Treatment System					
Inefficient tier (15%)	$503,062	1,257,748	90%	1,131,974	$0.44
Wasteful tier (85%)	$2,779,088	980,928	90%	882,835	$3.15

(1) From Table 13
(2) FY 2020-21 Units of Demand are based on the cumulative projected units of sale for the tiers. Universal Conservation includes the base, inefficient, and wasteful tiers.

Table 18 shows the FY 2020-21 commodity rates as calculated by Raftelis. The slight differences in the calculated commodity rates calculated by Raftelis and the commodity rates originally published in the District's FY 2020-21 Proposition 218 notice can be attributed to recommended minor cost allocation adjustments.

Table 18: FY 2020-21 Potable Water Commodity Rates ($/ccf)

Consumption Tier	Unit Cost of Water Supplies (1)	Unit Cost of Universal Conservation (2)	Unit Cost of Water Banking (2)	Unit Cost of Targeted Conservation (2)	Unit Cost of Natural Treatment System (2)	FY 2020-21 Commodity Rates as Calculated by Raftelis**	FY 2020-21 Rates (Noticed but Not Implemented)	Difference (2)
T1: Low Volume	$1.54					$1.54	$1.54	$0.00
T2: Base	$2.02	$0.06				$2.08	$2.12	-$0.04
T3: Inefficient	$3.22	$0.06		$1.34	$0.44	$5.08	$4.91	$0.15
T4: Wasteful	$3.22	$0.06	$1.74	$5.78	$3.15	$13.95	$13.65	$0.30

(1) From Table 16
(2) From Table 17. Water used in the low volume tier is efficient and universal conservation efforts are not necessary.
(3) Rate differences are due to minor cost allocation adjustment recommendations.

4.3.2. VARIABLE COST RECOVERY - AGRICULTURAL RATES

Allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. DRWF provides 49% of the source of supply at a cost of $1.54/ccf and imported water provides 11% at a cost of $3.22/ccf. The remaining 40% is the blended cost of the other sources at $2.02/ccf (Table 16). This results in a blended variable cost of $1.93/ccf. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $79,692. The fixed cost applied to the agricultural commodity rate adds $1.43 to the per ccf cost based on the estimated 55,757 CCF. Table 19 shows the Raftelis calculation of FY 2020-21 agricultural rates.

Table 19: FY 2020-21 Agricultural Water Commodity Rates ($/ccf)

System	FY 2020-21 Revenue Requirement	FY 2020-21 Projected Demand (CCF)	Variable Cost (CCF)	Fixed Component Cost (CCF)	FY 2020-21 Commodity Rates as Calculated by Raftelis	FY 2020-21 Rates (Noticed but Not Implemented)	Difference
Potable Water	$163,925	55,757	$1.93	$1.43	$3.34	$2.94	$0.40

4.3.3. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGES

The District recovers fixed operating costs and replacement and enhancement capital costs through monthly meter service charges. On the District potable water system, the baseline meter size serving customers is 5/8". Thus, the first step in developing the monthly meter service charge is to estimate the total number of 5/8" meter equivalent connections (MEUs) on the potable water system in order to establish the unit cost for a 5/8" equivalent meter. Table 20 shows a summary of this calculation using the District's fixed costs and meter count data.

Table 20: FY 2020-21 Monthly Unit Cost of Serving a 5/8" Equivalent Meter

System	5/8" MEU (A)	Operating Costs (B)	Capital Costs (C)	Total Fixed Cost Revenue Requirement (1) B + C=(D)	Operating Costs per 5/8" MEU B ÷ A=(E)	Capital Costs per 5/8" MEU C ÷ A=(F)	Total Unit Cost per 5/8" MEU ((2) E + F = G
Potable Water	259,766	$24,857,648	$8,775,735	$33,633,383	$7.97	$2.82	$10.79

(1) From Table 14

(2) Values prior to rounding

Having established the monthly fixed charge unit cost as being $10.79 per 5/8" meter equivalents, the final step in the process is to develop a schedule of monthly meter service charges for each meter size on the system. Table 21 presents this calculation. Note the $10.79 calculation in the table above is rounded up to $10.80. As shown in Table 21, there are differences in the FY 2020-21 monthly meter service charges calculated by Raftelis and the FY 2020-21 monthly meter service charges originally published by the District in its FY 2020-21 Proposition 218 notice for the rate change that IRWD did not implement due to COVID-19. These differences can be attributed to a difference in the estimation in the total number of 5/8" MEUs on the District's potable water system and an adjustment in the meter flow equivalencies used for some meter sizes.

Table 21: FY 2020-21 Monthly Meter Service Charges

Meter Size and Technology	Meter Flow Rate Equivalency Ratio	Number of Accounts	FY 2020-21 Rates (Noticed but Not Implemented)	FY 2020-21 Rates Calculated by Raftelis (After Rounding)	Difference
5/8" Disc	1.00	65,542	$10.40	$10.80	$0.40
3/4" Disc	1.50	11,577	$15.65	$16.20	$0.55
1" Disc	2.50	26,621	$26.05	$27.00	$0.95
1 1/2" Disc	6.00	3,995	$52.00	$64.75	$12.75
1 1/2" Single Jet	5.00	1	$52.00	$53.95	$1.95
2" Disc	8.00	5,335	$83.20	$86.35	$3.15
2" Single Jet	8.00	7	$83.20	$86.35	$3.15
2" Turbo	12.50	700	$109.25	$134.90	$25.65
3" Turbo	32.50	239	$249.65	$350.70	$101.05
4" Turbo	62.50	201	$520.10	$674.40	$154.30
4" Turbo Omni F-2	50.00	1	$520.10	$539.50	$19.40
6" Mag Meter	139.90	0	$1,454.75	$1,509.50	$54.75
6" Turbo	125.00	31	$1,040.25	$1,348.75	$308.50
6" Turbo Omni F-2	100.00	4	$1,454.75	$1,079.00	-$375.75
8" Turbo	235.00	10	$1,820.40	$2,535.60	$715.20
8" Turbo Omni F-2	235.00	1	$1,820.40	$2,535.60	$715.20

4.3.4. MONTHLY PRIVATE FIRELINE CHARGES

Private firelines provide water to sprinkler systems for fire suppression within private improvements such as buildings and other structures. The District, like many utilities, provides private fireline service to its customers. In FY 2020-21, the District estimated that it would collect private fire line revenues of $4,542,610. These revenues are used as an offset to the total fixed cost revenue requirement. The District last updated its private fire line charges in 2007 and has not changed the underlying methodology.

Raftelis recommends that the District update its method to develop private fire line rates that reflect the estimated cost of serving potential fireflow demands plus an additional amount for the recovery of replacement and enhancement costs allocable to private fireline customers. The previous approach assumed a greater allocation for replacement and enhancement capital. The updated approach provides a modified allocation for funding replacement and enhancement capital and meeting fire demands. Table 22 shows the calculation of the FY 2020-21 private fireline rates based on an estimated revenue requirement of $2,872,318 using the recommended approach. The monthly service charges are shown in Table 22.

Table 22: Proposed FY 2020-21 Private Fireline Charges

Private Fireline Size	Number of Lines	Potential Demand Based on Pipe Diameter (1)	Customer Related Costs (2)	Private Fire O&M Peaking Costs (3)	Capital Cost Component (4)	FY 2020-21 Rates Calculated by Raftelis	FY 2020-21 Rates (Noticed but Not Implemented)	Difference	Total Revenue
1"	43	1.00	$4.88	$0.09	$0.21	$5.18	$13.60	-$8.42	$2,673
1 1/2"	-	2.90	$4.88	$0.25	$0.61	$5.75	$20.40	-$14.65	$0
2"	1,046	6.19	$4.88	$0.53	$1.31	$6.72	$27.20	-$20.48	$84,349
3"	31	17.98	$4.88	$1.55	$3.80	$10.23	$40.80	-$30.57	$3,806
4"	996	38.32	$4.88	$3.29	$8.11	$16.28	$54.40	-$38.12	$194,579
6"	3,079	111.31	$4.88	$9.57	$23.55	$38.00	$81.60	-$43.60	$1,404,024
8"	1,039	237.21	$4.88	$20.39	$50.19	$75.46	$108.80	-$33.34	$940,835
10"	127	426.58	$4.88	$36.67	$90.26	$131.80	$136.00	-$4.20	$200,863
11"	1	548.10	$4.88	$47.11	$115.97	$167.96	$149.60	$18.36	$2,016
12"	5	689.04	$4.88	$59.22	$145.79	$209.89	$163.20	$46.69	$12,593

Total	**6,367**		**$2,872,318**
		Fire Flow Testing Revenue	$26,580
		Total Fireline Revenue	**$2,871,819**

(1) Potential demand based on the Hazen-Williams Equation which estimates flow based on factors such as pipe diameter, friction and the velocity of flow.
(2) $6,965,295 customer related operating costs/119,026 bills = $4.88.
(3) $714,362 peaking costs/692,594 private fire demand units = $0.09. For pipe diameters > 1", $0.09 is increased by the potential demand based on pipe diameter (Hazen-Williams).
(4) $2.50 capital cost for a 1" meter equivalent X $2.82 capital cost per MEU x 3.0% allocation to private firelines = $0.21. For pipe diameters > 1", $0.21 is increased by potential pipe diameter (Hazen-Williams).

4.3.5. PUBLIC FIRE HYDRANT WATER SERVICE COSTS

Fire hydrant water service is a component of water service and is one of several property-related services that aids in the provision of fire service provided to properties. To meet fire protection demands, the District must design, operate, and maintain a water system that meets peak fire demand requirements. Land developers typically install or pay for the fire hydrants and related infrastructure as part of a condition of approval imposed by a land-use agency (city or county) to ensure the availability of an adequate water supply to protect the homes and commercial or industrial facilities that will be constructed pursuant to the land-use approvals. These are property related expenses as defined by Government Code Section 53750.5 b. which says:

> *"The fees or charges for property-related water service imposed or increased pursuant to Section 6 of Article XIII D of the California Constitution may include the costs to construct, maintain, repair, or replace hydrants as needed or consistent with applicable fire codes and industry standards, and may include the cost of water distributed through hydrants. In addition to any other method consistent with Section 6 of Article XIII D of the California Constitution, fees or charges for the aspects of water service related to hydrants and the water distributed through them may be fixed and collected as a separate fee or charge, or included in the other water rates and charges fixed and collected by a public agency, as provided for in Section 53069.9 of the Government Code."*

The District recovers all its potable water fixed operating costs, including the cost of maintaining and testing public fire hydrants, through its monthly meter service charge. The recovery of public fire protection costs through the District's monthly meter service charge allocates the cost of maintaining these assets to the properties that will benefit from their availability if these resources are used. This provides a fair and equitable allocation of the associated costs and it is consistent with Proposition 218 requirements. The costs associated with fire protection are discussed in detail in the Exhibit B Technical Memo.

5. SEWER COST OF SERVICE

As is the case with its potable water, the District separates the components of its annual sewer revenue requirement from rates into three specific types of costs: variable operating costs, fixed operating costs, and replacement and enhancement costs. However, as described in Section 5.1.1 below, the rate structure used to recover these costs differs from that of potable water service.

Sewer growth-related capital costs (i.e., capital costs that increase system capacity to serve new customers) are not recovered through monthly sewer service rates. Instead, they are recovered via ad valorem property tax assessments and connection fees. This study did not include a review of the growth-related capital costs or their recovery.

5.1. FY 2020-21 Sewer Revenue Requirement

The FY 2020-21 sewer revenue requirement was determined to be $54,768,358 (see tables 23 and 24). Of this amount, $15,955,212 (29.1%) is associated with variable costs that are incurred to treat sewage for discharge. These costs vary with the amount of water used by customers that returns to the District's sewage treatment facilities and are recovered through IRWD's commodity rates. The District separates operational expenses between sewage treatment and recycled production with tertiary treatment and similar processes included in the cost for recycled water. Table 23 shows the FY 2020-21 sewer variable cost revenue requirement.

Table 23: FY 2020-21 Sewer Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Variable Operating Costs	
Sewer Variable Operations Costs	$7,047,630
Variable Orange County Sanitation District Treatment Costs	$4,122,300
General and Administrative Costs	$5,395,129
Sewage Secondary Membrane Bio Reactor (MBR) Treatment Michelson	$175,359
Biosolids Disposal Michelson	$174,210
Sewage Tertiary Ultraviolet (UV) Treatment Michelson	$116,378
Gross Variable Cost Revenue Requirement	**$17,205,212**
Revenue Requirement Offsets	
Other Direct Billing Revenue	$1,250,000
Total Revenue Requirement Offsets	**$1,250,000**
Net Variable Revenue Requirement from Rates	**$15,955,212**

Fixed costs do not vary with the volume of water used by customers and returned to the District's wastewater treatment facilities. The fixed cost portion of the total FY 2020-21 revenue requirement was $ $38,813,146 (70.9%). Table 24 provides a detail of the FY 2020-21 sewer fixed cost revenue requirement.

Table 24: FY 2020-21 Sewer Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Sewer Fixed Operations	$9,922,869
General and Administrative Costs	$4,056,547
Customer Service	$3,025,394
Fleet	$832,056
Building Maintenance	$485,271
General Plant	$358,388
Orange County Sanitation District Treatment Costs	$1,500
Total Fixed Operating Costs	**$18,682,025**
Replacement and Enhancement Capital Costs	
Enhancement	$1,567,500
Replacement	$18,864,000
Total Capital Costs	**$20,431,500**
Gross Fixed Cost Revenue Requirement	**$39,113,525**
Revenue Offsets	
Miscellaneous Revenues	$300,379
Total Revenue Offsets	**$300,379**
Net Fixed Revenue Requirement from Rates	**$38,813,146**

5.1.1. SEWER COST RECOVERY (RATE DESIGN)

The District recovers the variable and fixed components of its sewer revenue requirement through a rate structure that features three fixed consumption blocks. Unlike water, most sewer discharges to the collection system are not metered. Therefore, blocks are determined by engineering estimates of flow to the sewer system. The District uses the average of the three lowest water meter readings during the twelve month period ending December 31 to adjust for monthly anomalies in a ratepayer's water use and seasonal variations. The block breakpoints are based on a review of historical data for average usage during cooler months (November through March from 2016 through 2020) because of the limited demand for landscape during winter months. The analysis identified the average usage for all multi-family units was 5 CCF which aligns with the first block. The second block includes average usage below 10 CCF as single family residential customers averaged 10 CCF during the same low usage months. The third block, which includes all commercial, industrial, and institutional (CII) customers, exceeds 10 CCF. (The average usage for CII customers exceeds 10 CCF.) Non-residential/CII customers with billed water consumption of more than 10 ccf per month pay an additional commodity rate ($/ccf). The Orange County Sanitation District's (OCSD) Cost of Service study (December 2017) identified a flow factor, percentage of metered water usage returning to the sewer system, of 90% for single family homes and non-residential customers (CII). Therefore, the District applies the additional charge on 90% of the billed water consumption for CII customers, consistent with the OCSD study. Table 25 illustrates the current sewer rate structure.

Table 25: FY 2020-21 Sewer Rate Structure and Rates

Rate/Charge	Monthly Rate	Peak Cost	FY 2020-21 Rates (Noticed but Not Implemented)
Residential Sewer Rates			
Block 1: Average Water Usage < 5 ccf per month	$19.75	$0.00	$19.75/month
Block 2: Average Water Usage between 5 and 10 ccf per month	$19.75	$3.95	$23.70/month
Block 3: Average Water Usage > 10 ccf per month	$19.75	$6.60	$26.35/month
Commercial Sewer Rates			
Average Water Usage <= 10 ccf per month	$19.75	$6.60	$26.35/month
Average Water Usage > unit cost per ccf per month			$2.81/ccf

This rate structure is compliant with Proposition 218 because it provides a mechanism for recovering rate revenue from customers in a manner that is proportionate to the costs incurred by the District to provide service. As shown in Table 25, it includes a fixed component for all three blocks that does not change. A variable component is included that is based on the historic average of estimated sewage flow by customers within each block. This fact notwithstanding, the review of the specific cost allocation methodology used to develop the noticed FY 2020-21 sewer rates that were not implemented indicates that it can be adjusted to further align with revenue recovery costs. The proposed modifications will fine-tune allocation of the fixed and variable costs between customers based on the volume of their estimated average sewer discharges. For this reason, the following approach to the development of sewer rates is recommended.

Step 1: Determine the number of sewer customer accounts with usage in each consumption block as shown in Table 26.

Table 26: FY 2020-21 Sewer Customer Accounts by Consumption Block

Customer Class	Block 1	Block 2	Block 3	Total
Single Family Residence	27,720	25,006	13,611	66,337
Multi Family Residence	89,855	12,209	5,479	107,543
Residence Sewer Only				
Commercial			6,239	6,239
Industrial			1,019	1,019
Public Authority			372	372
Landscape				
Construction				
Total	**117,575**	**37,215**	**26,720**	**181,510**

Step 2: Estimate sewer volumes contributed by customer class as shown in Table 27.

Table 27: FY 2020-21 Contributed Sewage Volumes

Line No.	Metric	All Residential (Potable)	All Commercial, Industrial, Public Authority (Potable)	All Construction (Potable)	Total
1	Number of Accounts	173,880	7,630	0	181,510
2	FY 2020 Water Usage (ccf)	13,989,048	3,935,122	105,501	18,029,671
3	Return to Sewer Factor	74%	90%	2%	
4	**Annual Discharge (ccf) (Line 2*Line 3)**	**10,399,916**	**3,541,610**	**2,110**	**13,943,636**
5	Annual Discharge (MG)	7,779	2,649	2	10,219

Step 3: Determine the fixed and variable unit cost of service as shown in Table 28.

Table 28: FY 2020-21 Sewer Unit Cost of Service

Metric	Fixed Costs	Variable Costs	Total
Operating Revenue Requirement	$18,682,025	$17,205,212	$35,887,237
Capital Revenue Requirement	$20,431,500		$20,431,500
Revenue Offset			
Miscellaneous Revenue	$208,614	$91,765	$300,379
Other Direct Billing Revenue	$868,129	$381,871	$1,250,000
Revenue Requirement (Table 23 and 24)	**$38,036,782**	**$16,731,576**	**$54,768,358**
Discharge (Table 27)	181,510	13,943,636	
	accounts	ccf of sewer flow	
Unit Cost		$1.20	
		per ccf	

Step 4: Determine the average and total discharges in each fixed tier as shown in Table 29.

Table 29: FY 2020-21 Sewer Discharges by Fixed Consumption Block

Sewer Fixed Charge Tiers	Average Monthly Discharges (ccf) (A)	Number of Accounts (B)	Annual Avg Discharges (ccf) A x B x 12= (C)
Block 1: Average Water Usage < 5 ccf per month	3.2	117,575	4,514,885
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	37,215	3,126,065
Block 3: Average Water Usage > 10 ccf per month	10.0	26,720	3,206,379
Total		**181,510**	**10,847,328**

Step 5: Determine the allocation of fixed and variable sewer costs as shown in Table 30. The total of the fixed and variable cost allocations matches the sewer revenue requirement identified at the start of this section ($54,756,358).

Table 30: FY 2020-21 Allocation of Sewer Fixed and Variable Costs

Fixed Allocation	Discharge	Allocation	Cost Allocation	Unit Costs
Operating Costs Allocated to Fixed Charge (from Table 29)	10,847,328	78%	$14,133,428	$6.49 per account
Capital Allocated to Fixed Charge		100%	$19,869,048	$9.12 per account
Total Fixed Charge per Customer				$15.61 per account (1)
Operating Costs Allocated to Discharge >10 ccf	3,096,308	22%	$4,034,306	$1.30 per ccf
Capital Allocated to Discharge >10 ccf			$0	$0.00
Total (from Table 27)	**13,943,636**	**100%**	**$38,036,782**	
Variable Allocation	**Discharge**		**Cost Allocation**	**Unit Cost**
Discharge Block Rate – Allocated to Block Rates	13,943,636		$16,731,576	$1.20 per ccf
Total Revenue Requirement (Tables 23 and 24)			$54,768,35 8	

(1) Rounded up to $15.65 for rates to be on the $0.05 increment.

Step 6: Calculate the sewer rates based on the allocation of fixed and variable costs shown in Table 30 above. Table 31 shows this outcome.

Table 31: FY 2020-21 Proposed Sewer Rates

Monthly Sewer Service Charge Per Account	Avg Monthly CCF Discharged	Variable Cost [1]	Fixed Cost [2]	FY 2020-21 Rates Calculated by Raftelis[4]
Block 1: Average Water Usage < 5 ccf per month	3.2	$3.85	$15.61	$19.50
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	$8.40	$15.61	$24.05
Block 3: Average Water Usage > 10 ccf per month	10.0	$12.00	$15.61	$27.65
Variable Rates per ccf	**Discharge**	**Variable Cost [3]**	**Fixed Cost [3]**	**Proposed Rate**
Discharge >10 ccf	3,096,308	$1.20	$1.30	$2.50

(1) $1.20 From Table 29 * average monthly CCF discharged
(2) Total fixed charge per customer from Table 30
(3) From Table 30
(4) Variable cost plus fixed cost rounded to nearest $0.05

A final comparison of the FY 2020-21 sewer rates recommended by Raftelis versus the FY 2020-21 sewer rates originally noticed by the District is shown in Table 32.

Table 32: Raftelis Recommended FY 2020-21 Sewer Rates

Rate/Charge	FY 2020-21 Rates (Noticed but Not Implemented)	FY 2020-21 Rates (Calculated by Raftelis)	Difference ($)
Residential Sewer Rates			
Block 1: Average Water Usage < 5 ccf per month	$19.75/month	$19.50/month	-$0.25
Block 2: Average Water Usage between 5 and 10 ccf per month	$23.70/month	$24.05/month	$0.35
Block 3: Average Water Usage > 10 ccf per month	$26.35/month	$27.65/month	$1.30
Commercial Sewer Rates			
Average Water Usage <= 10 ccf per month	$26.35/month	$27.65/month	$1.30
Average Water Usage > ccf per month	$2.81/ccf	$2.50/ccf	-$0.31

6. RECYCLED WATER COST OF SERVICE

The method used by the District to develop recycled water rates is similar to that of potable water service (see Section 4 of this report) with one significant difference. The District does not calculate unique monthly meter service charges for recycled water. Instead, the monthly service charges for recycled water are set to the same as those charged for the potable water monthly meter service charge. The District takes this approach due to an imbalance between variable and fixed costs in the overall recycled water revenue requirement. This reallocation of fixed costs to variable revenue recovery through commodity rates is discussed in Section 6.1.2 below.

6.1.1. RECYCLED WATER BUDGET RATE STRUCTURE

Section 4.5.1 of this report provides a detailed discussion of the derivation of the District's water budget rate structure for landscape customers who purchase recycled water. Table 33 shows the consumption tier breakpoints employed to recover the variable costs incurred to provide service.

Table 33: FY 2020-21 Landscape Water Budget Rate Structure and Commodity Rates

Usage Tier	Consumption Tiers	FY 2020-21 Rates ($ccf) (Noticed but Not Implemented)
Tier 1: Low Volume	0 - 40% of budget	$1.25
Tier 2: Base	41 - 100% of budget	$1.72
Tier 3: Inefficient	101 - 160% of budget	$3.28
Tier 4: Wasteful	161% + of budget	$6.97

Section 4.6.1 of this report provides a detailed discussion of the derivation of the District's water budget rate structure for commercial customers who purchase recycled water. The base rate for these customers is the cost to produce recycled water. These customers are charged the wasteful tier rate when they exceed their budget.

6.1.2. FY 2020-21 RECYCLED WATER REVENUE REQUIREMENT

The District's recycled water revenue requirement from rates is $30,005,494. Prior to any adjustments, the composition of this revenue requirement is variable costs of $17,417,457 (58.0%) and fixed costs of $12,588,037 (42.0%). The District established the monthly fixed charge unit cost as being $10.79 per 5/8" meter equivalents in the potable process (see Table 21 in Section 4.3.3). Due to the high percentage of fixed costs identified in the recycled water revenue requirement (Table 35), the District reallocates a portion of fixed costs not recovered by monthly meter service charges ($4,397,395) into the variable cost revenue requirement. The total fixed costs include costs that can be included with variable expenses such as the cost for transporting recycled production to reservoirs ($1,971,380). These costs are included in the recycled system and recycled revenue provides the funding which is consistent with Proposition 218 requirements. This strategy provides a fair and equitable application of these costs without deterring usage.

Raftelis concludes that the District's recycled water rates are compliant with Proposition 218 as the overall level of revenue recovery from recycled water customers remains proportionate to the total cost of providing service. Tables 34 and 35 detail the FY 2020-21 variable and fixed recycled water revenue requirement before and after this reallocation.

Table 34: FY 2020-21 Recycled Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Untreated Water Purchases	$4,084,400
Recycled Water Tertiary Treatment Michelson	$3,305,378
El Toro Remediation Principal Aquifer Plant	$2,858,640
Recycled Water Tertiary Treatment Pumping Michelson	$1,415,486
El Toro Remediation Shallow Groundwater	$797,980
Recycled Water Tertiary Membrane Bio Reactor (MBR) Treatment Michelson	$789,058
Native Water	$463,500
Sewage Secondary Membrane Bio Reactor (MBR) Treatment Michelson	$321,581
Sewage Tertiary Ultraviolet (UV) Treatment Michelson	$220,377
Untreated Water System Maintenance	$219,922
Santiago Aqueduct Commission	$155,626
Irvine Lake	$115,888
Recycled Water Tertiary Ultraviolet (UV) Disinfection Treatment Michelson	$94,912
Total Cost of Water Supplies	**$15,713,369**
Conservation Programs	
Natural Treatment System	$996,117
Universal Conservation	$431,937
Targeted Conservation	$276,034
Total Conservation Program Costs	**$1,704,088**
Total Variable Cost Revenue Requirement Before Adjustment	**$17,417,457**
Adjustment to Reflect Reallocated Fixed Costs	$5,550,995
Total Variable Cost Revenue Requirement After Adjustment	**$22,968,451**

Table 35: FY 2020-21 Recycled Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Recycled Water System Maintenance	$5,925,061
Recycled Water Mitigation Monitoring	$11,000
General and Administrative	$3,624,032
Customer Service	$1,512,697
Recycled Water Site Inspection and Testing-Field	$406,208
Building Maintenance	$388,217
General Plant	$304,599
Recycled Water Site Inspection and Testing-Office	$692
Total Fixed Operating Costs	**$12,172,506**
Replacement and Enhancement Capital Costs	
Enhancement	$360,500
Replacement	$793,100
Total Capital Costs	**$1,153,600**
Gross Fixed Cost Revenue Requirement	**$13,326,106**
Revenue Requirement Offsets	
Pumping	$217,922
Miscellaneous Revenues	$520,146
Total Revenue Requirement Offsets	**$738,069**
Total Fixed Cost Revenue Requirement Before Adjustment	**$12,588,037**
Adjustment to Reflect Reallocated Fixed Costs	-$5,550,995
Net Fixed Revenue Requirement from Rates After Adjustment	**$7,037,042**

6.1.3. VARIABLE COST RECOVERY - COMMODITY RATES

The method used to determine recycled water commodity rates is similar to that used for potable water. In FY 2020-21, the District's projected total recycled water demand was 32,495 acre feet based on historical demand, customer growth factors and other relevant factors. In FY 2019-20, recycled water demand was projected to be 32,493 acre feet. Table 36 provides a detail of the FY 2020-21 unit cost of water supplies ($/ccf) from each supply source using the District's cost and demand data. Note that the net cost shown in each column includes the reallocation of fixed costs of $5,550,995 discussed above.

Table 36: Unit Cost of FY 2020-21 Recycled Water Supplies

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported	Total
Net Cost	$10,568,425	$4,376,824	$6,319,109	21,264,358
Acre Feet	22,204	4,503	5,787	32,495
Unit Cost per ccf (1)	$1.09	$2.23	$2.51	

(1) Acre feet is multiplied by 435.6 to convert to CCF.

The District allocates the lower cost water supplies to the low volume and base consumption tiers with higher cost water supplies being allocated to the inefficient and wasteful tiers. Table 37 details this allocation for FY 2020-21 using cost and demand data provided by the District.

The general formula used to determine the water budget for a landscape customer served by a recycled water connection is discussed in detail in 4.1.5.

Landscape Customer Served by a Recycled Water Connection (ccf) =
*Irrigated Landscape Area (1) * Evapotranspiration (ET) Rate (2) * 0.87 ET Adjustment Factor (3) * 36.3 Conversion Factor (4)*

(1) Area measured in acres.
(2) Evapotranspiration rate during each day of the monthly billing cycle based on actual temperature, humidity, and other factors.
(3) Adjustment factor assuming 100% efficient warm season turf, and 25% irrigation system inefficiency.
(4) 36.3 is a factor that converts acre-inches of water to one hundred cubic feet (ccf).

Table 37: Allocation of Recycled Water Supplies to Consumption Tiers for Landscape Customers

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported	Total Acre Feet	Unit Cost per $/ccf by Tier (1)
Unit Cost (Table 36)	$1.09	$2.23	$2.51		
T1: Low Volume	14,947			14,947	$1.09
T2: Base	7,257	4,503	4,162	15,923	$1.78
T3: Inefficient			975	975	$2.51
T4: Wasteful			650	650	$2.51
Total	**22,204**	**4,503**	**5,787**	**32,495**	

(1) The Unit Cost per $/ccf by TIER is the blended cost of the sources. Example: T2 =((7,457*435.6*$1.09)+(4,503*435.6*$2.23)+(4,162*435.6*$2.51))/(15,923*435.6) = $1.78

Having determined the unit cost of recycled water supplies by consumption tier for landscape customers as shown in Table 37 above, the District then allocates the cost of conservation programs, as shown in table 34, to the appropriate water budget tiers.

Universal conservation costs are added to the commodity rate in the base, inefficient, and wasteful tiers to pay for conservation program costs that help customers in each of these tiers achieve efficient use of recycled water. This cost is not included in the low volume rate since customers who remain in this usage tier do not need assistance to efficiently use water.

Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage reaches the wasteful tier. Costs are allocated to the wasteful tier based on expected usage.

Natural treatment system costs are incurred by the District to deal with urban water runoff produced by customers whose usage exceed their water budgets. The costs include prevention, control and treatment of the runoff of water from irrigation and other uses. These costs are added to the commodity rates of customers in the inefficient and wasteful tiers. Costs are allocated based on the expected usage in each tier.

Table 38 shows the outcome of derivation of the unit costs for the District's conservation programs.

Table 38: FY 2020-21 Conservation Unit Costs ($/ccf)

Program	FY 2020-2021 Revenue Requirement (A)*	FY 2020-21 Units of Demand (ccf) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2020-21 Adjusted Units of Demand B x C = (D)	Unit Cost Included in FY 2020-21 Commodity Rates A ÷ D = (E)
Universal Conservation	$431,937	7,643,909	100%	7,643,909	$0.06
Targeted Conservation					
Wasteful tier	$276,034	283,140	90%	254,826	$1.08
Natural Treatment System					
Inefficient tier	$174,079	424,710	90%	382,239	$0.46
Wasteful tier	$822,038	283,140	90%	254,826	$3.23

*See Table 34

Having determined the unit cost of recycled water supplies by consumption tier as shown in Table 37 and the unit cost of conservation programs in Table 38, the District must then allocate the cost of conservation programs to each consumption tier. Table 39 shows the outcome of this process as determined by Raftelis using the District's cost and demand data. As can be seen in Table 39, there are differences in the FY 2020-21 commodity rates calculated by Raftelis and the FY 2020-21 commodity rates originally published by the District in its Proposition 218 notice. These differences can be attributed to recommended minor cost allocation adjustments.

Table 39: FY 2020-21 Recycled Water Commodity Rates ($/ccf)

Consumption Tier	Unit Cost of Water Supplies (Table 37)	Unit Cost of Universal Conservation (Table 38)	Unit Cost of Targeted Conservation (Table 38)	Unit Cost of Natural Treatment System (Table 38)	FY 2020-21 Commodity Rates as Calculated by Raftelis	FY 2020-21 Rates (Noticed but Not Implemented)	Difference
T1: Low Volume	$1.09				$1.09	$1.25	-$0.16
T2: Base	$1.78	$0.06			$1.84	$1.72	$0.12
T3: Inefficient	$2.51	$0.06		$0.46	$3.02	$3.28	-$0.26
T4: Wasteful	$2.51	$0.06	$1.08	$3.23	$6.87	$6.97	-$0.10

6.1.4. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGE

Recycled water fixed charges are the same as potable water fixed charges (see Table 21 in Section 4.3.3).

7. POLICY OPTIONS

As part of the study, Raftelis considered several policy options related to the District's current water rate structure. Proposition 218 establishes general rate-setting principles but does not detail exactly how costs should be calculated or how they should be allocated among customers. The policy options considered here come within the District's zone of discretion in how to reasonably structure rates within Proposition 218's parameters and are presented as potential alternatives for future consideration. These alternatives were discussed with the District's Finance and Personnel (F&P) Committee. None of the options discussed were included in the rate generation in the Cost of Service document used to assess rates for FY 2020-21. The Recovery of OPEB and Pension costs will be included in the next rate generation process. A summary of the alternatives discussed is presented below.

7.1.1. ALTERNATIVES FOR TARGETED CONSERVATION SPENDING

The District's commodity rates for the inefficient (101 - 140% of budget) and wasteful tiers (140%+ of budget) include costs incurred for special targeted conservation programs designed to avoid water waste and to promote wise water use. They also include the cost of the natural treatment systems required to capture the water runoff created by excessive irrigation and include water banking that provides supply reliability to District customers. Over the long term, the District's spending for targeted conservation programs is expected to decline.

To offset the long-term decline in targeted conservation expenditures, Raftelis suggests an alternative which would transfer a portion of the recycled water costs to the potable commodity rates paid by customers with usage greater than their budget. The conceptual justification for this approach is that the District's recycled water system reduces the need to purchase expensive imported water supplies. Thus, recycled water serves as a direct substitute for the potable water used for outdoor irrigation by customers with usage in the inefficient and wasteful tiers. An incidental byproduct of recovering some portion of recycled water costs via potable water rates paid by customers whose usage exceed their budget is a lowering of recycled water commodity rates that could result in increased recycled water usage.

In order to provide the F&P Committee with an example of the commodity rate impacts of this approach, Raftelis identified $1.7 million in electric power costs associated with the transmission of recycled water. As shown in Table 40 below, the potable water commodity rates in the inefficient and wasteful tiers would increase by an estimated $0.78. In contrast, recycled water commodity rates would be reduced by approximately $0.13 across all consumption tiers.

Table 40: Commodity Rate Impacts of Recovering Recycled Costs Through Potable Rates

Potable Water			
Potable Tiers	Noticed FY 2020-21 Rates Not Implemented (per ccf)	Adjustment for Recycled Water (per ccf)	Adjusted Potable Water Rates (per ccf)
Low Volume	$1.54		$1.54
Base	$2.12		$2.12
Inefficient	$4.91	$0.78	$5.69
Wasteful	$13.65	$0.78	$14.43
Recycled Tiers	**Noticed FY 2020-21 Rates Not Implemented (per ccf)**	**Adjustment for Recycled Water (per ccf)**	**Adjusted Potable Water Rates (per ccf)**
Low Volume	$1.25	-$0.13	$1.12
Base	$1.72	-$0.13	$1.59
Inefficient	$3.28	-$0.12	$3.16
Wasteful	$6.97	-$0.12	$6.85

7.1.2. ALTERNATIVES FOR CAPITAL REPLACEMENT FUNDING

The District currently recovers the cost of expenditures for replacement and enhancement capital through monthly service charges paid by water, sewer, and recycled customers. As the District infrastructure ages, the cost for replacement and enhancement capital is likely to drive the fixed service charge portion of a customer's bill to a disproportionately high percentage to the total bill. This raises the concern that monthly service charges will become unaffordable and have inequitably large customer bill impacts, especially for customers with low water consumption and associated sewer discharge characteristics.

In order to mitigate the potentially large increases to the monthly meter service charges, Raftelis recommends that the District consider recovering a portion of the annual capital replacement and enhancement costs to commodity rates in the future. Although this approach is different from the District's long standing cost recovery policy, Raftelis believes the recovery of capital replacement costs via commodity rates is consistent with Proposition 218.

In order to provide the F&P Committee with an example of the potable water commodity rate impacts under this approach, Raftelis identified $300,000 in valve replacement costs in the District's FY 2020-21 water capital replacement budget. If these costs were recovered through commodity rates rather than through monthly service charges, Raftelis estimates that potable water commodity rates in each consumption tier would increase by $0.01. In contrast, the required increase in the monthly meter service for a customer served by a 5/8" water meter would decrease by $0.10. Table 41 shows the estimated rate impacts.

Table 41: Impact of Recovering $300K in Capital Replacement Expenditures via Commodity Rates

Potable Charges and Rates	Noticed FY 2020-21 Rates Not Implemented (per ccf)	Adjustment for the Recovery of Capital Replacement Costs	Adjusted Potable Water Rates (per ccf)
Monthly Meter Service Charge			
5/8" Meter	$10.40	-$0.10	$10.30
Commodity Rates ($/ccf)			
Low Volume	$1.54	$0.01	$1.55
Base	$2.12	$0.01	$2.13
Inefficient	$4.91	$0.01	$5.70
Wasteful	$13.65	$0.01	$14.44

7.1.3. ALTERNATIVE WATER RESIDENTIAL MONTHLY METER SERVICE CHARGES

The District currently charges monthly meter service charges based on a customer's meter size. This results in a single family residential customer with a 1" meter paying more than a customer with a 5/8" meter even though they may have the same monthly water consumption. The customer has no choice over the size of their meter and new construction building codes in most cities served by the District require a 1" meter for residential properties. IRWD staff asked Raftelis to analyze whether it would be appropriate to develop one monthly service charge rate for both a 5/8", 3/4" and 1" meter. The analysis as shown in Table 42 below indicates that it would create an increase of 43% to customers with a 5/8" meter, when over 60% of residential customers within the District have a 5/8" meter. This is inappropriate because a 1" meter has significantly more capacity to impose instantaneous demand on the system. As a result, Raftelis recommends no change.

Table 42: Single Family Residential Monthly Meter Service Charge Consolidation

Meter Size	FY 2020-21 (Noticed but not Implemented)	FY 2020-21 With Consolidation	Difference ($)	Difference (%)
5/8" Disc	$10.40	$14.90	$4.50	43%
3/4" Disc	$15.65	$14.90	-$0.75	-5%
1" Disc	$26.05	$14.90	-$11.15	-43%

7.1.4. RECOVERY OF PENSION & OPEB COSTS

IRWD includes the cost of pensions and other post-employment benefits (OPEB) in its annual revenue requirement from rates. The current methodology for the District is to include in rates the employer portion of the annual required defined benefit pension plan contribution (ARC) administered by CalPERS plus any additional discretionary contribution in excess of ARC. The District established a Pension Benefits Trust Fund (Trust Fund) as an alternative to additional CalPERS contributions to fund a portion of its pension liability. The discretionary contribution is a payback to another District Fund which loaned money to establish the Trust Fund and is to be paid back over a specified number of years.

Changes in pension accounting rules over the past several years prompted the District to ask Raftelis to review alternatives for development of its annual rate requirement related to pensions. Alternatives considered include:

- Use the actuarial determined pension expense as calculated by CalPERS, minus investment earnings from the Trust Fund.
- Use ARC plus the discretionary ARC contributions minus a portion of the investment earnings from the Trust Fund plus the discretionary ARC contributions.
- Use the actuarial determined pension expense as calculated by CalPERS plus the discretionary ARC contributions.

Raftelis considered all alternatives and although all alternatives would be compliant with Proposition 218, utilizing the actuarially determined pension expense can have a high degree of volatility year-to-year based on projected and actual rates of return in the capital markets and therefore we do not recommend that approach. Raftelis believes the ARC provides a more stable amount that is better suited for developing rates.

Raftelis recommends that amounts contributed to CalPERS and the Trust Fund should both be recognized as payments toward the pension liability and be included in the development of rates. The Trust Fund was initially funded by a borrowing from another District fund and Raftelis agrees with the Committee that the borrowing should be paid back plus interest over a reasonable timeframe, suggested at 20 years straight line amortization. In addition, the Trust Fund earns interest on its investments and Raftelis recommends that customers be given credit for a portion of that interest earned. This was discussed with the F&P Committee and the recommendation was to provide a credit for the proportionate share the Trust Fund provides to the total funded percentage. For example, if the District's funding ratio with CalPERS is 75% and the overall funding including the Trust fund is 100%, then 25% (100%- 75%) of the investment earnings would be credited for purposes of determining the pension revenue requirement. The Committee recommended and Raftelis concurs with basing the proportionate share of Trust Fund investment earnings from the 3 prior years.

Table 43 summarizes the results which would result in pension and OPEB costs of $11.1 million being collected from customers through their water, sewer, and recycled water rates.

Table 43: Recommended Recovery of Pension and OPEB Costs

FY 2020-21 Expense	Current Cost Recovery	Raftelis Recommended
CalPERS Expense		
CalPERS Contribution	$9,100,000	$9,100,000
Trust Earnings		-$1,200,000
Current Replacement Fund Payback	$1,400,000	
Replacement Fund 20 Year Payback		$3,200,000
Total	**$10,500,000**	**$11,100,000**
Additional Cost vs Current Methodology		$600,000

Exhibit A

Technical Memo

Legal Basis for Including Fire Hydrant Water Service Costs in Water Service Fees

I: Supplying water through fire hydrants is a property-related service

California Constitution article XIII D, approved by the voters in 1996 as part of Proposition 218, includes the following definitions relating to certain fees charged by government agencies for services:

> Section 2(e): "Fee" or "charge" means any levy other than an *ad valorem* tax, a special tax, or an assessment, imposed by an agency upon a parcel or upon a person as an incident of property ownership, including a user fee or charge for a property related service.
>
> Section 2(h): "Property-related service" means a public service having a direct relationship to property ownership.

Article XIII D, section 6, then sets out a series of substantive and procedural rules restricting the use of fees levied on property or on a person because of the person's ownership of property.

The California Supreme Court determined in Bighorn-Desert View Water Agency v. Verjil (Kelley) (2006) 39 Cal.4th 205 that supplying water for domestic[1] use is a property-related service and, therefore, that the fees charged by a local agency for such water service are subject to the rules of California Constitution article XIII D, section 6.

The Court in Bighorn, quoting at length from its opinion in Richmond v. Shasta Community Services District (2004) 32 Cal. 4th 409, cited the Legislative Analyst's impartial

[1] The court in Bighorn did not define "domestic" use. The Legislative Analyst did not use the term in the voter information pamphlet for the election at which Proposition 218 was approved; and the court did not use the term in Richmond. The U.S. Geological Survey defines it as including "indoor and outdoor uses at residences, and includes uses such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, watering lawns and gardens, and maintaining pools." California Department of Water Resource's glossary distinguishes it from fire hydrant water supply: "Categories of beneficial uses recognized in California include aquaculture, domestic, **fire protection**, fish and wildlife, frost protection, heat control, industrial use, mining, municipal, power, recreation, stock watering, and water quality control." (Emphasis added.) But the DWR glossary also recognizes the integration of the two in water service provided to: "A drinking water distribution system is an interconnected series of pipes, storage facilities, and components that convey drinking water and meet the fire protection needs of customers."

analysis included in the voter information pamphlet for the election at which article XIII D was approved. That voter information pamphlet identified three characteristics of water service that lead to the conclusion that it is a service that has a direct relationship to property ownership. Each of these three characteristics also applies to providing fire hydrant water service.

First, water service has a direct relationship to property ownership, because it is indispensable to most uses of real property. For example, dwellings in urbanized areas cannot receive a certificate of occupancy without a functioning water supply. Water immediately available to real property for fire protection is also indispensable for the use of property. In particular, local land use control agencies will not permit construction of residences and commercial/industrial buildings without it. The California Fire Code requires infrastructure to provide sufficient flow to fight structure fires on particular property. (Cal. Code Regs., title 24, § 507.1) The City of Irvine, by its Ordinance No. 19-14, adopted November 12, 2019, adopted the California Fire Code as its municipal fire code. The County of Orange, by its Ordinance No.19-010, adopted November 5, 2019, adopted the California Fire Code as its fire code. While there is no State law requiring homeowners to have fire insurance, most mortgage lenders do require it as a condition of the loan; fire insurance is generally not available without proximate fire hydrant water service or in-structure sprinklers.

Second, water service is provided through pipes that are physically connected to the property. Fire hydrant water is also supplied through pipes and is delivered to locations that are physically proximate to the properties and structures that they serve. It is a matter of logistics (accessibility to the fire engines) that the hydrants are located next to the street. It is a matter of economy that there is not one hydrant for each structure.

Third, a water provider may, by recording a certificate, obtain a lien on the property for the amount of any delinquent service charges. In Health and Safety Code section 5473.11(b), the Legislature has provided this power to every public agency that levies sewer or water charges. As discussed below, providers of domestic water service in California have long also provided water for fire protection through hydrants and charged their customers for it. The lien provisions in Section 5473.11(b) make no distinction between different components of water service (residential, commercial, agricultural, or fire flows).

Accordingly, merely by owning the property, without actually using the service, if the service is immediately available, the property owner must pay for the service. The service is, thus, an incident of property ownership.

II. Supplying water through fire hydrants is not a general governmental service that is available to the public at large in substantially the same manner as it is to property owners

Article XIII D, section 6(b)(5), provides that:

> No fee or charge may be imposed for general governmental services including, but not limited to, police, fire, ambulance or library services, where the service is available to the public at large in substantially the same manner as it is to property owners.

This provision appears tautological. Article XIII D, section 2(h), defines "property-related service" as "a public service having a direct relationship to property ownership." Logically, if a service is available to the public at large in substantially the same manner as it is to property owners, then it does not have a direct relationship to property ownership.

The purpose of including Section 6(b)(5) in Article XIII D appears to have been to identify specific kinds of services that the proponent of Proposition 218, the Howard Jarvis Taxpayers Association (HJTA), believed were traditionally, and should continue to be, funded from property taxes rather than fees.

A. The Legislative History of Proposition 218 Indicates that Fire Hydrant Water Service is not a General Governmental Service

1. Article XIII D, section 6(b)(5): A charge for supplying water to property through fire hydrants is not the kind of fee that Proposition 218 was intended to prohibit from being charged to customers of a government water utility as a fee for a property-related service. The prohibition contained in Article XIII D, section 6(b)(5), was intended by HJTA to protect the property tax reductions made by Proposition 13 from subversion by local governments, which HJTA accused of replacing taxes with fees. Because government water utilities charged fees (rather than levying taxes) for these costs before the adoption of Proposition 13 in 1978, such fees do not circumvent Proposition 13.

The purpose of Proposition 13, which was adopted in 1978, was to provide real property tax relief. (Amador Valley Joint Union High School District v. State Board of Equalization (1978) 22 Cal.3d 208, 230.) Following the adoption of Proposition 13, local governments increased their use of non-property taxes, special benefit assessments, and fees to replace some of the lost tax revenue. In an annotated version of the text of Proposition 218 prepared by HJTA dated September 5, 1996 (before the 1996 election at which it was approved), HJTA articulated that the purpose of Proposition 218 was to prevent what it saw as "end-runs" around Proposition 13 by the use of some of these other revenue measures. Section 6(b)(5) is one expression of that purpose – a rule that general governmental services should be funded by taxes rather than fees.

2. Article XIII D, section 6(c): Another portion of Article XIII D, section 6, indirectly touches on the issue of "end-runs." Section 6 imposes both procedural requirements in subsection (a) (e.g., notice and hearing) and substantive requirements in subsection (b) (e.g., proportionality of fees to costs) on property-related fees. Except for water, sewer, and refuse collection fees, Section 6(c) requires property-related fees, like taxes, to be approved by voters. The HJTA pre-election annotation to Article XIII D, section 6(c), explains the rationale for exempting those three types of fees from voter approval as follows:

> Exemption for sewer, water and refuse collection is for voter approval only. Such fees still must meet all of the five substantive requirements of paragraph (b). Exemption is based on philosophy of attempting to reverse the end-runs around Proposition 13. Since water, sewer and refuse collection fees pre-date Proposition 13, they were exempted from voter approval.

Charging property owners for water supplied through fire hydrants also pre-dates Proposition 13. Several statutes for various kinds of water districts specifically authorize the district to deliver water for fire protection purposes. For example, Water Code section 22077 (relating to irrigation districts), in the form of that section originally adopted in 1943, provides that: "A district may deliver water for fire protection purposes." Likewise, Water Code section 55330 (relating to county waterworks districts), in the form adopted in 1959, provides that: "A district may provide for the supplying of the inhabitants of the district with water for irrigation, domestic, industrial, or fire protection purposes …."

These statutes further provide that the districts may impose exactions on its customers for the water by means of charges rather than property assessments (which are akin to taxes). For example, in the case of irrigation districts, Water Code section 22280, in the form adopted in 1943, provides: "Any district may in lieu in whole or in part of levying assessments fix and collect charges for any service furnished by the district, including, but not limited to, all of the following: … use, sale, or lease of water, which may include a standby charge whether the water is actually used or not." Likewise, in the case of county waterworks districts, Water Code section 55501 provides: "The board may fix and collect rates or charges for the use and supply of water furnished by the system, and to apply the receipts from the rates or charges to the expenses of the administration and government of the district and the use, operation and extension of the waterworks and water supply."

An even broader indication of how the Legislature, pre-Proposition 13, viewed imposition of charges for fire protection services by water agencies is found in legislation adopted in 1973. Chapter 149 of the Statutes of 1973, which added Section 53069.9 to the Government Code, authorized all California public agencies to charge property owners for the costs of installing and operating fire hydrants and to collect such charges along with "other water rates or water charges collected by the public agency." Section 3 of Chapter 149 provides this:

> The Legislature hereby finds and declares that it is the intention of the Legislature that this act shall not constitute a limitation upon the right of any public agency providing retail water service to impose additional charges for costs attributable to other water services necessary to maintain and provide for an adequate system of fire protection. (Emphasis added.)
>
> The reason to include such a declaration of intent was to avoid any possible effects (by negative implication) on then-current public agency practice of collecting fire hydrant water service costs from water service customers/property owners. Charging fees to property owners for the cost of installing, operating and maintaining fire hydrants, for the infrastructure supporting the fire hydrants (such as larger pipelines, pumps, and reservoirs), and for the water provided through fire hydrants pre-dated Proposition 13, so it cannot be construed as a circumvention of Proposition 13 (converting property taxes into fees) that Section 6 was designed to prevent.

Regarding the financing of hydrants, an amendment to Section 53069.9 adopted by Chapter 538 of the Statutes of 1977 prohibited public agencies from charging fire protection agencies for fire hydrant costs, except by agreement. Fire protection agencies are funded by *ad*

valorem property taxes. Allowing water agencies to charge fire agencies for hydrants and the infrastructure and water required for hydrants to function as intended would have resulted in funding this fire protection cost from taxes. The prohibition established in Section 53069.9 shows that the Legislature did not think these charges were only legitimately funded from taxes.

3. Article XIII D, section 4: The provisions of Proposition 218 regarding special benefit assessments also address the issue of "end-runs" around Proposition 13. Article XIII D, section 4, requires that such assessments be levied only for special benefits provided to a property and not for general benefits. Section 2(i) defines special benefit as "a particular and distinct benefit over and above general benefits conferred on real property located in the district or to the public at large."

In another pre-election publication, "Myths about Proposition 218," HJTA addressed funding public safety services. Under the heading Myth #3, they state that "'fees' for general governmental services are thinly disguised taxes." But they then make a distinction regarding assessments for a particular governmental service:

> Opponents have also wrongfully claimed that all fire suppression assessments would end. Nothing in Proposition 218 expressly prohibits fire suppression assessments. If a fire suppression assessment district can be shown to provide special benefits to property within close proximity of a fire facility, then it may in fact meet the requirements of the act.

The objection made by opponents was that the description of fire protection as a general governmental service in Section 6(b)(5) implied that such fire protection could not be found to provide a special benefit under Section 4. HJTA said that fire protection could be shown to provide special benefits to property "within close proximity to a fire facility," like a local fire house. By analogy, even if the provision of water through hydrants were part of fire service, because it is delivered proximate to the property charged, it would be "property-related" and "not available to the public at large in substantially the same manner as it is to property owners." Moreover, as detailed below, general public use of fire hydrants is legally prohibited.

B. The Characteristics of Fire Protection Water Service Indicate that it is Not Available to the General Public in Substantially the Same Manner as to Property Owners

Water supplied through hydrants for firefighting is not available to the general public in substantially the same manner as it is to property owners. As discussed above in Part I, fire hydrants are located in proximity to homes and other buildings and are designed to immediately provide the water flows prescribed to extinguish structure fires.

In SB 1386, the Legislature found that: "Hydrants and the water distributed through them are not available to the public at large in substantially the same manner as they are to property owners served by a water service provider because hydrants are designed, installed, and used to serve properties receiving water service, and the public at large does not generally have access to water through those hydrants. Incidental or other de minimis use of hydrants and the water distributed through them for other purposes does not change their essential character as a property-related service." (Gov't Code § 53750.5(a)(5).)

Specifically:

1. Hydrants are located in proximity to buildings

In SB 1386, the Legislature found that: "Hydrants are generally located in proximity to properties served by a water service provider to facilitate water service to those properties." (Gov't Code § 53750.5(a)(4).)

The California Fire Code (Title 24, Part 9, of the California Code of Regulations) Section C 102.1 specifies the number of hydrants required to be installed in the vicinity of various types of buildings in terms of the characteristics of the buildings served by those hydrants. All of the hydrants in the District are installed in proximity to buildings that they serve.

2. Fire flows are calculated with respect to buildings

In SB 1386, the Legislature found that: "Hydrants and the water distributed through them have a direct relationship to property ownership because hydrants are generally sized based upon property use and then are installed when parcels are developed or connected to a water system." and that "Hydrants are generally designed, installed, and used to provide an immediately available water service to aid in extinguishing fires that threaten property served by a water service provider, and are generally not designed or installed to provide water service to aid in extinguishing fires that threaten property not served by a water service provider or wildfires." (Gov't Code § 53750.5(a)(4), (3).)

Section B105.1 of the California Fire Code (Title 24, Part 9, of the California Code of Regulations) specifies minimum fire-flow (required gallons per minute and pressure of water) and flow duration requirements through hydrants with reference to buildings of different types and sizes. The capacity of each hydrant in the District is directly related to the characteristics of the buildings served and is not based on any other possible use.

3. Access to fire hydrants for purposes other than firefighting is strictly limited

Use of fire hydrants is restricted by regulation to use for fighting fires, unless otherwise permitted by the District, and then only upon payment for the water. Section 4.9.1 of the District's Rules and Regulations for Water, Sewer, Recycled Water, and Natural Treatment System Service provides:

> 4.9.1 Fire hydrants connected to the District's mains and fire hydrants that are served by an applicant, owner, or customer fire line are provided for the sole purpose of furnishing water to fight fires and shall be opened and used only by persons authorized by the District. If the District permits the use of hydrants for purposes other than extinguishing fire, that permit will be granted only through the procedures and provisions contained in Section 4.1 of these Rules and Regulations. Rates to be charged for water extracted from a hydrant for temporary construction use or other purposes will be in accordance with the applicable schedule contained in Exhibit B, Schedule of Rates and Charges.

Likewise, Section 105.6.15 of the California Fire Code (Title 24, Part 9, of the California Code of Regulations) requires a permit for the use of fire hydrants.

4. Fire Hydrant Water Service is not Typologically Related to the Examples of General Government Services Given in Section 6(b)(5)

While fire hydrants might be used on occasion for other firefighting purposes (e.g., grass fires), such incidental use does not lead to a conclusion that fire hydrant water service is a general governmental service available to the public at large in substantially the same manner as it is to property owners.

Section 6(b)(5) lists four examples of services that are general governmental services – police, fire, ambulance, and library services. The four examples fall into two broad types of service. The first typological group contains services that are essentially mobile. Police cars, fire trucks, and ambulances take their services to where they are needed. To the list of police, fire, and ambulance service could be added vector control and animal control. Since the services are mobile, they are not necessarily related to property ownership. The second typological group contains services that are made available at some central location. Section 6(b)(5) gives only one example of this type – library services. Based on HJTA's hostility to the regional park assessments that are the subject of Knox v. Orland (1992) 4 Cal.4th 132, this category likely also includes recreational services provided by parks. In each case, the service is accessed by persons going to it, so it is available to property owners and others in substantially the same manner.

Fire hydrants are fixed in place in regulated and prescribed proximity to structures that cannot be built and occupied without them. The service they provide is immediately available to the owners of the adjacent property in a way that is substantially different from how it might incidentally be used for purposes other than fighting proximate structure fires.

Typologically, fire hydrants are in the class of services such as domestic water, sewer, and refuse collection that are recognized in Article XIII D, Section 6(c), as classic property-related services.

That third service listed as a property-related service in Proposition 218, refuse collection, has a mobile component – the collection truck comes to the property to provide the service. But the nature of the service that is provided is one that is provided to particular properties and not to members of the general public. In the case of fire suppression, the fire truck and the firefighters are mobile, and they serve both property and the public for other fires. The water made available through fire hydrants for structure fires, however, is supplied through fixed locations. Or, as the Legislature found in SB 1386: "Fire service is a different and distinct service from water service, which is one of several other property-related services that aids in the provision of fire service provided to properties." (Gov't Code § 53750.5(a)(1).)

In conclusion, fire hydrants are not located, designed, or intended for all fires that might occur in public places. They are located in **proximity** to property that is intended to be protected, which is then charged for the operation and maintenance of the hydrants and the water system capacity to operate them.

III: **Water provided through hydrants for fire protection is immediately available to property owners**

Charging property owners the cost of making water available for fire hydrant water service is consistent with California Constitution article XIII D, section 6(b)(4), which provides:

> No fee or charge may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in question. Fees or charges based on potential or future use of a service are not permitted. Standby charges, whether characterized as charges or assessments, shall be classified as assessments and shall not be imposed without compliance with Section 4.

The subject matter of this provision of Proposition 218 is the distinction between standby charges, which must be levied pursuant to the rules on special benefit assessments, and property-related fees, which may be levied as such only if the financed service is actually used or is immediately available to the property.

In their "Proposition 218 Right to Vote on Taxes Act: Statement of Drafters' Intent," dated January 2, 1997, HJTA commented on this section, writing:

> Standby charges are usually nothing more than flat rate parcel taxes imposed on the theory that water or sewer service may, at some point in the indefinite future, be available to the property being charged. This provision is a flat prohibition of such levies.

The California Legislative Analyst's statement included in the 1996 voter information pamphlet explained:

> Some local governments also levy "standby charges," which are similar to assessments. Standby charges commonly finance water and sewer service expansions to new households and businesses. (The measure treats standby charges as assessments.)

In an early case addressing this provision, Keller v. Chowchilla Water District (2000) 80 Cal.App.4th 1006, the court wrote:

> The term "standby" charge is not defined in article XIII D. Nor do the parties point out any statutory or other definition of that term. It does not appear in Black's Law Dictionary (7th ed.1999) or in Webster's New International Dictionary (3d ed.1986). Amicus curiae Howard Jarvis Taxpayers Association asserts that "standby charges are generally understood to be some sort of property levy, often based on acreage, imposed on the mere availability of a service, whether the service is used or not.[5]
>
> > [5] The Uniform Standby Charge Procedures Act (Gov.Code, §§ 54984-54984.9), while not defining the term "standby charge," authorizes local agencies to fix such a charge each year for making water available to

> property "whether the water ... services are actually used or not." (*Id.* at § 54984.2; see 82 Ops. Cal.Atty.Gen. 35 (1999).)

Paland v. Brooktrails Township Community Services District Board of Directors (2009) 179 Cal.App.4th 1358, provides the most useful analysis of Section 6(b)(4):

> As far as we are aware, no published decision has yet directly addressed the precise question before us: how to distinguish between charges for services that are "immediately available" to property owners though not actually used, which are fees under the initiative, and standby charges for "potential or future use of a service," which are defined as assessments.

Although Section 6(b)(4) has three sentences, the court analyzed it as addressing only two categories: (1) services actually used or immediately available and (2) standby charges for potential or future use (essentially defining a standby charge as one for potential or future use). **This analytic division also means that, if the service is immediately available, it is not a standby charge or for future or potential use.**

Paland held local governments may impose a minimum charge on parcels connected to utility systems for the basic cost of providing service, regardless of actual use:

> As long as the local government has provided the necessary service connections at the charged parcel and it is only the unilateral act of the property owner (either in requesting termination of service or failing to pay for service) that causes the service not to be actually used, the service is 'immediately available' and a charge for the service is a fee rather than an assessment (assuming the other substantive requirements of a fee are satisfied).

(Paland, supra, 179 Cal.App.4th at 1370.)

In the case of fire hydrants, the District charges customers where the hydrants have been installed (i.e., the service connection is in place) and the water is currently available. The parenthetical in the quotation from Paland above only identifies two kinds of unilateral acts of property owners that cause the service not to be used. Paland does not mention the other circumstance where a property owner unilaterally chooses not to use an immediately available service – when the occasion for its use has not arisen. Fire hydrant water will be used only when a fire breaks out.[2]

*"*Potential" Service? Another example of an immediately available service for which a utility may validly charge is domestic water service. A standard component of charges levied by water utilities is a fixed charge that is unrelated to the volume of water consumed. Such fixed

[2] It is not significant that it is the fire department's personnel who physically access the water and apply it to extinguish the fire engulfing the property owner's property. The firefighters may have been summoned by the property owner, but, in any event, they are acting as the agents of the property owner to apply the water made available through the adjacent service connection, the fire hydrant.

charges are payable even if customer takes no water. One might describe the fixed charge as a charge for potential service. As stated by the California Supreme Court, however, in Bighorn-Desert View Water Agency v. Verjil (Kelley) (2006) 39 Cal.4th 205, 217:

> Accordingly, once a property owner or resident has paid the connection charges and has become a customer of a public water agency, all charges for water delivery incurred thereafter are charges for a property-related service, whether the charge is calculated on the basis of consumption or is imposed as a fixed monthly fee.

*"*Future" Service? In Griffith v. Pajaro Valley Water Management Agency (2014) 220 Cal.App.4th 586, the plaintiffs claimed that groundwater augmentation charges were being used to fund a service that is not "immediately available" to property owners, because the ordinance adopting the fees provided the charge could fund efforts to identify and design future supplemental water projects. That might be referred to as future services. However, the court dismissed this argument and held that identifying and determining the future needs of the agency is part of the agency's present-day services. The costs of planning for such future needs therefore may be recovered from charges imposed on current users. (Griffith, 220 Cal.App.4th at 602.) By analogy, making water for firefighting immediately available for use upon the occasion of a fire is a present-day service.

Exhibit B

Technical Memo
Determination of Costs of Public Fire Hydrant Water Service
For
Irvine Ranch Water District

Executive Summary

As discussed in Exhibit A, public fire hydrant water service is a property-related service and as stated in the California Government Code Section 53750.5(b) explicitly authorizes this:

> *The fees or charges for property-related water service imposed or increased pursuant to Section 6 of Article XIII D of the California Constitution may include the costs to construct, maintain, repair, or replace hydrants as needed or consistent with applicable fire codes and industry standards, and may include the cost of water distributed through hydrants. In addition to any other method consistent with Section 6 of Article XIII D of the California Constitution, fees or charges for the aspects of water service related to hydrants and the water distributed through them may be fixed and collected as a separate fee or charge, or included in the other water rates and charges fixed and collected by a public agency, as provided for in Section 53069.9 of the Government Code.*

The purpose of this memo is to identify the costs for public fire hydrant water service for Irvine Ranch Water District ("IRWD" or the "District") customers and to describe how the District allocates these costs among all customers who receive fire hydrant water service.

There are two cost components associated with public fire hydrant water service: direct costs and indirect costs. The budgeted costs for FY 2021-22 are:

Direct costs	$ 457,000
Indirect costs	2,586,000
Total Public Fire Hydrant Water Service Costs	$3,043,000

Direct costs are associated primarily with maintenance of the fire hydrants. These include inspections, painting, and flushing of the hydrants. Flushing is an important maintenance activity that verifies the proper operation of the hydrant to ensure adequate water flow will be available when the need to extinguish a structure fire arises. Flushing also removes the sediment that naturally accumulates in the hydrant.

Indirect costs are the District's costs for design and sizing of the infrastructure to support the "fire flow" (volume and pressure of water) prescribed to meet peak firefighting water demand. The District's water system is designed to provide capacity to handle two defined hypothetical fires. Capacity is measured in terms of maximum hourly and maximum daily water flow. See Table J below. The annual costs to provide that fire flow capacity are the indirect costs.

Details as to how these costs are calculated are described in this memo. Both direct and indirect costs are incurred by IRWD to ensure that fire hydrants can immediately provide the prescribed water flows to fight structure fires on adjacent and proximate real property served by IRWD. IRWD's rate structure, including public fire hydrant water service, complies with Proposition 218's cost-of-service and proportionality principles.

Calculation of Public Fire Hydrant Water Service Costs

As discussed in the Cost of Service Design Study (the "Study"), IRWD's existing rate structure allocates fire hydrant water service costs among customers through a monthly fixed water meter service charge (see Sections 4.3.3 and 4.3.5 in the Study for further discussion). The monthly charges are for fixed expenditures that relate to the overall asset maintenance and operational activities of the District, including operational support activities such as accounting, billing, customer service, and administrative and technical support. These expenditures are common to all customers and are reasonably uniform across the different customer classes. The service charges also include meter- and capacity-related costs, such as meter maintenance and peaking charges, to meet peak fire hydrant water demand requirements that are included based on the meter's hydraulic capacity (measured in gallons per minute [gpm]). The total cost for public fire hydrant water service is allocated to all customers - residential, commercial, industrial, institutional, irrigation, and agricultural.

There are two cost components associated with public fire hydrant water service: direct costs and indirect costs.

Direct Costs: Direct costs of fire hydrant water service include triennial fire hydrant maintenance. This is based on inspections and services to all District fire hydrants, of which approximately one-third are serviced or inspected annually on a rotating basis. The direct cost component also includes the amount of water used for flushing or other related purposes. The budget for direct costs for FY 2020-21 is $457,000. Budgeted costs are based on historical unit costs, inflation factors, and projected maintenance activity.

Indirect Costs: The second component of public fire hydrant water service costs is indirect costs. Indirect costs are those associated with designing and sizing the infrastructure to support the fire flow necessary to meet peak fire flow demand requirements (called "peaking factors"), which are set generally by the relevant land use agency as a condition for subdivision or construction permitting. These costs are included in IRWD's normal operating expenses and allocated to District customers through the monthly meter service charge. Indirect costs for FY 2020-21 are budgeted at $2,586,000.

The District uses a detailed method to calculate the annual indirect costs of fire hydrant water service. There are two primary components of indirect fire hydrant water service costs: asset maintenance and operating expense. For the first component, the District categorizes its assets by function and calculates the costs of asset maintenance allocated to fire hydrant water service. For the second component, the District breaks down system operating costs and determines allocations to fire hydrant water service based on demand categories.

The following steps are used to calculate indirect fire hydrant water service costs:

a. Identify total system peaking factors allocated to Base, Max Day, and Max Hour demands;
b. Apply functional allocation percentages to the asset categories;
c. Allocate asset values by function;
d. Allocate functions to peaking factors;
e. Determine asset value by peaking factor;
f. Allocate operating costs by their demands on the system;
g. Summarize peaking factor percentages for all operating costs by demand category;
h. Identify operating costs by demand category;
i. Calculate the cost of service by peaking factor;
j. Determine capacity requirements for fire flow and the allocation to public fire hydrant water supply capacity; and
k. Compute the public fire hydrant water supply cost-of-service.

The result is the cost estimate for the indirect component related to public fire hydrant water service. Each of these steps is discussed in more detail below:

a. **Identify total system peaking factors –** Peak water system demand factors, or "peaking factors," are based on the District's Master Plan, which uses the requirements of the city or other land use agency in which the hydrants are located. The factors are calculated based on the following demands on the system:

1. Base demand, which is equivalent to the average daily demand on the water system within a given year;
2. Maximum day or Max Day demand, which represents the maximum volume of water used during a 24 hour period within a year. Based on historical experience, the Master Plan sets Max Day demand equal to 1.8 times the Base demand. The Base demand component of Max Day (1.0/1.8) is 55.6%, while the incremental Max Day demand (the portion in excess of the Base demand component) is (0.8/1.8) is 44.4%; and
3. Maximum hour or Max Hour demand, which represents the maximum volume of water used within a one hour period within a year. Based on historical experience, the Master Plan sets Max Hour demand equal to 2.5 times the Base demand. The Base demand component of Max Hour (1.0/2.5) is 40%, while the Max Day component (0.8/2.5) is 32% and the incremental Max Hour demand (0.7/2.5) is 28%.

Table A: Identify Peaking Factors

Allocation Factor	System Peaking Factor	Base	Max Day	Max Hour	Total
Base	1.00	100%	0%	0%	100%
Max Day	1.80	56%	44%	0%	100%
Max Hour	2.50	40%	32%	28%	100%

First Component – asset maintenance: To allocate annual asset maintenance costs to Base demand, Max Day demand, and Max Hour demand capacity, the District first allocates the value of its assets to functional categories (Tables B and C below), then assigns the functionalized assets to the several peaking factors (Table D below), and then calculates the values per peaking factor (Table E below).

b. **Apply functional allocation percentages to the asset categories -** The asset categories are based on the District's historic asset groupings as identified in the District's accounting system. Raftelis Financial Consultants (Raftelis) has identified the several functions performed by District assets. Based on their professional judgement and experience, Raftelis has assigned the percentage of each asset type allocable to each function.

Table B: Functional Allocation Percentages

	Asset Functions							
Asset Type	Supply	Storage	Pumping	Transmis-sion	Distrib-ution	Meters	Fire	Total
Pipes				30%	70%			100%
Reservoirs	80%	20%						100%
Hydrants							100%	100%
System Valves				30%	70%			100%
Pump Stations			100%					100%
Meters						100%		100%
Pressure Regulating Stations					100%			100%
Wells	100%							100%

c. **Allocate asset values by function –** The total value of each asset category, as shown in the District's fiscal year end 2019-20 accounting records, is allocated to the several asset functions according to the percentages identified in Table B.

Table C: Allocation of Asset Values to Functions

Asset Type	Supply	Storage	Pumping	Transmis-sion	Distrib-ution	Meters	Fire	Total
	Asset Functions (dollars in millions)							
Pipes	$ -	$ -	$ -	$ 688.4	$ 1,606.3	$ -	$ -	$ 2,294.7
Reservoirs	282.1	70.5	-	-	-	-	-	352.6
Hydrants	-	-	-	-	-	-	228.7	228.7
System Valves	-	-	-	51.3	119.8	-	-	171.1
Pump Stations	-	-	92.8	-	-	-	-	92.8
Meters	-	-	-	-	-	40.9	-	40.9
Pressure Regulating Stati	-	-	-	-	7.8	-	-	7.8
Wells	3.6	-	-	-	-	-	-	3.6
Total Allocation	**$ 285.7**	**$ 70.5**	**$ 92.8**	**$ 739.7**	**$ 1,733.9**	**$ 40.9**	**$ 228.7**	**$ 3,192.2**

d. Allocate functions to peaking factors - Peaking factor allocation percentages in Table A are assigned to the functions in Table B. These assignments are based on the professional judgement and experience of Raftelis. Meter and direct fire hydrant maintenance expenses do not change with peaking factors and are allocated separately to become a component in the customer's fixed meter service charge.

Table D: Peaking Factor Percentages Allocated to Asset Functions

Asset Functions	Allocation Basis	Base	Max Day	Max Hour	Customer	Fire	Total
Supply	**Base**	100%	0%	0%			100%
Storage	**Max Hour**	40%	32%	28%			100%
Pumping	**Max Hour**	40%	32%	28%			100%
Transmission	**Max Day**	56%	44%	0%			100%
Distribution	**Max Hour**	40%	32%	28%			100%
Meters					**100%**		100%
Fire						**100%**	100%

e. Determine asset value by peaking factor - The asset values in Table C are multiplied by the percentages identified in Table D. The assets that are assigned directly to fire hydrant water supply (i.e., the hydrants) are then reallocated to peaking factors based on the total allocation value component percentages. The percentage of annual maintenance costs allocated to each demand factor is then determined based on the reallocated values.

Table E: Asset Values Allocated by Peaking Factor Percentages

Functionalized Expenses (millions)	Allocation Basis	Base	Max Day	Max Hour	Customer	Fire	Total
Supply	Base	$ 285.7	$ -	$ -	$ -	$ -	$ 285.7
Storage	Max Hour	28.2	22.6	19.7	-	-	70.5
Pumping	Max Hour	37.1	29.7	26.0	-	-	92.8
Transmission	Max Day	411.0	328.7	-	-	-	739.7
Distribution	Max Hour	693.6	554.8	485.5	-	-	1,733.9
Meters		-	-	-	40.9	-	40.9
Fire		-	-	-	-	228.7	228.7
Total Allocation		**$ 1,455.6**	**$ 935.8**	**$ 531.2**	**$ 40.9**	**$ 228.7**	**$ 3,192.2**
Reallocation of Fire		$ 112.3	$ 72.2	$ 41.0	$ 3.2	$ (228.7)	$ -
Revised Allocation		**$ 1,567.9**	**$ 1,008.0**	**$ 572.2**	**$ 44.1**	**$ -**	**$ 3,192.2**
Asset Maintenance		***49.1%***	***31.6%***	***17.9%***	***1.4%***	***0.0%***	***100%***

Second component – operating costs: To allocate annual operating costs to Base demand, Max Day demand, and Max Hour demand capacity, the District first allocates each of the nine demand categories of operating costs (see list and Table G below) to the three demand factors. The District then assigns costs to each of the demand categories (Table H below). Finally, the District calculates the costs per peaking factor (Exhibit I below).

f. Categorize operating costs by their demands on the system – The strategy for allocating operating expenses is based on demands on the system. Table F below shows the nine operating cost demand categories and the asset maintenance cost demand category, assigned to variable and fixed revenue requirement groups. The net costs include all potable operating costs, capital contributions, and offsets. (See Table 13 [variable revenue requirement] and Table 14 [fixed revenue requirement] in the Study for the identification of the demand categories and the costs assigned to each one).

Table F: Operating and Asset Maintenance Cost System Demand Categories

Cost Group	Demand Category	Cost (thousands)
Variable:	Water Supplies	Base Supply
	Water Supplies	Excess Supply
	Conservation and Supply Reliability	Water Banking
	Conservation and Supply Reliability	Conservation and NTS
	Conservation and Supply Reliability	Universal Conservation
Fixed:	Fixed Operating Costs	Customer Service
	Fixed Operating Costs	System Maintenance
	Fixed Operating Costs	G&A and Administrative
	Fixed Operating Costs	G&A Plant
	Fixed Operating Costs	Asset Maintenance (1)

(1) Includes fleet, building maintenance, and capital contribution.

The demands for each operating expense category on the system, based on the professional judgment and experience of Raftelis, are as follows:

1. Base Supply – Primary water supply sources meeting low volume and most base rate demands. This is included as 100% Base demand.
2. Excess Supply – Imported water is used to meet a portion of the base and all over-allocation demands. The distribution between Base, Max Day, and Max Hour is based on allocated use of imported water between the base, inefficient, and wasteful.
3. Water Banking – Similarly, water banking is a source of supply that is only necessary during severe water limitations. This is allocated entirely to Max Hour.
4. Targeted Conservation and NTS – These expenses are used to manage and reduce water overuse. Targeted conservation is outreach to customers exceeding budget use while NTS provides for treatment of overuse flows prior to flowing to the ocean. These costs are allocated to Max Day and Max Hour based on demands.
5. Universal Conservation – These costs include District efforts to educate customers on ways to conserve water. This is allocated to all sales except low volume. Low volume sales are excluded because remaining within low volume usage provides a high level of conservation. These costs are allocated to Base, Max Day, and Max Hour based on the respective percentage of sales to the base, inefficient and wasteful tiers.

6. Customer Service – This is primarily costs associated with providing communication to District customers. It includes responding to bill payment questions, requests for service, reading meters, etc. This has no impact on peaking factors and is included in the fixed charges allocated to meters.
7. System Maintenance – This includes costs related to the overall maintenance and operational activities of the District. It is a Base cost and excludes the direct cost of fire hydrant maintenance.
8. General and Administrative (G&A) – This includes indirect operating costs that are not directly allocable to a system but provide a benefit for all systems. This is allocated to Base, Max Day, Max Hour, customer, and direct fire hydrant maintenance based on their respective portion of total costs.
9. General Plant - This includes costs associated with the purchase of assets used within the office, District fleet, etc. They are allocated between Base and Max Day using the Max Day peaking factor percentage.

g. Summarize peaking factor percentages for all operating costs by demand category - Peaking factor percentages for operating expenses by demand category are summarized in the table below. These are assigned based on the professional judgment and experience of Raftelis.

Table G: Summarized Peaking Factor Percentages for all Operating Costs

Functional Group	Base	Max Day	Max Hour	Customer	Fire	General	Total
Base Supply	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Excess Supply	21.5%	43.2%	35.2%	0.0%	0.0%	0.0%	100%
Water Banking	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100%
NTS & Conservation	0.0%	55.1%	44.9%	0.0%	0.0%	0.0%	100%
Universal Conservation	84.5%	8.5%	6.9%	0.0%	0.0%	0.0%	100%
Customer Service	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100%
System Maintenance	94.4%	0.0%	0.0%	0.0%	5.6%	0.0%	100%
Asset Maintenance (Table E)	49.1%	31.6%	17.9%	1.4%	0.0%	0.0%	100%
G & A	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100%
GP	55.6%	44.4%	0.0%	0.0%	0.0%	0.0%	100%

h. Identify operating costs by demand category – Amounts are assigned to demand categories shown in Table F. The net costs are explained in further detail in section 4.3 in the Study and as stated above, are shown in Table 13 (variable revenue requirement) and Table 14 (fixed revenue requirement).

Table H: Operating and Asset Maintenance Costs by System Demands

	Cost Group	Demand Category	Cost (thousands)	Totals
Variable:	Water Supplies	Base Supply	$37,894	
	Water Supplies	Excess Supply	8,322	
	Conservation and Supply Reliability	Water Banking	1,539	
	Conservation and Supply Reliability	Conservation and NTS	9,907	
	Conservation and Supply Reliability	Universal Conservation	857	58,519
Fixed:	Fixed Operating Costs	Customer Service	$4,538	
	Fixed Operating Costs	System Maintenance	7,350	
	Fixed Operating Costs	General and Administrative	9,817	
	Fixed Operating Costs	General Plant	1,016	
	Fixed Operating Costs	Asset Maintenance	10,912	33,633
		Net allocated Costs	$ 92,152	$92,152

i. Calculate cost-of-service by peaking factor - The allocated percentages identified in Table G are applied to the operating costs identified in Table H to calculate the cost by peaking factor. General and Administrative (G&A) is reallocated based on the total cost of service.

Table I: Calculate Cost-of-Service by Peaking Factor

	Cost Allocation (thousands)						
Demand Category	**Base**	**Max Day**	**Max Hour**	**Customer**	**Fire**	**G&A**	**Total**
Base Supply	$37,894	$ -	$ -	$ -	$ -	$ -	$ 37,894
Excess Supply	1,791	3,599	2,932	-	-	-	8,322
Water Banking	-	-	1,874	-	-	-	1,874
NTS & Conservation	-	5,286	4,306	-	-	-	9,593
Universal Conservation	708	71	58	-	-	-	837
Customer Service	-	-	-	4,538	-	-	4,538
System Maintenance	6,942	-	-	-	408	-	7,350
Capital & Asset Mangement	5,359	3,446	1,956	150	-	-	10,911
G & A	-	-	-	-	-	9,817	9,817
GP	565	452	-	-	-	-	1,016
Total Cost of Service	**53,259**	**12,854**	**11,126**	**4,688**	**408**	**9,817**	**92,152**
Allocation of G&A	**6,350**	**1,532**	**1,327**	**559**	**49**	**(9,817)**	**-**
Sub-total Cost Allocation	**$59,609**	**$14,386**	**$12,453**	**$5,247**	**$457**	**$ -**	**92,152**

j. Determine capacity requirements for fire flow and the allocation to public fire hydrant water supply capacity - To estimate the costs associated with (and to provide capacity for) public fire hydrant water service, the methodology put forth in the AWWA M1 Manual was used.

To determine the capacity requirements for fire flow, the District uses two hypothetical fires with varying fire flow. The first fire requires flows of 2,500 gallons per minute for a minimum of 4 hours, and the second requires 8,000 gallons per minute for a minimum of 8 hours as shown below. These hypothetical fires were chosen based on the professional judgement and experience of Raftelis.

Fire flows as a percentage of total capacity is converted to a percentage and used to identify the indirect cost allocated to water supply for public and private fire protection. The water supply demand capacity for public and private fire hydrant water service are based on firelines and hydrant capacity.

Water is supplied for private fire service through pipes and appurtenances on private property. These include all water-based fire protection systems, such as fire protection sprinklers and fire hydrants that are not part of, but are connected to, the public water service. Costs are allocated to these systems in a similar fashion and billed separately to the individual customers owning the private fire protection systems.

Max Day capacity is the amount of water needed for the duration of a fire in one day (fire flow gallons per minute multiplied by the duration of fire in minutes).

Max Hour capacity is the amount of water needed if a similar fire lasted an entire day (fire flow gallons per minute multiplied by the number of minutes in a day), less the capacity already allocated to Max Day. Capacity amounts in gallons are converted to ccf in the table below. (One ccf = 748.05 gallons.)

Table J: Capacity Requirements for Fire Flow and Public Fire Water Allocation

Fire Flow Estimate	Fire #1		Fire #2		Total	
	Max Day (1)	Max Hour (2)	Max Day (1)	Max Hour (2)	Max Day	Max Hour
Duration of Fire (Hours)	4.00		4.00		8.00	
Fire Flow (gpm)	2,500	2,500	8,000	8,000	10,500	10,500
Capacity Demanded for Fire (ccf)	802	4,010	2,567	12,833	3,369	16,844
Public Fire Water Capacity 74.9% (ccf) (3)	601	3,004	1,922	9,612	2,523	12,616
Private Fire Capacity 25.1% (ccf) (4)	201	1,007	644	3,221	846	4,228
Total Potable Capacity					84,624	72,789
Public Fire Water Allocation (Max Day: 2,523/84,624;Max Hour 12,616/72,789)					**3.0%**	**17.3%**
Private Fire Allocation (Max Day: 846/84,624;Max Hour 4,228/72,789)					1.0%	5.8%

(2) Max Day Capacity demanded for fire = (hours*minutes*gallons)/748.05.
(3) Max Hour Capacity demanded for fire = (hours*minutes*gallons)/748.05 – Max Day Capacity.
(4) Split is based on total system hydrant/fireline meter capacity = 2,086,635/2,784,809 = 74.9%.
Private Fire = Remaining capacity (25.1%)
(5) Total potable capacity is max day and max hour demands for all customer classes.

k. Compute the public fire hydrant water service cost –

The Max Day and Max Hour percentages identified in Table J for public fire hydrant water service are applied to the total cost-of-service by peaking factor to reallocate expenses included in Max Day and Max Hour fire protection water service costs to customer costs:

Max Day Public Fire Hydrant Water Service costs: 3.0% * $14,386K = $ 432k

Max Hour Public Fire Hydrant Water Service costs: 17.3% * $12,453K = $2,154k

Total indirect costs of Public Fire Hydrant Water Service: $2,586k

Table K: Public Fire Hydrant Water Service Cost-of-Service

Cost Allocation (thousands)	Base	Max Day	Max Hour	Customer	Direct Fire	Private Fire	Total
Total Operating Costs	$ 59,609	$ 14,386	$ 12,453	$ 5,247	$ 457	$ -	$ 92,152
Allocation of Direct Public Fire Water to Customer				**457**	**(457)**		-
Allocation of Indirect Public Fire Water to Customer (1)		**(432)**	**(2,154)**	**2,586**			-
Allocation to Private Fire		144	722	-		(866)	-
Adjusted Cost of Service	**$ 59,609**	**$ 14,098**	**$ 11,021**	**$ 8,290**	**$ -**	**$ (866)**	**$ 92,152**
Total Cost of Public Fire Water Included in "Customer"				**$ 3,043**			

(1) As described above, public fire water is calculated as follows:
Max day - $14,386K (Table I) * 3.0% = $ 432K
Max Hour - $12,453K (Table I) * 17.3% = 2,154K

As identified in Table K, there are two cost components associated with public fire hydrant water service: direct and indirect. The total cost of public fire hydrant water service is $3,043,000 including the direct cost of $457,000 and the indirect cost of $2,586,000.

Total public fire hydrant water service costs are allocated to all customers through the fixed meter charge through the IRWD's rate structure, including public fire hydrant water service. This complies with Proposition 218's cost-of-service and proportionality principles because meter charges are proportional to a given property's water demand, which is proportional to the property's structures that are being protected by the fire hydrant water service.

1. Executive Summary

This is an update to the 2021 Cost of Service (COS) Study related to Fiscal Years (FY) 2021-22 and FY 2022-23.

The appendix attachments listed in Section 3 below, are a supplement to provide the support for the development of rates for FY 2021-22 through FY 2022-23. The methodology and assumptions in the 2021 COS study remain the same, however the tables are updated with the details from the FY 2021-22 and FY 2022-23 budgets that were adopted by the IRWD Board of Directors on April 26, 2021.

2. Background

The approved Fiscal Year (FY) 2021-22 Operating Budget for IRWD is $180.2 million, representing an increase of $6.6 million, or 3.8%, compared to the Operating Budget for FY 2020-21. The proposed FY 2022-23 Operating Budget for IRWD is $187.7 million, representing an increase of $7.6 million, or 4.2%, compared to the proposed Operating Budget for FY 2021-22. These budgets were adopted by the IRWD Board of Directors on April 26, 2021.

Increases to the IRWD rates and charges for services are necessary to provide for cost-of-service equity. However, due to the continued economic impact of COVID-19 to IRWD's customers, the District deferred a rate increase until after December 31, 2021. Staff anticipates resuming the normal two-year rate review cycle consistent with the adoption of the next two-year budget.

Staff and Raftelis updated IRWD's 2020 rate model based on Raftelis' findings and Committee recommendations. The same methodology was used to develop cost-of-service based rates for FY 2021-22 and FY 2022-23. Using this information, staff completed additional analysis to develop rate recommendations that will provide cost equity for both fiscal years.

The 2021 COS Study includes the following:

- Raftelis COS Study for FY 2020-21;
- Exhibit A - Tech Memo re: Legal Basis for Fire Water in Service Charge;
- Exhibit B - Tech Memo re: Determination of Costs of Fire Water;

3. Appendices to the 2021 COS Study

The 2021 COS Study is the basis for rate setting. The following list are appendices provided to support rates for years after 2021.

Appendix 1: Appendices to 2021 COS Study

Appendix 2: Rate Development for FY 2021-22

Appendix 3: Rate Development for FY 2022-23

Appendix 4: Rate Development for 16-month Period from February 2022 to June 2023

Appendix 5: Costs for Public Fire Water for FY 2021-22

Appendix 6: Costs for Public Fire Water for FY 2022-23

Appendix 7: Rate Development for Water Shortage Contingency Plan

Appendix 8: Rate Development for Surcharge

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2021-22 and FY 2022-23.

The IRWD Board of Directors adopted a two year operating budget for FY 2021-22 and 2022-23 on April 26, 2021. Generally, rates are adopted and implemented to cover operating costs for each FY adopted budget. Rate increases for the full year FY 2021-22 were not implemented as the Board elected to defer rate increases part of the year due to continued customer hardships resulting from COVID-19. It is anticipated that the Board will adopt rate increases covering operating costs for both fiscal years (FY 2021-22 and FY 2022-23) in January 2022.

Appendix 2 provides the support for the development of rates to cover operating costs for FY 2021-22 assuming the Board had elected to implement new rates for the full FY 2021-22. Appendix 3 provides the support for the development of rates to cover operating costs for the full FY 2022-23.

As discussed above, rates increases were deferred for part of the FY 2021-22 and it is anticipated that the Board will adopt rate increases covering operating costs for both fiscal years (FY 2021-22 and FY 2022-23) in January 2022. Rate increases would be reflected on customer bills beginning March 1, 2022. Rates were developed to recover budgeted operating costs for both fiscal years over the remaining 16 month period (March 2022-June 30,2023). The support for the development of these rates is shown in Appendix 4 and provides the basis for the January 2022 recommended rate increases. The proposed rates in Appendix 4 are anticipated to generate sufficient revenues to recover operating costs for both fiscal years over the 16 month period.

The tables are updated with the details from the FY 2021-22 operating budget. The methodology and assumptions from the 2021 Cost of Service (COS) study remain the same and the tables included in this appendix use the same numbering scheme as those in the 2021 COS. Section 8 has been added to address rates for untreated water.

The District anticipates resuming the normal two-year rate cycle consistent with the adoption of the two-year budget for FY 2023-24 and FY 2024-25.

Potable Water Cost of Service FY 2021-22

See section 4 of the Cost of Service Report for a complete discussion on the District's potable water cost of service.

The FY 2021-22 water revenue requirement was determined to be $93,129,524 (see sum of tables 13 and 14 below). Of this amount, $58,898,954 (63.6%) is associated with variable costs that are incurred to acquire and treat water supplies. These costs vary with the amount of water used by customers and are recovered through commodity rates. Note that the variable cost revenue requirement includes $13,095,132 in costs for universal conservation, targeted conservation, water banking operations, and the District's natural treatment system used to control runoff from customers who use water in the inefficient and wasteful tiers. Table 13 provides detail of the FY 2021-22 variable revenue requirement.

4.3. FY 2021-22 POTABLE WATER REVENUE REQUIREMENT

Table 13: FY 2021-22 Potable Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Dyer Road Wellfield	$18,688,185
Baker Treatment Facilities	12,755,729
Imported Water Purchases Irvine Ranch	8,982,508
Deep Aquifer Treatment System	6,711,209
Irvine Desalter Domestic	3,816,374
Wells 21 & 22 Desalter Treatment Plant	2,630,667
Irvine Desalter Plant W115	606,558
Orange Park Acres Well 1	65,551
Total Gross Potable Water Supply Costs	**$ 54,256,781**
Revenue Requirement Offsets to Water Supply Costs	
Revenue from Partners	$4,652,959
Revenue from Sinking Fund	1,700,000
Revenue from Water Banking Operations	2,100,000
Total Revenue Requirement Offsets	**$ 8,452,959**
Net Revenue Requirement for Water Supply Costs	**$ 45,803,822**
Conservation and Supply Reliability	
Targeted Conservation	$5,802,874
Natural Treatment System	4,374,225
Water Banking	1,888,510
Universal Conservation	1,029,523
Total Conservation and Supply Reliability Costs	**$ 13,095,132**
Net Potable Variable Cost Revenue Requirement	**$ 58,898,954**
Untreated Water Supplies	
Untreated Water Purchases	($661,816)
Santiago Aqueduct Commission	135,650
Untreated Water System Maintenance	235,154
Irvine Lake	130,824
Native Water	670,000
Net Untreated Water Variable Cost Revenue Requirement	**$ 509,812**

Fixed costs do not vary with the volume of water by customers. The fixed cost portion of the total FY 2021-22 revenue requirement was $33,720,758 (36.4%) as shown in Table 14. Of these fixed costs, $9,599,245 were associated with expenditures for replacement and enhancement capital costs that do not increase the capacity of the water utility system to serve new customer demand growth. Table 14 provides a detail of the FY 2021-22 fixed revenue requirement.

Table 14: FY 2021-22 Potable Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Amount
Fixed Operating Costs	
Domestic Water System Maintenance	$15,342,094
General and Administrative Expenses	6,789,485
Customer Service	4,547,742
Fleet	1,347,518
General Plant	849,851
Building Maintenance	1,141,254
Water System Mitigation Monitoring	10,000
Total Fixed Operating Costs	**$ 30,027,944**
Replacement and Enhancement Capital Costs	
Replacement	$7,285,581
Enhancement	2,313,665
Total Capital Costs	**$ 9,599,245**
Gross Fixed Cost Revenue Requirement	**$ 39,627,190**
Revenue Requirement Offsets	
Fireline Revenues	$3,269,837
Miscellaneous Revenue	1,613,594
Pumping Surcharge Revenue	1,023,000
Total Revenue Requirement Offsets	**$ 5,906,431**
Net Fixed Cost Revenue Requirement from Rates	**$ 33,720,758**

4.3.1. VARIABLE COST RECOVERY – COMMODITY RATES

The District recovers water supply costs through commodity rates with the lowest cost water supplies being recovered in the low volume and base consumption tiers and the highest cost water supplies being recovered in the inefficient and wasteful tiers. The District's method for recovering variable costs is compliant with Proposition 218 because of the direct linkage between the revenue recovered in each tier to the costs incurred to provide service to customers with demand in each consumption tier.

The District also recovers the cost of water conservation and water supply reliability programs through its commodity rates with targeted costs being allocated to customers with consumption in the inefficient and wasteful tiers. This approach is reasonable because customers who exceed their monthly water budget allocation impose higher costs on the District. Thus, the commodity rates charged in these two upper tiers are designed to not only recover the cost of more expensive water supplies, but also the additional costs of:

- Targeted conservation programs designed to reduce excessive use.
- Water banking operational costs to enhance water supply reliability.
- Rebates for long-term improvements in customer water use efficiency.
- Urban runoff source control programs referred to as the NTS, which treats runoff from customers who use water in the inefficient and wasteful tiers.

In FY 2021-22, the District's projected total water demand of 52,494 acre feet was based on historical averages by tier, adjusted for customer account growth and other relevant factors. This reflects a 2.7% decrease over the 53,939 acre feet of water demand projected in FY 2020-21. Table 15 details the FY 2021-22 unit cost of water supplies ($/CCF) from each supply source as determined using cost and demand data provided by the District.

Table 15: Unit Cost of FY 2021-22 Water Supplies

Metric	Dyer Road Wellfield	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Total Cost and Acre Feet
Net Cost (1)	$17,154,111	$5,392,696	$8,102,770	$3,786,556	$2,319,630	$9,048,059	$0	$45,803,822
Demand in Acre Feet (net)	26,600	7,376	6,631	3,560	1,740	6,587	-	52,494
CCF (2)	11,586,960	3,212,986	2,888,464	1,550,736	757,944	2,869,297	-	22,866,386
Unit Cost per ccf (1) divided by (2)	$1.48	$1.68	$2.81	$2.44	$3.06	$3.15		

(1) From Table 14
(2) Acre feet is multiplied by 435.6 to convert to CCF

The District allocates the water supply in the order of cost for each source. The higher cost water supplies are appropriately allocated to the inefficient and wasteful tiers. Table 16 details this allocation for FY 2021-22 using cost and demand data provided by the District.

Table 16: Allocation of Potable Water Supplies to Consumption Tiers for Unit Costs

Metric	Dyer Road Wellfield (1)	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Total Acre Feet	Unit Cost by Tier ($ /ccf) (2)
Unit Cost	$1.48	$1.68	$2.81	$2.44	$3.06	$3.15	$0.00		
T1: Low Volume	19,105	-	-	-	-	-	-	19,105	$1.48
T2: Base	7,495	7,376	6,631	3,560	1,740	1,418	-	28,220	$2.15
T3: Inefficient	-	-	-	-	-	2,848	-	2,848	$3.15
T4: Wasteful	-	-	-	-	-	2,320	-	2,320	$3.15

(1) 19,105 acre feet are used to meet projected low volume demand estimated based on historic demand as adjusted for customer account growth and other relevant factors. The remainder (7,495 acre feet) is allocated to partially meet the base demand.
(2) The Unit Cost by Tier is the blended cost of the sources.

Having determined the unit cost of water supplies by consumption tier as shown in Table 16 above, the District then allocates the cost of conservation programs and supply reliability programs to the water budget tiers as described below:

Universal Conservation: Universal conservation costs are incurred to encourage customers to use water as efficiently as possible. Universal program costs are added to the commodity rate in the base, inefficient, and wasteful tiers. This cost is not included in the low volume rate since customers who remain in this usage tier do not need assistance to efficiently use water.

Targeted Conservation: Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage exceeds their water budgets. Therefore, these costs are added to the commodity rates of customers in the inefficient and wasteful tiers. Based on a historical estimate of customers who have been provided assistance in these programs, approximately 75% of the customers are in the wasteful tier with the remainder of customers being in the inefficient tier. Therefore, 75% of the targeted conservation costs are allocated to the wasteful tier with the remaining 25% of the costs being allocated to the inefficient tier.

NTS Costs: These costs are incurred by the District to deal with urban water runoff produced by customers whose usage exceeds their water budgets. These costs are added to the commodity rates of customers in the inefficient and wasteful tiers because their excessive water usage creates urban water runoff. The allocation is based on an estimate of the historic mix of urban runoff created by customers in the inefficient and wasteful tiers primarily from hosing down hardscape and excess irrigation running off the landscape into the storm drains. The District estimates 85% of NTS costs are created by customers in the wasteful tier because wasteful outdoor demand flows to NTS sites. The remaining 15% of urban runoff costs results from inefficient customers overwatering drought tolerant landscape.

Water Banking: Water banking costs are incurred to support the reliability of the District's water supplies. These costs are added to the commodity rates of customers in the wasteful tier because their excessive water usage creates the need for enhanced reliability of costly imported water supplies as previously discussed.

Table 17 shows the outcome of derivation of the unit costs for the District's conservation and supply reliability programs.

Table 17: FY 2021-22 Conservation and Supply Reliability Unit Costs ($/CCF)

Program	FY 2021-22 Revenue Requirement (1) (A)	FY 2021-22 Units of Demand (ccf) (2) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2021-22 Adjusted CCF B x C = (D)	Unit Cost Included in FY 2021-22 Commodity Rates A/B = (E)
Universal Conservation	$1,029,523	14,544,120	100%	14,544,120	$0.07
Water Banking					
Wasteful tier	$1,888,510	1,010,745	90%	909,671	$2.08
Targeted Conservation					
Inefficient tier (75%)	$1,329,825	1,240,762	90%	1,116,686	$1.19
Wasteful tier (25%)	$4,473,049	1,010,745	90%	909,671	$4.92
Natural Treatment System					
Inefficient tier (15%)	$681,697	1,240,762	90%	1,116,686	$0.61
Wasteful tier (85%)	$3,692,527	1,010,745	90%	909,671	$4.06

(1) From Table 14
(2) Units of Demand are based on the cumulative projected units of sale for the tiers. Universal Conservation includes the base, inefficient, and wasteful tiers.

Table 18 shows the FY 2021-22 commodity rates.

Table 18: FY 2021-22 Potable Water Commodity Rates ($/CCF)

Consumption Tier	Unit Cost of Water Supplies (1)	Unit Cost of Universal Conservation (2)	Unit Cost of Water Banking (2)	Unit Cost of Targeted Conservation (2)	Unit Cost of Natural Treatment System (2)	FY 2021-22 Commodity Rates	FY 2021-22 CCF	FY 2021-22 Revenue
T1: Low Volume	$1.48					$1.48	8,322,265	$12,316,952
T2: Base	$2.15	$0.07				$2.22	12,292,520	27,289,395
T3: Inefficient	$3.15	$0.07		$1.19	$0.61	$5.02	1,240,762	6,228,627
T4: Wasteful	$3.15	$0.07	$2.08	$4.92	$4.06	$14.28	1,010,745	14,433,441
Totals							**22,866,293**	**$ 60,268,416**

(1) From Table 16
(2) From Table 17. Water used in the low volume tier is efficient and universal conservation efforts are not necessary.

4.3.2. VARIABLE COST RECOVERY - AGRICULTURAL RATES

Allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. DRWF provides 51% of the source of supply at a cost of $1.48/CCF and imported water provides 13% at a cost of $3.15/CCF. The remaining 37% is the blended cost of the other sources at $2.33/CCF (Table 15). This results in a blended variable cost of $2.00/CCF. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $55,981. The fixed cost applied to the agricultural commodity rate adds $1.04 to the per CCF cost based on the estimated 53,725 CCF. Table 19 shows the calculation of FY 2021-22 agricultural rates.

Table 19: FY 2021-22 Agricultural Water Commodity Rates ($/CCF)

System	FY 2021-22 Revenue Rquirement	FY 2021-22 Projected Demand (CCF)	Variable Cost (CCF) (1)	Fixed Cost Component (CCF) (2)	FY 2021-22 Commodity Rates (1)+(2)	FY 2021-22 Revenue
Potable Water	$163,598	53,725	$2.00	$1.04	$3.05	$163,861

4.3.3. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGES

The District recovers fixed operating costs and replacement and enhancement capital costs through monthly meter service charges. On the District potable water system, the baseline meter size serving customers is 5/8". Thus, the first step in developing the monthly meter service charge is to estimate the total number of 5/8" meter equivalent connections (MEUs) on the potable water system in order to establish the unit cost for a 5/8" equivalent meter. Table 20 shows a summary of this calculation using the District's fixed costs and meter count data.

Table 20: FY 2021-22 Monthly Unit Cost of Serving a 5/8" Equivalent Meter

System	5/8" MEU (A)	Operating Costs (B)	Capital Costs (C)	Total Fixed Cost Revenue Requirement (1) B + C = (D)	Operating Costs per 5/8" MEU B/A = (E)	Capital Costs per 5/8" MEU C/A = (F)	Total Unit Cost per 5/8" MEU(2) E + F = (G)
Potable Water	260,219	$24,121,513	$9,599,245	$33,720,758	$7.73	$3.07	$10.80

(1) From Table 14
(2) Values prior to rounding

Having established the monthly fixed charge unit cost as being $10.80 per 5/8" meter equivalents, the final step in the process is to develop a schedule of monthly meter service charges for each meter size on the system. The cost per unit is rounded to the nearest $0.05. Table 21 presents this calculation.

Table 21: FY 2021-22 Monthly Meter Service Charges

Meter Size and Technology	Meter Flow Rate Equivalency Ratio	Number of Accounts	FY 2021-22 Rates (After Rounding)	FY 2021-22 Total MEUs	FY 2021-22 Revenue
5/8" Disc	1.0	67,478	$10.80	809,742	$8,745,214
3/4" Disc	1.5	12,017	$16.20	216,312	2,336,170
1" Disc	2.5	27,921	$27.00	837,636	9,046,469
1 1/2" Disc	6.0	4,074	$64.80	293,334	3,168,007
1 1/2" Single Jet	5.0	1	$54.00	66	713
2" Disc	8.0	5,485	$86.40	526,566	5,686,913
2" Single Jet	8.0	7	$86.40	678	7,322
2" Turbo	12.5	710	$135.00	106,506	1,150,265
3" Turbo	32.5	244	$351.00	95,166	1,027,793
4" Turbo	62.5	205	$675.00	153,756	1,660,565
4" Turbo Omni F-2	50.0	1	$540.00	606	6,545
6" Mag Meter	139.9	0	$1,510.38	6	65
6" Turbo	125.0	31	$1,350.00	46,506	502,265
6" Turbo Omni F-2	100.0	4	$1,080.00	4,806	51,905
8" Turbo	235.0	10	$2,538.00	28,206	304,625
8" Turbo Omni F-2	235.0	1	$2,538.00	2,826	30,521
Totals				**3,122,718**	**$ 33,725,354**

4.3.4. MONTHLY PRIVATE FIRELINE CHARGES

Private firelines provide water to sprinkler systems for fire suppression within private improvements such as buildings and other structures. The District, like many utilities, provides private fireline service to its customers.

Table 22 shows the calculation of the FY 2021-22 private fireline rates using the recommended approach. For a complete discussion of the calculation method for these rates, please see sections 4.3.4 in the 2021 COS study.

Table 22: Proposed FY 2021-22 Private Fireline Charges

Private Fireline Size	Number of Lines	Potential Demand Based on Pipe Diameter (1)	Customer Related Costs (2)	Private Fire O&M Peaking Costs (3)	Capital Cost Component (4)	FY 2021-22 Rates	FY 2021-22 Revenue
1"	42	1.00	$5.70	$0.16	$0.25	$6.10	$3,074
2"	1,045	6.19	$5.70	$0.99	$1.53	$8.20	$102,828.00
3"	31	17.98	$5.70	$2.89	$4.44	$13.00	$4,836.00
4"	1,018	38.32	$5.70	$6.15	$9.45	$21.30	$260,200.80
6"	1,173	111.31	$5.70	$17.87	$27.46	$51.00	$717,876.00
8"	1,059	237.21	$5.70	$38.07	$58.51	$102.30	$1,300,028.40
10"	127	426.58	$5.70	$68.47	$105.22	$179.40	$273,405.60
11"	1	548.10	$5.70	$87.97	$135.19	$228.85	$2,746.20
12"	5	689.04	$5.70	$110.60	$169.95	$286.25	$17,175.00
Total	**4,501**						**$ 2,682,170**
						Fire Flow Testing and Hydrant Revenue	$ 587,666
						Total Fireline Revenue	$3,269,837

(1) Potential demand based on the Hazen-Williams Equation which estimates flow based on factors such as pipe diameter, friction, and the velocity of flow.
(2) $8,281,871 customer related operating costs/121,057 bills = $5.70.
(3) $936,099 peaking costs/486,016 private fire demand units = $0.16. For pipe diameters > 1", $0.16 is increased by the potential demand based on pipe diameter (Hazen-Williams).
(4) $2.50 capital cost for a 1" meter equivalent X $3.07 capital cost per MEU x 3.2% allocation to private firelines = $0.25. For pipe diameters > 1", $0.25 is increased by potential pipe diameter (Hazen-Williams).

4.3.5. PUBLIC FIRE WATER SERVICE COSTS

There are two cost components associated with public fire water service: direct costs and indirect costs. The budgeted costs for FY 2021-22 are:

Direct costs	$ 523,000
Indirect costs	$2,490,000
Total Public Fire Water Service Costs	$3,013,000

Direct costs are associated primarily with maintenance of the fire hydrants. These include inspections, painting, and flushing of the hydrants. Flushing is an important maintenance activity that verifies the proper operation of the hydrant to ensure adequate water flow will be available when the need to extinguish a structure fire arises. Flushing also removes the sediment that naturally accumulates in the hydrant.

Indirect costs are the District's costs for design and sizing of the infrastructure to support the "fire flow" (volume and pressure of water) prescribed to meet peak firefighting water demand. The District's water system is designed to provide capacity to handle two defined hypothetical fires. Capacity is measured in terms of maximum hourly and maximum daily water flow. See Appendix 5 for a more detailed discussion on these costs.

5. Sewer Cost of Service FY 2021-22

See section 5 of the Cost of Service Report for a complete discussion on the District's sewer cost of service.

As is the case with its potable water, the District separates the components of its annual sewer revenue requirement from rates into three specific types of costs: variable operating costs, fixed operating costs, and replacement and enhancement costs. However, as described in Section 5.1.1 in the Cost of Service report, the rate structure used to recover these costs differs from that of potable water service.

5.3. FY 2021-22 SEWER REVENUE REQUIREMENT

The FY 2021-22 sewer revenue requirement was determined to be $56,606,301 (see tables 23 and 24 below). Of this amount, $17,218,437 (30.4%) is associated with variable costs that are incurred to treat sewage for discharge. These costs vary with the amount of water used by customers that returns to the District's sewage treatment facilities and are recovered through IRWD's commodity rates. The District separates operational expenses between sewage treatment and recycled production with tertiary treatment and similar processes included in the cost for recycled water. Table 23 shows the FY 2021-22 sewer variable cost revenue requirement.

Table 23: FY 2021-22 Sewer Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Variable Operating Costs	
Sewer Variable Operations Costs	$8,377,365
Variable Orange County Sanitation District Treatment Costs	4,176,800
General and Administrative Costs	3,610,980
Sewage Secondary Membrane Bio Reactor (MBR) Treatment Michelson	627,753
Biosolids Disposal Michelson	103,400
Sewage Tertiary Ultraviolet (UV) Treatment Michelson	449,073
Gross Variable Cost Revenue Requirement	**$ 17,345,371**
Revenue Requirement Offsets	
Other Direct Billing Revenue	126,934
Total Revenue Requirement Offsets	**$ 126,934**
Net Variable Revenue Requirement from Rates	**$ 17,218,437**

Fixed costs do not vary with the volume of water used by customers and returned to the District's wastewater treatment facilities. The fixed cost portion of the total FY 2021-22 revenue requirement was $ $39,387,864 (69.6%). Table 24 provides a detail of the FY 2021-22 sewer fixed cost revenue requirement.

Table 24: FY 2021-22 Sewer Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Sewer Fixed Operations	$8,739,298
General and Administrative Costs	2,730,383
Customer Service	2,526,524
Fleet	888,137
Building Maintenance	634,030
General Plant	756,643
Orange County Sanitation District Treatment Costs	24,284
Total Fixed Operating Costs	**$ 16,299,298**
Replacement and Enhancement Capital Costs	
Enhancement	$1,591,013
Replacement	21,787,920
Total Capital Costs	**$ 23,378,933**
Gross Fixed Cost Revenue Requirement	**$ 39,678,230**
Revenue Offsets	
Other Direct Billing Revenue	$290,366
Total Revenue Offsets	**$ 290,366**
Net Fixed Revenue Requirement from Rates	**$ 39,387,864**

5.3.1. SEWER COST RECOVERY (RATE DESIGN)

The District uses the average of the three lowest water meter readings during the twelve month period ending December 31 to adjust for monthly anomalies in a ratepayer's water use and seasonal variations. The consumption block breakpoints (table 26) are based on a review of historical data for average usage during cooler months (November through March from 2016 through 2020) because of the limited demand for landscape during winter months. The analysis identified the average usage for all multi-family units was 5 CCF which aligns with the first block. The second block includes average usage below 10 CCF as single family residential customers averaged 10 CCF during the same low usage months. The third block, which includes all commercial, industrial, and institutional (CII) customers, exceeds 10 CCF (The average usage for CII customers exceeds 10 CCF). Non-residential/CII customers with billed water consumption of more than 10 CCF per month pay an additional commodity rate ($/CCF). The Orange County Sanitation District's (OC San) Cost of Service study (December 2017) identified a flow factor, a percentage of metered water usage returning to the sewer system, of 90% for single family homes and non-residential customers (CII). Therefore, the District applies the additional charge on 90% of the billed water consumption for CII customers, consistent with the OC San study. See Table 25 in the Cost of Service Report to view the FY 2020-21 Sewer Rate Structure and Rates.

This rate structure is compliant with Proposition 218 because it provides a mechanism for recovering rate revenue from customers in a manner that is proportionate to the costs incurred by the District to provide service. It includes a fixed component for all three blocks that does not change. A variable component is included that is based on the historic average of estimated sewage flow by customers within each block.

Step 1: Determine the number of sewer customer accounts with usage in each consumption block as shown in Table 26.

Table 26: FY 2021-22 Sewer Customer Accounts by Consumption Block

Customer Class	Block 1	Block 2	Block 3	Total
Single Family Residence	27,721	25,006	13,611	66,339
Multi Family Residence	89,857	12,210	5,479	107,546
Commercial			6,239	6,239
Industrial			1,019	1,019
Public Authority			372	372
Total	**117,578**	**37,216**	**26,720**	**181,514**

Step 2: Estimate sewer volumes contributed by customer class as shown in Table 27.

Table 27: FY 2021-22 Contributed Sewage Volumes

Line No.	Metric	All Residential (Potable)	All Commercial, Industrial, Public Authority (Potable)	All Construction (Potable)
1	Number of Accounts	173,884	7,630	-
2	Projected Indoor Water Usage (ccf)	12,897,419	5,179,180	135,660
3	Return to Sewer Factor	72%	90%	2%
4	Annual Discharge (ccf) (Line 2*Line 3)	9,286,142	4,661,262	2,713
5	Annual Discharge (MG)	6,951	3,489	2

Step 3: Determine the fixed and variable unit cost of service as shown in Table 28.

Table 28: FY 2021-22 Sewer Unit Cost of Service

Metric	Fixed Costs	Variable Costs	Total
Operating Revenue Requirement	$16,299,298	$17,345,371	$33,644,669
Capital Revenue Requirement	23,378,933		23,378,933
Revenue Offset			
Miscellaneous Revenue	215,078	94,022	309,100
Other Direct Billing Revenue	75,288	32,912	108,200
Revenue Requirement (Table 23 and 24)	**$ 39,387,864**	**$ 17,218,437**	**$ 56,606,301**
Discharge (Table 27)		13,950,116	
		ccf of sewer flow	
Unit Cost		$1.23	
		per ccf	

Step 4: Determine the average and total discharges in each fixed tier as shown in Table 29.

Table 29: FY 2021-22 Sewer Discharges by Fixed Consumption Block

Sewer Fixed Charge Tiers	Average Monthly Discarges (ccf) (A)	Number of Accounts (B)	Annual Avg Discharges (ccf) A x B x 12= (C)
Block 1: Average Water Usage < 5 ccf per month	3.2	117,578	4,514,997
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	37,216	3,126,143
Block 3: Average Water Usage > 10 ccf per month	10.0	26,720	3,206,436
Total		**181,514**	**10,847,576**

Step 5: Determine the allocation of fixed and variable sewer costs as shown in Table 30.

Table 30: FY 2021-22 Allocation of Sewer Fixed and Variable Costs

Fixed Allocation	Discharge	Allocation	Cost Allocation	Unit Costs
Operating Costs Allocated to Fixed Charge (from Table 29)	10,847,576	78%	12,581,543	$5.78 per account
Capital Allocated to Fixed Charge		100%	23,207,845	$10.65 per account
Total Fixed Charge per Customer				$16.43 per account
Operating Costs Allocated to Discharge >10 ccf	3,102,540	22%	3,598,476	$1.16 per ccf
Capital Allocated to Discharge >10 ccf				
Total (from Table 27)	13,950,116	100%	39,387,864	
Variable Allocation	Discharge	Cost Allocation	Rate	
Discharge Block Rate – Allocated to Block Rates	**13,950,116**	**17,218,437**	**$1.23**	**per ccf**

Step 6: Calculate the sewer rates based on the allocation of fixed and variable costs shown in Table 30 above. Table 31 shows this outcome.

Table 31: FY 2021-22 Proposed Sewer Rates

Sewer Fixed Charge Tiers	Avg Monthly CCF' Discharged	Variable Cost (1)	Fixed Cost (2)	FY 2021-22 Monthly Rates (4)	FY 2021-22 Accounts (12 Months)	FY 2021-22 Revenue
Block 1: Average Water Usage < 5 ccf per month	3.2	$3.95	$16.43	$20.40	1,410,937	$28,783,109
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	$8.64	$16.43	$25.05	446,592	11,187,126
Block 3: Average Water Usage > 10 ccf per month	10.0	$12.34	$16.43	$28.75	322,934	9,284,365
Totals					**2,180,463**	**$49,254,600**
Variable Rates per ccf	**Discharge**	**Variable Rate (3)**	**Fixed Charge (3)**	**Proposed Rate per CCF**	**FY 2022-23 Discharge CCF**	**FY 2022-23 Revenue**
Discharge >10 ccf	3,102,540	$1.23	$1.16	$2.39	3,102,540	$7,415,069

(1) $1.23 From Table 29 * average monthly CCF discharged
(2) Total fixed charge per customer from Table 30
(3) From Table 30
(4) Variable cost plus fixed cost rounded to nearest $0.05

6. RECYCLED WATER COST OF SERVICE

See section 6 of the COS Report for a complete discussion on the District's recycled water cost of service.

The method used by the District to develop recycled water rates is similar to that of potable water service (see Section 2 of this report) with one significant difference. The District does not calculate unique monthly meter service charges for recycled water. Instead, the monthly service charges for recycled water are set to the same as those charged for the potable water monthly meter service charge (see Table 21 in section 4.3.3). The District takes this approach due to an imbalance between variable and fixed costs in the overall recycled water revenue requirement. This reallocation of fixed costs to variable revenue recovery through commodity rates is discussed in Section 6.1. below.

6.1. FY 2021-22 RECYCLED WATER REVENUE REQUIREMENT

The District's recycled water revenue requirement from rates is $30,369,097. Prior to any adjustments, the composition of this revenue requirement is variable costs of $14,197,792 (48.8%) and fixed costs of $14,888,855 (51.2%). The District established the monthly fixed charge unit cost as being $10.80 per 5/8" meter equivalents in the potable process (see Table 21 in section 4.3.3). Due to the high percentage of fixed costs identified in the recycled water revenue requirement, the District reallocates a portion of fixed costs not recovered by monthly meter service charges ($7,129,311) into the variable cost revenue requirement. These costs are included in the recycled system and recycled revenue provides the funding which is consistent with Proposition 218 requirements. This strategy provides a fair and equitable application of these costs without deterring usage.

Tables 34 and 35 detail the FY 2021-22 variable and fixed recycled water revenue requirement before and after this reallocation.

Table 34: FY 2021-22 Recycled Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Untreated Water Purchases	$2,910,862
Recycled Water Tertiary Treatment	4,270,209
El Toro Remediation Principal Aquifer Plant	2,574,203
Recycled Water Tertiary Treatment Pumping Michelson	1,978,801
El Toro Remediation Shallow Groundwater	683,560
Recycled Water Tertiary Membrane Bio Reactor (MBR) Treatment Michelson	1,042,799
Sewage Secondary Membrane Bio Reactor (MBR) Treatment Michelson	354,642
Sewage Tertiary Ultraviolet (UV) Treatment Michelson	251,820
Recycled Water Tertiary Ultraviolet (UV) Disinfection Treatment Michelson	130,895
Total Cost of Water Supplies	**$ 14,197,792**
Conservation Programs	
Natural Treatment System	1,306,587
Universal Conservation	492,177
Targeted Conservation	241,786
Total Conservation and Supply Reliability Costs	**$ 2,040,550**
Total Variable Cost Revenue Requirement Before Adjustment	**$ 16,238,343**
Adjustment to Reflect Reallocated Fixed Costs	$7,129,311
Total Variable Cost Revenue Requirement After Adjustment	**$ 23,367,653**

Table 35: FY 2021-22 Recycled Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Recycled Water System Maintenance	$7,625,911
Recycled Water Mitigation Monitoring	13,000
General and Administrative	2,696,796
Customer Service	2,021,219
Recycled Water Site Inspection and Testing-Field	449,100
Building Maintenance	507,224
Fleet	61,251
General Plant	208,206
Recycled Water Site Inspection and Testing-Office	59,900
Total Fixed Operating Costs	**$ 13,642,606**
Replacement and Enhancement Capital Costs	
Replacement	$880,341
Enhancement	365,908
Total Capital Costs	**1,246,249**
Gross Fixed Cost Revenue Requirement	**$ 14,888,855**
Revenue Requirement Offsets	
Pumping	120,000
Miscellaneous Revenues	638,100
Total Revenue Requirement Offsets	**$ 758,100**
Total Fixed Cost Revenue Requirement Before Adjustment	**$ 14,130,755**
Adjustment to Reflect Reallocated Fixed Costs	**($ 7,129,311)**
Net Fixed Revenue Requirement from Rates After Adjustment	**$ 7,001,444**

6.1.3. VARIABLE COST RECOVERY - COMMODITY RATES

The method used to determine recycled water commodity rates is similar to that used for potable water. In FY 2021-22, the District's projected total recycled water demand was 29,730 acre feet based on historical demand, customer growth factors and other relevant factors. Table 36 provides a detail of the FY 2021-22 unit cost of water supplies ($/CCF) from each supply source using the District's cost and demand data. Note that the net cost shown in each column includes the reallocation of fixed costs of $7,129,311 discussed above.

Table 36: Unit Cost of FY 2021-22 Recycled Water Supplies

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported	Total
Net Cost	$12,060,950	$4,893,624	$4,372,529	$21,327,103
Acre Feet	22,890	3,540	3,300	29,730
Unit Cost per ccf (1)	$1.21	$3.17	$3.04	

(1) Acre feet is multiplied by 435.6 to convert to CCF.

The District allocates the lower cost water supplies to the low volume and base consumption tiers with higher cost water supplies being allocated to the inefficient and wasteful tiers. Table 37 details this allocation for FY 2021-22 using cost and demand data provided by the District.

The general formula used to determine the water budget for a landscape customer served by a recycled water connection is discussed in detail in 4.1.5. in the Cost of Service report.

Table 37: Allocation of Recycled Water Supplies to Consumption Tiers for Landscape Customers

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported	Total Acre Feet	Unit Cost per $ /ccf by Tier (1)
Unit Cost (Table 36)	$1.21	$3.17	$3.04		
T1: Low Volume	13,769	-	-	13,769	$1.21
T2: Base	9,121	3,540	1,053	13,714	$1.86
T3: Inefficient	-	-	1,342	1,342	$3.04
T4: Wasteful	-	-	905	905	$3.04
Total	22,890	3,540	3,300	29,730	

(1) The Unit Cost per $/CCF by TIER is the blended cost of the sources.

Having determined the unit cost of recycled water supplies by consumption tier for landscape customers as shown in Table 37 above, the District then allocates the cost of conservation programs, as shown in table 34, to the appropriate water budget tiers.

Universal conservation costs are added to the commodity rate in the base, inefficient, and wasteful tiers to pay for conservation program costs that help customers in each of these tiers achieve efficient use of recycled water. This cost is not included in the low volume rate since customers who remain in this usage tier do not need assistance to efficiently use water.

Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage reaches the wasteful tier. Costs are allocated to the wasteful tier based on expected usage.

Natural treatment system costs are incurred by the District to deal with urban water runoff produced by customers whose usage exceed their water budgets. The costs include prevention, control and treatment of the runoff of water from irrigation and other uses. These costs are added to the commodity rates of customers in the inefficient and wasteful tiers. Costs are allocated based on the expected usage in each tier.

Table 38 shows the outcome of derivation of the unit costs for the District's conservation programs.

Table 38: FY 2021-22 Conservation Program Unit Costs ($/CCF)

Program	FY 2021-22 Revenue Requirement (A)*	FY 2021-22 Units of Demand (ccf) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2021-22 Adjusted Units of Demand B x C = (D)	Unit Cost Included in FY 2021-22 Commodity Rates A/D = (E)
Universal Conservation	$492,177	6,952,971	100%	6,952,971	$0.07
Targeted Conservation					
Wasteful tier	$241,786	394,297	90%	354,868	$0.68
Natural Treatment System					
Inefficient tier	$227,232	584,675	90%	526,208	$0.43
Wasteful tier	$1,079,354	394,297	90%	354,868	$3.04

*See Table 34

Having determined the unit cost of recycled water supplies by consumption tier as shown in Table 37 and the unit cost of conservation program cost in Table 38, the District must then allocate the cost of conservation programs to each consumption tier. Table 39 shows the outcome of this process using the District's cost and demand data.

Table 39: FY 2021-22 Recycled Water Commodity Rates ($/CCF)

Consumption Tier	Unit Cost of Water Supplies (Table 37)	Unit Cost of Universal Conservation (Table 38)	Unit Cost of Targeted Conservation (Table 38)	Unit Cost of Natural Treatment System (Table 38)	FY 2021-22 Commodity Rates	FY 2021-22 CCF	FY 2021-22 Revenue
T1: Low Volume	$1.21				$1.21	5,997,595	$7,257,090
T2: Base	$1.86	$0.07			$1.93	5,973,998	11,529,816
T3: Inefficient	$3.04	$0.07		$0.43	$3.54	584,675	2,069,750
T4: Wasteful	$3.04	$0.07	$0.68	$3.04	$6.83	394,297	2,693,050
Totals						**12,950,566**	**$ 23,549,707**

6.1.4. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGE

Recycled water fixed charges are the same as potable water fixed charges (see Table 21 in Section 4.3.3).

6.1.5. VARIABLE COST RECOVERY – RECYCLED WATER AGRICULTURAL RATES

As discussed in section 4.3.2, allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used and these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. It is assumed that produced water provides 77% of the source of supply, 12% is the cost of processed water, and imported water provides 11%. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $9,961. A portion of the fixed cost is included in the variable rate component as described in section 6.1.3. An additional fixed cost of $0.01 per CCF is, which is not recovered through the commodity rate, is applied based on an estimated 1,300,894 CCF. Table 40 shows the calculation of FY 2021-22 recycled water agricultural rates.

Table 40: FY 2021-22 Recycled Water Agricultural Water Commodity Rates ($/CCF)

Customer Class	FY 2021-22 Revenue Rquirement	FY 2021-22 Projected Demand (CCF)	Variable Cost (CCF) (1)	Fixed Component Cost (CCF) (2)	FY 2021-22 Commodity Rates (1)+(2)	FY 2021-22 Revenue
Agricultural	$2,159,484	1,300,894	$1.65	$0.01	$1.66	$2,159,484

8. Untreated Water Cost of Service FY 2021-22

8.1. UNTREATED WATER COMMODITY RATE

The FY 2021-22 variable revenue requirement for untreated water was determined to be $135,650. The source of this water comes from the Santiago Aqueduct Commission (SAC) and this is the cost incurred to acquire water supplies (See Table 13). Table 41 shows the calculation of the variable rate for untreated water

Table 41: FY 2021-22 Untreated Water Commodity Rate ($/CCF)

Consumption Tier	FY 2021-22 Revenue Rquirement	FY 2021-22 SAC Purchases (AF)	Variable Cost (AF)	Variable Cost (CCF) (1)	FY 2021-22 Commodity Rates
Untreated Water	$135,650	175	$775	$1.78	$1.78

(1) Acre feet is multiplied by 435.6 to convert to CCF

8.1.0. UNTREATED WATER AGRICULTURAL COMMODITY RATE

The fixed cost revenue requirement for all untreated water uses was determined to be $375,010 for FY 2021-22. These include capacity, readiness to serve, and meter costs that do not vary based upon the amount of water used. The untreated agricultural rate includes a fixed charge component that is based upon an allocated portion of the untreated water costs for all untreated imported water uses. This includes untreated water supplies used by the Baker Treatment Plant (7,200 AF), the Recycled System (1,479 AF), and water sold directly to customers (187 AF). The total projected demand for these customers is 8,666. Table 42 shows the calculation of the rate included for fixed costs for untreated agricultural customers.

Table 42: FY 2021-22 Untreated Water Agricultural Commodity Rates ($/CCF)

FY 2021-22 Revenue Requirement	FY 2021-22 Projected Demand (AF)	FY 2021-22 Projected Demand (CCF)(1)	Fixed Cost Component (CCF)
$375,010	8,866	3,862,030	$0.10

(1) Acre feet is multiplied by 435.6 to convert to CCF

Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. As discussed in section 4.3.2, allocated fixed and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. The untreated water agricultural rate is calculated by combining the variable cost shown in Table 41 and the fixed cost component as shown in Table 42.

Table 43: FY 2021-22 Untreated Water Agricultural Commodity Rates ($/CCF)

Consumption Tier	Variable Cost (CCF)	Fixed Cost Component (CCF)	FY 2021-22 Commodity Rates
Untreated Water	$1.78	$0.10	$1.88

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2021-22 and FY 2022-23.

The IRWD Board of Directors adopted a two year operating budget for FY 2021-22 and 2022-23 on April 26, 2021. Generally, rates are adopted and implemented to cover operating costs for each FY adopted budget. Rate increases for the full year FY 2021-22 were not implemented as the Board elected to defer rate increases part of the year due to continued customer hardships resulting from COVID-19. It is anticipated that the Board will adopt rate increases covering operating costs for both fiscal years (FY 2021-22 and FY 2022-23) in January 2022.

Appendix 2 provides the support for the development of rates to cover operating costs for FY 2021-22 assuming the Board had elected to implement new rates for the full FY 2021-22. Appendix 3 provides the support for the development of rates to cover operating costs for the full FY 2022-23.

As discussed above, rates increases were deferred for part of the FY 2021-22 and it is anticipated that the Board will adopt rate increases covering operating costs for both fiscal years (FY 2021-22 and FY 2022-23) in January 2022. Rate increases would be reflected on customer bills beginning March 1, 2022. Rates were developed to recover budgeted operating costs for both fiscal years over the remaining 16 month period (March 2022-June 30,2023). The support for the development of these rates is shown in Appendix 4 and provides the basis for the January 2022 recommended rate increases. The proposed rates in Appendix 4 are anticipated to generate sufficient revenues to recover operating costs for both fiscal years over the 16 month period.

The tables are updated with the details from the FY 2022-23 operating budget. The methodology and assumptions from the 2021 Cost of Service (COS) study remain the same and the tables included in this appendix use the same numbering scheme as those in the 2021 COS.

The District anticipates resuming the normal two-year rate cycle consistent with the adoption of the two-year budget for FY 2023-24 and FY 2024-25.

Potable Water Cost of Service FY 2022-23

See section 4 of the Cost of Service Report for a complete discussion on the District's potable water cost of service.

The FY 2022-23 water revenue requirement was determined to be $97,735,041 (see sum of tables 13 and 14 below). Of this amount, $61,757,366 (63.6%) is associated with variable costs that are incurred to acquire and treat potable water supplies. These costs vary with the amount of water used by customers and are recovered through commodity rates. Note that the variable cost revenue requirement includes $13,247,579 in costs for universal conservation, targeted conservation, water banking operations, and the District's natural treatment system used to control runoff from customers who use water in the inefficient and wasteful tiers. Table 13 provides detail of the FY 2022-23 variable revenue requirement.

4.3. FY 2022-23 POTABLE WATER REVENUE REQUIREMENT

Table 13: FY 2022-23 Potable Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Dyer Road Wellfield	$19,749,097
Baker Treatment Facilities	13,300,182
Imported Water Purchases Irvine Ranch	9,747,936
Deep Aquifer Treatment System	7,050,071
Irvine Desalter Domestic	4,011,380
Wells 21 & 22 Desalter Treatment Plant	2,749,193
Irvine Desalter Plant W115	643,642
Orange Park Acres Well 1	70,463
Total Gross Potable Water Supply Costs	**$ 57,321,964**
Revenue Requirement Offsets to Water Supply Costs	
Revenue from Partners	$4,886,177
Revenue from Sinking Fund	1,700,000
Revenue from Water Banking Operations	2,226,000
Total Revenue Requirement Offsets	**$ 8,812,177**
Net Revenue Requirement for Water Supply Costs	**$ 48,509,787**
Conservation and Supply Reliability	
Targeted Conservation	$5,758,028
Natural Treatment System	4,483,176
Water Banking	1,907,266
Universal Conservation	1,099,109
Total Conservation and Supply Reliability Costs	**$ 13,247,579**
Net Potable Variable Cost Revenue Requirement	**$ 61,757,366**
Untreated Water Supplies	
Untreated Water Purchases	($630,034)
Santiago Aqueduct Commission	139,850
Untreated Water System Maintenance	236,679
Irvine Lake	130,824
Native Water	690,000
Net Untreated Water Variable Cost Revenue Requirement	**$ 567,319**

Fixed costs do not vary with the volume of water by customers. The fixed cost portion of the total FY 2022-23 revenue requirement was $35,410,355 (36.4%) as shown in Table 14. Of these fixed costs, $10,566,505 were associated with expenditures for replacement and enhancement capital costs that do not increase the capacity of the water utility system to serve new customer demand growth. Table 14 provides a detail of the FY 2022-23 fixed revenue requirement.

Table 14: FY 2022-23 Potable Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Amount
Fixed Operating Costs	
Domestic Water System Maintenance	$15,893,142
General and Administrative Expenses	7,091,446
Customer Service	4,819,307
Fleet	1,377,451
General Plant	756,030
Building Maintenance	1,181,555
Water System Mitigation Monitoring	10,200
Total Fixed Operating Costs	**$31,129,130**
Replacement and Enhancement Capital Costs	
Replacement	$8,218,135
Enhancement	2,348,370
Total Capital Costs	**$10,566,505**
Gross Fixed Cost Revenue Requirement	**$41,695,635**
Revenue Requirement Offsets	
Fireline Revenues	$3,565,690
Miscellaneous Revenue	1,645,589
Pumping Surcharge Revenue	1,074,000
Total Revenue Requirement Offsets	**$6,285,279**
Net Fixed Cost Revenue Requirement from Rates	**$35,410,355**

4.3.1. VARIABLE COST RECOVERY – COMMODITY RATES

The District recovers water supply costs through commodity rates with the lowest cost water supplies being recovered in the low volume and base consumption tiers and the highest cost water supplies being recovered in the inefficient and wasteful tiers. The District's method for recovering variable costs is compliant with Proposition 218 because of the direct linkage between the revenue recovered in each tier to the costs incurred to provide service to customers with demand in each consumption tier.

The District also recovers the cost of water conservation and water supply reliability programs through its commodity rates with targeted costs being allocated to customers with consumption in the inefficient and wasteful tiers. This approach is reasonable because customers who exceed their monthly water budget allocation impose higher costs on the District. Thus, the commodity rates charged in these two upper tiers are designed to not only recover the cost of more expensive water supplies, but also the additional costs of:

- Targeted conservation programs designed to reduce excessive use.
- Water banking operational costs to enhance water supply reliability.
- Rebates for long-term improvements in customer water use efficiency.
- Urban runoff source control programs referred to as the NTS, which treats runoff from customers who use water in the inefficient and wasteful tiers.

In FY 2022-23, the District's projected total water demand of 53,294 acre feet was based on historical averages by tier, adjusted for customer account growth and other relevant factors. This reflects a 1.5% increase over the 52,494 acre feet of water demand projected in FY 2021-22. Table 15 details the FY 2022-23 unit cost of water supplies ($/ccf) from each supply source as determined using cost and demand data provided by the District.

Table 15: Unit Cost of FY 2022-23 Water Supplies

Metric	Dyer Road Wellfield	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Total Cost and Acre Feet
Net Cost (1)	$17,812,921	$5,897,526	$8,414,006	$4,092,737	$2,474,199	$9,818,399	$0	$48,509,787
Demand in Acre Feet (net)	26,600	7,498	6,750	3,658	1,789	6,999	-	53,294
CCF (2)	11,586,960	3,266,129	2,940,300	1,593,425	779,288	3,048,764	-	
Unit Cost per ccf (1) divided by (2)	$1.54	$1.81	$2.86	$2.57	$3.17	$3.22		

(1) From Table 14
(2) Acre feet is multiplied by 435.6 to convert to CCF

The District allocates the water supply in the order of cost for each source. The higher cost water supplies are appropriately allocated to the inefficient and wasteful tiers. Table 16 details this allocation for FY 2022-23 using cost and demand data provided by the District.

Table 16: Allocation of Potable Water Supplies to Consumption Tiers for Unit Costs

Metric	Dyer Road Wellfield (1)	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Total Acre Feet	Unit Cost by Tier ($ /ccf) (2)
Unit Cost	$1.54	$1.81	$2.86	$2.57	$3.17	$3.22	$0.00		
T1: Low Volume	19,394	-	-	-	-	-	-	19,394	$1.54
T2: Base	7,206	7,498	6,750	3,658	1,789	1,749	-	28,650	$2.26
T3: Inefficient	-	-	-	-	-	2,893	-	2,893	$3.22
T4: Wasteful	-	-	-	-	-	2,357	-	2,357	$3.22

(1) 19,394 acre feet are used to meet projected low volume demand estimated based on historic demand as adjusted for customer account growth and other relevant factors. The remainder (7,206 acre feet) is allocated to partially meet the base demand.
(2) The Unit Cost by Tier is the blended cost of the sources.

Having determined the unit cost of water supplies by consumption tier as shown in Table 16 above, the District then allocates the cost of conservation programs and supply reliability programs to the water budget tiers as described below:

Universal Conservation: Universal conservation costs are incurred to encourage customers to use water as efficiently as possible. Universal program costs are added to the commodity rate in the base, inefficient, and wasteful tiers. This cost is not included in the low volume rate since customers who remain in this usage tier do not need assistance to efficiently use water.

Targeted Conservation: Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage exceeds their water budgets. Therefore, these costs are added to the commodity rates of customers in the inefficient and wasteful tiers. Based on a historical estimate of customers who have been provided assistance in these programs, approximately 75% of the customers are in the wasteful tier with the remainder of customers being in the inefficient tier. Therefore, 75% of the targeted conservation costs are allocated to the wasteful tier with the remaining 25% of the costs being allocated to the inefficient tier.

NTS Costs: These costs are incurred by the District to deal with urban water runoff produced by customers whose usage exceeds their water budgets. These costs are added to the commodity rates of customers in the inefficient and wasteful tiers because their excessive water usage creates urban water runoff. The allocation is based on an estimate of the historic mix of urban runoff created by customers in the inefficient and wasteful tiers primarily from hosing down hardscape and excess irrigation running off the landscape into the storm drains. The District estimates 85% of NTS costs are created by customers in the wasteful tier because wasteful outdoor demand flows to NTS sites. The remaining 15% of urban runoff costs results from inefficient customers overwatering drought tolerant landscape.

Water Banking: Water banking costs are incurred to support the reliability of the District's water supplies. These costs are added to the commodity rates of customers in the wasteful tier because their excessive water usage creates the need for enhanced reliability of costly imported water supplies as previously discussed.

Table 17 shows the outcome of derivation of the unit costs for the District's conservation and supply reliability programs.

Table 17: FY 2022-23 Conservation and Supply Reliability Unit Costs ($/ccf)

Program	FY 2022-23 Revenue Requirement (1) (A)	FY 2022-23 Units of Demand (ccf) (2) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2022-23 Adjusted CCF B x C = (D)	Unit Cost Included in FY 2022-23 Commodity Rates A/B = (E)
Universal Conservation	$1,099,109	14,766,881	100%	14,766,881	$0.07
Water Banking					
Wasteful tier	$1,907,266	1,026,600	90%	923,940	$2.06
Targeted Conservation					
Inefficient tier (75%)	$1,319,548	1,260,225	90%	1,134,203	$1.16
Wasteful tier (25%)	$4,438,480	1,026,600	90%	923,940	$4.80
Natural Treatment System					
Inefficient tier (15%)	$698,677	1,260,225	90%	1,134,203	$0.62
Wasteful tier (85%)	$3,784,500	1,026,600	90%	923,940	$4.10

(1) From Table 14
(2) FY 2022-23 Units of Demand are based on the cumulative projected units of sale for the tiers. Universal Conservation includes the base, inefficient, and wasteful tiers.

Table 18 shows the FY 2022-23 commodity rates.

Table 18: FY 2022-23 Potable Water Commodity Rates ($/ccf)

Consumption Tier	Unit Cost of Water Supplies (1)	Unit Cost of Universal Conservation (2)	Unit Cost of Water Banking (2)	Unit Cost of Targeted Conservation (2)	Unit Cost of Natural Treatment System (2)	FY 2022-23 Commodity Rates	FY 2022-23 CCF	FY 2022-23 Revenue
T1: Low Volume	$1.54					$1.54	8,447,959	$13,009,857
T2: Base	$2.26	$0.07				$2.33	12,480,055	29,078,529
T3: Inefficient	$3.22	$0.07		$1.16	$0.62	$5.07	1,260,225	6,389,342
T4: Wasteful	$3.22	$0.07	$2.06	$4.80	$4.10	$14.25	1,026,600	14,629,050
Totals							**23,214,840**	**$ 63,106,779**

(1) From Table 16
(2) From Table 17. Water used in the low volume tier is efficient and universal conservation efforts are not necessary.

4.3.2. VARIABLE COST RECOVERY - AGRICULTURAL RATES

Allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. DRWF provides 51% of the source of supply at a cost of $1.54/ccf and imported water provides 13% at a cost of $3.22/ccf. The remaining 37% is the blended cost of the other sources at $2.48/ccf (Table 15). This results in a blended variable cost of $2.05/ccf. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $59,018. The fixed cost applied to the agricultural commodity rate adds $1.08 to the per ccf cost based on the estimated 54,568 ccf's. Table 19 shows the calculation of FY 2022-23 agricultural rates.

Table 19: FY 2022-23 Agricultural Water Commodity Rates ($/ccf)

System	FY 2022-23 Revenue Rquirement	FY 2022-23 Projected Demand (CCF)	Variable Cost (CCF)	Fixed Component Cost (CCF)	FY 2022-23 Commodity Rates	FY 2022-23 Revenue
Potable Water	$171,698	54,568	$2.05	$1.08	$3.13	$170,967

4.3.3. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGES

The District recovers fixed operating costs and replacement and enhancement capital costs through monthly meter service charges. On the District potable water system, the baseline meter size serving customers is 5/8". Thus, the first step in developing the monthly meter service charge is to estimate the total number of 5/8" meter equivalent connections (MEUs) on the potable water system in order to establish the unit cost for a 5/8" equivalent meter. Table 20 shows a summary of this calculation using the District's fixed costs and meter count data.

Table 20: FY 2022-23 Monthly Unit Cost of Serving a 5/8" Equivalent Meter

System	5/8" MEU (A)	Operating Costs (B)	Capital Costs (C)	Total Fixed Cost Revenue Requirement (1) B + C = (D)	Operating Costs per 5/8" MEU B/A = (E)	Capital Costs per 5/8" MEU C/A = (F)	Total Unit Cost per 5/8" MEU ((2) E + F = (G)
Potable Water	262,797	$24,843,851	$10,566,505	$35,410,355	$7.88	$3.35	$11.23

(1) From Table 14
(2) Values prior to rounding

Having established the monthly fixed charge unit cost as being $11.23 per 5/8" meter equivalents, the final step in the process is to develop a schedule of monthly meter service charges for each meter size on the system. The cost per unit is rounded to the nearest $0.05 to $11.25. Table 21 presents this calculation.

Table 21: FY 2022-23 Monthly Meter Service Charges

Meter Size and Technology	Meter Flow Rate Equivalency Ratio	Number of Accounts	FY 2022-23 Rates (After Rounding)	FY 2022-23 Total MEUs	FY 2022-23 Revenue
5/8" Disc	1.0	70,542	$11.25	846,468	$9,522,765
3/4" Disc	1.5	12,577	$16.88	226,386	2,546,843
1" Disc	2.5	30,001	$28.13	900,030	10,125,338
1 1/2" Disc	6.0	4,195	$67.50	302,040	3,397,950
1 1/2" Single Jet	5.0	1	$56.25	60	675
2" Disc	8.0	5,735	$90.00	550,560	6,193,800
2" Single Jet	8.0	8	$90.00	768	8,640
2" Turbo	12.5	720	$140.63	108,000	1,215,000
3" Turbo	32.5	249	$365.63	97,110	1,092,488
4" Turbo	62.5	209	$703.13	156,750	1,763,438
4" Turbo Omni F-2	50.0	1	$562.50	600	6,750
6" Mag Meter	139.9	0	$1,573.31	0	0
6" Turbo	125.0	32	$1,406.25	48,000	540,000
6" Turbo Omni F-2	100.0	5	$1,125.00	6,000	67,500
8" Turbo	235.0	11	$2,643.75	31,020	348,975
8" Turbo Omni F-2	235.0	1	$2,643.75	2,820	31,725
Totals				**3,276,612**	**$ 36,861,885**

4.3.4. MONTHLY PRIVATE FIRELINE CHARGES

Private firelines provide water to sprinkler systems for fire suppression within private improvements such as buildings and other structures. The District, like many utilities, provides private fireline service to its customers.

Table 22 shows the calculation of the FY 2022-23 private fireline rates using the recommended approach. For a complete discussion of the calculation method for these rates, please see sections 4.3.4 in the 2021 COS study.

Table 22: Proposed FY 2022-23 Private Fireline Charges

Private Fireline Size	Number of Lines	Potential Demand Based on Pipe Diameter (1)	Customer Related Costs (2)	Private Fire O&M Peaking Costs (3)	Capital Cost Component (4)	FY 2022-23 Rates	FY 2022-23 Revenue
1"	43	1.00	$5.84	$0.16	$0.28	$6.30	$3,251
2"	1,066	6.19	$5.84	$1.01	$1.75	$8.60	$110,011.20
3"	32	17.98	$5.84	$2.94	$5.09	$13.85	$5,318.40
4"	1,038	38.32	$5.84	$6.27	$10.84	$22.95	$285,865.20
6"	1,196	111.31	$5.84	$18.20	$31.49	$55.55	$797,253.60
8"	1,080	237.21	$5.84	$38.80	$67.12	$111.75	$1,448,280.00
10"	130	426.58	$5.84	$69.77	$120.70	$196.30	$306,228.00
11"	1	548.10	$5.84	$89.64	$155.08	$250.55	$3,006.60
12"	5	689.04	$5.84	$112.69	$194.96	$313.50	$18,810.00
Total	**4,591**						**$ 2,978,024**
						Fire Flow Testing and Hydrant Revenue	$ 587,666
						Total Fireline Revenue	$3,565,690

(1) Potential demand based on the Hazen-Williams Equation which estimates flow based on factors such as pipe diameter, friction, and the velocity of flow.
(2) $8,659,922 customer related operating costs/123,478 bills = $5.84.
(3) $972,965 peaking costs/495,752 private fire demand units = $0.16. For pipe diameters > 1", $0.16 is increased by the potential demand based on pipe diameter (Hazen-Williams).
(4) $2.50 capital cost for a 1" meter equivalent X $3.35 capital cost per MEU x 3.2% allocation to private firelines = $0.28. For pipe diameters > 1", $0.28 is increased by potential pipe diameter (Hazen-Williams).

4.3.5. PUBLIC FIRE WATER SERVICE COSTS

There are two cost components associated with public fire water service: direct costs and indirect costs. The budgeted costs for FY 2022-23 are:

Direct costs	$ 541,000
Indirect costs	$2,532,000
Total Public Fire Hydrant Water Service Costs	$3,073,000

Direct costs are associated primarily with maintenance of the fire hydrants. These include inspections, painting, and flushing of the hydrants. Flushing is an important maintenance activity that verifies the proper operation of the hydrant to ensure adequate water flow will be available when the need to extinguish a structure fire arises. Flushing also removes the sediment that naturally accumulates in the hydrant.

Indirect costs are the District's costs for design and sizing of the infrastructure to support the "fire flow" (volume and pressure of water) prescribed to meet peak firefighting water demand. The District's water system is designed to provide capacity to handle two defined hypothetical fires. Capacity is measured in terms of maximum hourly and maximum daily water flow. See Appendix 6 for a more detailed discussion on these costs.

5. Sewer Cost of Service FY 2022-23

See section 5 of the Cost of Service Report for a complete discussion on the District's sewer cost of service.

As is the case with its potable water, the District separates the components of its annual sewer revenue requirement from rates into three specific types of costs: variable operating costs, fixed operating costs, and replacement and enhancement costs. However, as described in Section 5.1.1 in the Cost of Service report, the rate structure used to recover these costs differs from that of potable water service.

5.3. FY 2022-23 SEWER REVENUE REQUIREMENT

The FY 2022-23 sewer revenue requirement was determined to be $59,257,026 (see tables 23 and 24 below). Of this amount, $17,464,289 (30.9%) is associated with variable costs that are incurred to treat sewage for discharge. These costs vary with the amount of water used by customers that returns to the District's sewage treatment facilities and are recovered through IRWD's commodity rates. The District separates operational expenses between sewage treatment and recycled production with tertiary treatment and similar processes included in the cost for recycled water. Table 23 shows the FY 2022-23 sewer variable cost revenue requirement.

Table 23: FY 2022-23 Sewer Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Variable Operating Costs	
Sewer Variable Operations Costs	$8,438,558
Variable Orange County Sanitation District Treatment Costs	4,181,600
General and Administrative Costs	3,735,999
Sewage Secondary Membrane Bio Reactor (MBR) Treatment Michelson	650,388
Biosolids Disposal Michelson	117,500
Sewage Tertiary Ultraviolet (UV) Treatment Michelson	465,648
Gross Variable Cost Revenue Requirement	**$17,589,693**
Revenue Requirement Offsets	
Other Direct Billing Revenue	125,404
Total Revenue Requirement Offsets	**$125,404**
Net Variable Revenue Requirement from Rates	**$17,464,289**

Fixed costs do not vary with the volume of water used by customers and returned to the District's wastewater treatment facilities. The fixed cost portion of the total FY 2022-23 revenue requirement was $ $41,792,737 (73.8%). Table 24 provides a detail of the FY 2022-23 sewer fixed cost revenue requirement.

Table 24: FY 2022-23 Sewer Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Sewer Fixed Operations	$8,871,782
General and Administrative Costs	2,850,846
Customer Service	3,212,871
Fleet	907,865
Building Maintenance	656,419
General Plant	682,520
Orange County Sanitation District Treatment Costs	26,154
Total Fixed Operating Costs	**$17,208,457**
Replacement and Enhancement Capital Costs	
Enhancement	$1,614,878
Replacement	23,269,499
Total Capital Costs	**$24,884,376**
Gross Fixed Cost Revenue Requirement	**$42,092,834**
Revenue Offsets	
Other Direct Billing Revenue	$300,096
Total Revenue Offsets	**$300,096**
Net Fixed Revenue Requirement from Rates	**$41,792,737**

5.3.1. SEWER COST RECOVERY (RATE DESIGN)

The District uses the average of the three lowest water meter readings during the twelve month period ending December 31 to adjust for monthly anomalies in a ratepayer's water use and seasonal variations. The consumption block breakpoints (table 26) are based on a review of historical data for average usage during cooler months (November through March from 2016 through 2020) because of the limited demand for landscape during winter months. The analysis identified the average usage for all multi-family units was 5 CCF which aligns with the first block. The second block includes average usage below 10 CCF as single family residential customers averaged 10 CCF during the same low usage months. The third block, which includes all commercial, industrial, and institutional (CII) customers, exceeds 10 CCF (The average usage for CII customers exceeds 10 CCF). Non-residential/CII customers with billed water consumption of more than 10 CCF per month pay an additional commodity rate ($/CCF). The Orange County Sanitation District's (OC San) Cost of Service study (December 2017) identified a flow factor, a percentage of metered water usage returning to the sewer system, of 90% for single family homes and non-residential customers (CII). Therefore, the District applies the additional charge on 90% of the billed water consumption for CII customers, consistent with the OC San study. See Table 25 in the Cost of Service Report to view the FY 2020-21 Sewer Rate Structure and Rates.

This rate structure is compliant with Proposition 218 because it provides a mechanism for recovering rate revenue from customers in a manner that is proportionate to the costs incurred by the District to provide service. It includes a fixed component for all three blocks that does not change. A variable component is included that is based on the historic average of estimated sewage flow by customers within each block.

Step 1: Determine the number of sewer customer accounts with usage in each consumption block as shown in Table 26.

Table 26: FY 2022-23 Sewer Customer Accounts by Consumption Block

Customer Class	Block 1	Block 2	Block 3	Total
Single Family Residence	27,998	25,256	13,747	67,002
Multi Family Residence	90,756	12,332	5,534	108,621
Commercial			6,239	6,239
Industrial			1,019	1,019
Public Authority			372	372
Total	**118,754**	**37,588**	**26,911**	**183,253**

Step 2: Estimate sewer volumes contributed by customer class as shown in Table 27.

Table 27: FY 2022-23 Contributed Sewage Volumes

Line No.	Metric	All Residential (Potable)	All Commercial, Industrial, Public Authority (Potable)	All Construction (Potable)
1	Number of Accounts	175,623	7,630	-
2	Projected Indoor Water Usage (ccf)	12,984,011	5,217,852	137,788
3	Return to Sewer Factor	72%	90%	2%
4	Annual Discharge (ccf) (Line 2*Line 3)	9,348,488	4,696,067	2,756
5	Annual Discharge (MG)	6,993	3,513	2

Step 3: Determine the fixed and variable unit cost of service as shown in Table 28.

Table 28: FY 2022-23 Sewer Unit Cost of Service

Metric	Fixed Costs	Variable Costs	Total
Operating Revenue Requirement	$17,208,457	$17,589,693	$34,798,150
Capital Revenue Requirement	24,884,376		24,884,376
Revenue Offset			
Miscellaneous Revenue	222,304	92,896	315,200
Other Direct Billing Revenue	77,792	32,508	110,300
Revenue Requirement (Table 23 and 24)	**$ 41,792,737**	**$ 17,464,289**	**$ 59,257,026**
Discharge (Table 27)		14,047,311	
		ccf of sewer flow	
Unit Cost		$1.24	
		per ccf	

Step 4: Determine the average and total discharges in each fixed tier as shown in Table 29.

Table 29: FY 2022-23 Sewer Discharges by Fixed Consumption Block

Sewer Fixed Charge Tiers	Average Monthly Discarges (ccf) (A)	Number of Accounts (B)	Annual Avg Discharges (ccf) A x B x 12= (C)
Block 1: Average Water Usage < 5 ccf per month	3.2	118,754	4,560,147
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	37,588	3,157,404
Block 3: Average Water Usage > 10 ccf per month	10.0	26,911	3,229,344
Total		**183,253**	**10,946,896**

Step 5: Determine the allocation of fixed and variable sewer costs as shown in Table 30.

Table 30: FY 2022-23 Allocation of Sewer Fixed and Variable Costs

Fixed Allocation	Discharge	Allocation	Cost Allocation	Unit Costs
Operating Costs Allocated to Fixed Charge (from Table 29)	10,946,896	78%	13,314,731	$6.05 per account
Capital Allocated to Fixed Charge		100%	24,706,966	$11.24 per account
Total Fixed Charge per Customer				$17.29 per account
Operating Costs Allocated to Discharge >10 ccf	3,100,415	22%	3,771,040	$1.22 per ccf
Capital Allocated to Discharge >10 ccf				
Total (from Table 27)	14,047,311	100%	41,792,737	
Variable Allocation	Discharge	Cost Allocation	Rate	
Discharge Block Rate – Allocated to Block Rates	**14,047,311**	**17,218,437**	**$1.24**	**per ccf**

Step 6: Calculate the sewer rates based on the allocation of fixed and variable costs shown in Table 30 above. Table 31 shows this outcome.

Table 31: FY 2022-23 Proposed Sewer Rates

Monthly Sewer Service Charge Per Account	Avg Monthly CCF' Discharged	Variable Cost (1)	Fixed Cost (2)	FY 2022-23 Monthly Rates (4)	FY 2022-23 Accounts (12 Months)	FY 2022-23 Revenue
Block 1: Average Water Usage < 5 ccf per month	3.2	$3.98	$17.29	$21.25	1,425,046	$30,282,229
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	$8.70	$17.29	$26.00	451,058	11,727,502
Block 3: Average Water Usage > 10 ccf per month	10.0	$12.43	$17.29	$29.70	322,934	9,591,153
Totals					**2,199,038**	**$51,600,884**
Variable Rates per ccf	**Discharge**	**Variable Rate (3)**	**Fixed Cost (3)**	**Proposed Rate per CCF (4)**	**Discharge CCF**	**FY 2022-23 Revenue**
Discharge >10 ccf	3,100,415	$1.24	$1.22	$2.46	3,100,415	$7,627,020

(1) $1.24 From Table 30 * average monthly CCF discharged
(2) Total fixed charge per customer from Table 30
(3) From Table 30
(4) Variable cost plus fixed cost rounded to nearest $0.05

6. RECYCLED WATER COST OF SERVICE

See section 6 of the COS Report for a complete discussion on the District's recycled water cost of service.

The method used by the District to develop recycled water rates is similar to that of potable water service (see Section 2 of this report) with one significant difference. The District does not calculate unique monthly meter service charges for recycled water. Instead, the monthly service charges for recycled water are set to the same as those charged for the potable water monthly meter service charge (see Table 9b in section 2.4). The District takes this approach due to an imbalance between variable and fixed costs in the overall recycled water revenue requirement. This reallocation of fixed costs to variable revenue recovery through commodity rates is discussed in Section 6.1. below.

6.1. FY 2022-23 RECYCLED WATER REVENUE REQUIREMENT

The District's recycled water revenue requirement from rates is $31,957,123. Prior to any adjustments, the composition of this revenue requirement is variable costs of $15,427,288 (50.4%) and fixed costs of $15,197,633 (49.6%). The District established the monthly fixed charge unit cost as being $11.25 per 5/8" meter equivalents in the potable process (see Table 21 in section 4.3.3). Due to the high percentage of fixed costs identified in the recycled water revenue requirement, the District reallocates a portion of fixed costs not recovered by monthly meter service charges ($6,933,254) into the variable cost revenue requirement. These costs are included in the recycled system and recycled revenue provides the funding which is consistent with Proposition 218 requirements. This strategy provides a fair and equitable application of these costs without deterring usage.

Tables 34 and 35 detail the FY 2022-23 variable and fixed recycled water revenue requirement before and after this reallocation.

Table 34: FY 2022-23 Recycled Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Untreated Water Purchases	$3,581,564
Recycled Water Tertiary Treatment	4,447,450
El Toro Remediation Principal Aquifer Plant	2,749,473
Recycled Water Tertiary Treatment Pumping Michelson	2,075,999
El Toro Remediation Shallow Groundwater	712,517
Recycled Water Tertiary Membrane Bio Reactor (MBR) Treatment Michelson	1,094,100
Sewage Secondary Membrane Bio Reactor (MBR) Treatment Michelson	367,707
Sewage Tertiary Ultraviolet (UV) Treatment Michelson	261,533
Recycled Water Tertiary Ultraviolet (UV) Disinfection Treatment Michelson	136,946
Total Cost of Water Supplies	**$15,427,288**
Conservation and Supply Reliability	
Natural Treatment System	1,339,131
Universal Conservation	529,954
Targeted Conservation	239,918
Total Conservation and Supply Reliability Costs	**$2,109,003**
Total Variable Cost Revenue Requirement Before Adjustment	**$17,536,291**
Adjustment to Reflect Reallocated Fixed Costs	$6,933,254
Total Variable Cost Revenue Requirement After Adjustment	**$24,469,544**

Table 35: FY 2022-23 Recycled Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Recycled Water System Maintenance	$7,789,218
Recycled Water Mitigation Monitoring	13,200
General and Administrative	2,806,385
Customer Service	2,021,219
Recycled Water Site Inspection and Testing-Field	421,100
Building Maintenance	525,135
Fleet	61,251
General Plant	149,150
Recycled Water Site Inspection and Testing-Office	62,400
Total Fixed Operating Costs	**$13,849,058**
Replacement and Enhancement Capital Costs	
Replacement	$977,179
Enhancement	371,396
Total Capital Costs	**1,348,575**
Gross Fixed Cost Revenue Requirement	**$15,197,633**
Revenue Requirement Offsets	
Pumping	125,900
Miscellaneous Revenues	650,900
Total Revenue Requirement Offsets	**$776,800**
Total Fixed Cost Revenue Requirement Before Adjustment	$14,420,833
Adjustment to Reflect Reallocated Fixed Costs	**($6,933,254)**
Net Fixed Revenue Requirement from Rates After Adjustment	**$7,487,579**

6.1.3. VARIABLE COST RECOVERY - COMMODITY RATES

The method used to determine recycled water commodity rates is similar to that used for potable water. In FY 2022-23, the District's projected total recycled water demand was 30,445 acre feet based on historical demand, customer growth factors and other relevant factors. Table 36 provides a detail of the FY 2022-23 unit cost of water supplies ($/ccf) from each supply source using the District's cost and demand data. Note that the net cost shown in each column includes the reallocation of fixed costs of $6,933,254 discussed above.

Table 36: Unit Cost of FY 2022-23 Recycled Water Supplies

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported	Total
Net Cost	$12,151,510	$5,017,859	$5,191,172	$22,360,541
Acre Feet	22,890	3,975	3,580	30,445
Unit Cost per ccf (1)	$1.22	$2.90	$3.33	

(1) Acre feet is multiplied by 435.6 to convert to CCF.

The District allocates the lower cost water supplies to the low volume and base consumption tiers with higher cost water supplies being allocated to the inefficient and wasteful tiers. Table 37 details this allocation for FY 2022-23 using cost and demand data provided by the District.

The general formula used to determine the water budget for a landscape customer served by a recycled water connection is discussed in detail in 4.1.5. in the Cost of Service report.

Table 37: Allocation of Recycled Water Supplies to Consumption Tiers for Landscape Customers

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported	Total Acre Feet	Unit Cost per $ /ccf by Tier (1)
Unit Cost (Table 36)	$1.22	$2.90	$3.33		
T1: Low Volume	14,100	0	0	14,100	$1.22
T2: Base	8,790	3,975	1,279	14,044	$1.89
T3: Inefficient	0	0	1,374	1,374	$3.33
T4: Wasteful	0	0	927	927	$3.33
Total	22,890	3,975	3,580	30,445	

(1) The Unit Cost per $/ccf by TIER is the blended cost of the sources.

Having determined the unit cost of recycled water supplies by consumption tier for landscape customers as shown in Table 37 above, the District then allocates the cost of conservation programs, as shown in table 34, to the appropriate water budget tiers.

Universal conservation costs are added to the commodity rate in the base, inefficient, and wasteful tiers to pay for conservation program costs that help customers in each of these tiers achieve efficient use of recycled water. This cost is not included in the low volume rate since customers who remain in this usage tier do not need assistance to efficiently use water.

Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage reaches the wasteful tier. Costs are allocated to the wasteful tier based on expected usage.

Natural treatment system costs are incurred by the District to deal with urban water runoff produced by customers whose usage exceed their water budgets. The costs include prevention, control and treatment of the runoff of water from irrigation and other uses. These costs are added to the commodity rates of customers in the inefficient and wasteful tiers. Costs are allocated based on the expected usage in each tier.

Table 38 shows the outcome of derivation of the unit costs for the District's conservation programs.

Table 38: FY 2022-23 Conservation Program Unit Costs ($/ccf)

Program	FY 2022-23 Revenue Requirement (A)*	FY 2022-23 Units of Demand (ccf) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2022-23 Adjusted Units of Demand B x C = (D)	Unit Cost Included in FY 2022-23 Commodity Rates A/D = (E)
Universal Conservation	$529,954	7,120,109	100%	7,120,109	$0.07
Targeted Conservation					
Wasteful tier	$239,918	403,776	90%	363,398	$0.66
Natural Treatment System					
Inefficient tier	$232,892	598,730	90%	538,857	$0.43
Wasteful tier	$1,106,238	403,776	90%	363,398	$3.04

*See Table 34

Having determined the unit cost of recycled water supplies by consumption tier as shown in Table 37 and the unit cost of conservation program cost in Table 38, the District must then allocate the cost of conservation programs to each consumption tier. Table 39 shows the outcome of this process using the District's cost and demand data.

Table 39: FY 2022-23 Recycled Water Commodity Rates ($/ccf)

Consumption Tier	Unit Cost of Water Supplies (Table 37)	Unit Cost of Universal Conservation (Table 38)	Unit Cost of Targeted Conservation (Table 38)	Unit Cost of Natural Treatment System (Table 38)	FY 2022-23 Commodity Rates	FY 2022-23 CCF	FY 2022-23 Revenue
T1: Low Volume	$1.22				$1.22	6,141,768	$7,492,957
T2: Base	$1.89	$0.07			$1.96	6,117,604	11,990,503
T3: Inefficient	$3.33	$0.07		$0.43	$3.83	598,730	2,293,135
T4: Wasteful	$3.33	$0.07	$0.66	$3.04	$7.10	403,776	2,866,807
Totals						**13,261,878**	**$24,643,403**

6.1.4. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGE

Recycled water fixed charges are the same as potable water fixed charges (see Table 21 in Section 4.3.3).

6.1.5. VARIABLE COST RECOVERY – RECYCLED WATER AGRICULTURAL RATES

As discussed in section 4.3.2, allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used and these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. It is assumed that produced water provides 75% of the source of supply, 13% is the cost of processed water, and imported water provides 12%. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $10,429. A portion of the fixed cost is included in the variable rate component as described in section 6.1.3. An additional fixed cost of $0.01 per ccf is, which is not recovered through the commodity rate, is applied based on an estimated 1,332,165 ccf's. Table 40 shows the calculation of FY 2022-23 recycled water agricultural rates.

Table 40: FY 2022-23 Recycled Water Agricultural Water Commodity Rates ($/ccf)

Customer Class	FY 2022-23 Revenue Rquirement	FY 2022-23 Projected Demand (CCF)	Variable Cost (CCF) (1)	Fixed Cost Component (CCF) (2)	FY 2022-23 Commodity Rates (1)+(2)	FY 2022-23 Revenue
Agricultural	$2,264,681	1,332,165	$1.69	$0.01	$1.70	$2,264,681

8. Untreated Water Cost of Service FY 2022-23

8.1. UNTREATED WATER COMMODITY RATE

The FY 2022-23 variable revenue requirement for untreated water was determined to be $139,850. The source of this water comes from the Santiago Aqueduct Commission (SAC) and this is the cost incurred to acquire water supplies (See Table 13). Table 41 shows the calculation of the variable rate for untreated water.

Table 41: FY 2022-23 Untreated Water Commodity Rate ($/ccf)

Consumption Tier	FY 2022-23 Revenue Rquirement	FY 2022-23 SAC Purchases (AF)	Variable Cost (AF)	Variable Cost (CCF) (1)	FY 2022-23 Commodity Rates
Untreated Water	$139,850	175	$799	$1.83	$1.83

(1) Acre feet is multiplied by 435.6 to convert to CCF

8.1.0. UNTREATED WATER AGRICULTURAL COMMODITY RATE

The fixed cost revenue requirement for all untreated water uses was determined to be $396,360 for FY 2022-23. These include capacity, readiness to serve, and meter costs that do not vary based upon the amount of water used. The untreated agricultural rate includes a fixed charge component that is based upon an allocated portion of the untreated water costs for all untreated imported water uses. This includes untreated water supplies used by the Baker Treatment Plant (7,200 AF), the Recycled System (2,425 AF), and water sold directly to customers (189 AF). The total projected demand for these customers is 9,814. Table 42 shows the calculation of the rate included for fixed costs for untreated agricultural customers.

Table 42: FY 2022-23 Untreated Water Agricultural Commodity Rates ($/ccf)

FY 2022-23 Revenue Requirement	FY 2022-23 Projected Demand (AF)	FY 2022-23 Projected Demand (CCF)(1)	Fixed Cost Component (CCF)
$396,360	9,814	4,275,188	0..09

(1) Acre feet is multiplied by 435.6 to convert to CCF

Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. As discussed in section 4.3.2, allocated fixed and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. The untreated water agricultural rate is calculated by combining the variable cost shown in Table 41 and the fixed cost component as shown in Table 42.

Table 43: FY 2022-23 Untreated Water Agricultural Commodity Rates ($/ccf)

Consumption Tier	Variable Cost (CCF) (1)	Fixed Cost Component (CCF) (2)	FY 2022-23 Commodity Rates (1)+(2)
Untreated Water	$1.83	$0.09	$1.92

1. Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2021-22 and FY 2022-23.

The IRWD Board of Directors adopted a two-year operating budget for FY 2021-22 and 2022-23 on April 26, 2021. Generally, rates are adopted and implemented to cover operating costs for each FY adopted budget. Rate increases for the full year FY 2021-22 were not implemented as the Board elected to defer rate increases part of the year due to continued customer hardships resulting from COVID-19. It is anticipated that the Board will adopt rate increases covering operating costs for both fiscal years (FY2021-22 and FY 2022-23) in January 2022. Rate increases would be reflected on customer bills beginning March 1, 2022 and would cover the period March 1, 2022 through June 30,2023 (16 months).

In order to calculate rates to cover costs for both fiscal years over the remaining period March 2022 through June 2023 rates first had to be developed as if they had been in effect for the each of the full fiscal years. Appendix 2 provides the support for the development of rates to cover operating costs for the full FY 2021-22. Appendix 3 provides the support for the development of rates to cover operating costs for the full FY 2022-23. Rates were then developed to recover budgeted operating costs for both fiscal years over the remaining 16-month period (March 2022 through June 30,2023). The support for the development of these rates is shown in Appendix 4 and provides the basis for the rates presented to the Board for approval in January 2022. The proposed rates in Appendix 4 are anticipated to generate sufficient revenues to recover operating costs for both fiscal years over the remaining 16 month period.

The tables are updated with the details from the respective operating budget. The assumptions from the 2021 Cost of Service (COS) study remain the same. This appendix uses the same section numbering scheme as those in the 2021 COS for easy reference.

The District anticipates resuming the normal two-year rate cycle consistent with the adoption of the two-year budget for FY 2023-24 and FY 2024-25.

2. Steps for Developing Cost of Service Rates over 16 Months

Proposed changes to rates were developed to address revenue requirements for the 16- month period as described above in the executive summary. Costs for FY 2021-22 and FY 2022-23 have been identified in Appendix 2 and 3. For fiscal year beginning July 1,2021, the District has been collecting revenues for the first 8 months based on rates that were effective in July 2019. Increased rates are needed to generate sufficient revenues to cover the full year of costs for FY 2021-22 and 2022-23 over the remaining 16-month period. The following steps outlined below were used to develop the rates for each tier.

Step 1: Identify sales volumes (based on the FY 2021-22 budget) from July 2021 through February 2022.
Step 2: Determine the revenue generated from July 2021through February 2022 based on the previous rates. This is done by multiplying sales volumes from step 1 by the actual rates in effect during that period.
Step 3: Determine revenues required to cover operating costs for each full fiscal year (FY 2021-22 and FY 2022-23). This is done by multiplying calculated rates by budgeted sales volumes.
Step 4: Determine the remaining revenues needed. This is done by adding total revenue requirements for both fiscal years as calculated in step 3 and subtracting the revenue generated in step 2.
Step 5: Determine the remaining sales volumes to be covered. This is done by adding the total sales volumes for both fiscal years from step 3 and subtracting the sales volumes shown in step 1.
Step 6: Determine the rates needed. This is done by dividing the revenue required as calculated in step 4 by the remaining sales volumes in step 5.

The following Sections provide details on the rates that were developed to address revenue requirements for the period following Board approval in January 2022.

4. Potable Water Service Rates for FY 2021-22 and 2022-23

4.1. POTABLE WATER COMMODITY RATES

Step 1: Identify the budgeted potable water sales volumes per hundred cubic feet (CCF) used by each tier July 2021 through February 2022.

Table 1: Potable Water Sales Volumes /CCF by Tier

Consumption Tier	Sales CCF - 8 months
T1: Low Volume	5,627,286
T2: Base	8,537,240
T3: Inefficient	915,104
T4: Wasteful	757,106
Totals	**15,836,736**

Step 2: Determine the revenue generated from July 2021 through February 2022. This is done by multiplying the sales volumes from Step 1 by the actual rates in effect per CCF during that period.

Table 2: Potable Water Commodity Revenue by Tier July 2021 through February 2022

Consumption Tier	FY 2021-22 Rates July-February (1)	8 Months Sales CCF (Step 3) (2)	8 Months Revenue (1)*(2)
T1: Low Volume	$1.47	5,627,286	$8,272,110
T2: Base	$2.00	8,537,240	17,074,479
T3: Inefficient	$4.86	915,104	4,447,407
T4: Wasteful	$13.63	757,106	10,319,358
Totals		**15,836,736**	**$ 40,113,354**

Step 3: Determine the revenues required for cost of service equity for each fiscal year. See Appendices 2 and 3 Section 4.3.1 for the detailed calculation of rates. Revenue is calculated by multiplying the rate for each tier by budgeted sales volume.

Table 3: Potable Water FY 2021-22 Commodity Revenue by Tier

Consumption Tier	FY 2021-22 Cost of Service Rates (1)	FY 2021-22 Sales CCF (2)	FY 2021-22 Revenue (1) * (2)
T1: Low Volume	$1.48	8,322,265	$12,316,952
T2: Base	$2.22	12,292,520	27,289,395
T3: Inefficient	$5.02	1,240,762	6,228,627
T4: Wasteful	$14.28	1,010,745	14,433,441
Totals		**22,866,293**	**$ 60,268,416**

See Appendix 2 Table 18 in Section 4.3.1

Table 4: Potable Water FY 2022-23 Commodity Revenue by Tier

Consumption Tier	FY 2022-23 Cost of Service Rates (1)	FY 2022-23 Sales CCF (2)	FY 2022-23 Revenue (1) * (2)
T1: Low Volume	$1.54	8,447,959	$13,009,857
T2: Base	$2.33	12,480,055	29,078,529
T3: Inefficient	$5.07	1,260,225	6,389,342
T4: Wasteful	$14.25	1,026,600	14,629,050
Totals		**23,214,840**	**$63,106,779**

See Appendix 3 Table 18 in Section 4.3.1

Step 4: Determine the remaining revenues needed for cost of service equity. This is done by adding the total revenue requirements for both full fiscal years as calculated in step 3 (Tables 3 and 4) and subtracting the expected revenue based on current rates (July 2021 through February 2022) as calculated in step 2 (Table 2). This calculation provides the revenue required over the remaining 16 months.

Table 5: Potable Water Remaining Revenue Required by Tier FY 2021-22 and FY 2022-23

Consumption Tier	Revenue from Table 3 (1)	Revenue from Table 4 (2)	Total Revenue Requirement (3)	less: Revenue From Table 2 (4)	Revenue Required (3) -(4)
T1: Low Volume	$12,316,952	$13,009,857	$25,326,809	$8,272,110	$17,054,699
T2: Base	27,289,395	29,078,529	56,367,924	17,074,479	39,293,445
T3: Inefficient	6,228,627	6,389,342	12,617,969	4,447,407	8,170,563
T4: Wasteful	14,433,441	14,629,050	29,062,492	10,319,358	18,743,134
Totals	**$60,268,416**	**$63,106,779**	**$123,375,195**	**$40,113,354**	**$83,261,840**

Step 5: Determine the remaining budgeted sales volumes for both fiscal years. This is done by adding total sales volumes for both fiscal years used in step 3 (Tables 3 and 4) and subtracting the sales volumes from step 2. This calculation provides the budgeted sales volumes over the remaining 16 months.

Table 6: Potable Water Remaining CCF Sales Volumes by Tier FY 2021-22 and FY 2022-23

Consumption Tier	CCF From Table 3 (1)	CCF From Table 4 (2)	Total CCF Sales (3)	Less: CCF from Table 1 (4)	Remaining CCF Sales (3) - (4)
T1: Low Volume	8,322,265	8,447,959	16,770,224	5,627,286	11,142,938
T2: Base	12,292,520	12,480,055	24,772,576	8,537,240	16,235,336
T3: Inefficient	1,240,762	1,260,225	2,500,988	915,104	1,585,883
T4: Wasteful	1,010,745	1,026,600	2,037,345	757,106	1,280,239
Totals	**22,866,293**	**23,214,840**	**46,081,133**	**15,836,736**	**30,244,397**

Step 6: Determine the rates needed to cover the remaining sixteen-month period March 2022- June 2023. This is done by dividing revenue required as calculated in step 4 by the sales volumes calculated in step 5.

Table 7: Sixteen-Month Potable Water Commodity Rates per CCF

Consumption Tier	Revenue Required Table 5 (1)	Remaining Sales Table 6 (2)	Proposed Rates per CCF (1)/(2)
T1: Low Volume	$17,054,699	11,142,938	$1.53
T2: Base	39,293,445	16,235,336	$2.42
T3: Inefficient	8,170,563	1,585,883	$5.15
T4: Wasteful	18,743,134	1,280,239	$14.64
Totals	**$ 83,261,840**	**30,244,397**	

4.2. POTABLE WATER MONTHLY FIXED SERVICE RATES

Step 1: Identify the budgeted potable water meter equivalent units (MEU's) for July 2021 through February 2022.

Table 8: Potable Water Fixed Service MEUs

System	MEUs - 1 months	MEUs - 8 months
Potable Water	260,219	2,081,752

Step 2: Determine the revenue generated from July 2021through February 2022. This is done by multiplying the meter equivalent unit volumes (MEU's) from Step 1 by the actual rates in effect per CCF during that period.

Table 9: Potable Water Fixed Service Revenue July 2021 through February 2022

System	FY 2021-22 Rate July-February (1)	8 Months Sales MEUs (2)	8 Months Revenue (1)*(2)
Potable Water	$10.35	2,081,752	$21,546,133

Step 3: Determine the revenue required for cost of service equity for each fiscal year. See Appendices 2 and 3 Section 4.3.3 for a detailed calculation of rates. Revenue is calculated by multiplying the full year MEU volumes by the fiscal year monthly rate.

Table 10: Potable Water FY 2021-22 Fixed Service Revenue

System	FY 2021-22 Cost of Service Rate (1)	FY 2021-22 Sales MEUs (2)	FY 2021-22 Revenue (1)*(2)
Potable Water	$10.80	3,122,628	$33,724,382

See Appendix 2 Table 21 in Section 4.3.3

Table 11: Potable Water FY 2022-23 Fixed Service Revenue

System	FY 2022-23 Cost of Service Rate (1)	FY 2022-23 Sales MEUs (2)	FY 2022-23 Revenue (1)*(2)*12
Potable Water	$11.25	3,276,612	$36,861,885

See Appendix 3 Table 21 in Section 4.3.3

Step 4: Determine the remaining revenues needed for cost of service equity. This is done by adding the total revenue requirements for both full fiscal years as calculated in step 3 (Tables10 and 11) and subtracting the expected revenue based on current rates (July 2021 through February 2022) as calculated in step 2 (Table 9). This calculation provides the revenue required over the remaining 16 months.

Table 12: Potable Water Remaining Fixed Service Revenue Required for FY 2021-22 and FY 2022-23

System	Revenue from Table 10 (1)	Revenue from Table 11 (2)	Total Revenue Requirement (3)	less: Revenue From Table 9 (4)	Revenue Required (3) -(4)
Potable Water	$ 33,724,382	$ 36,861,885	$ 70,586,267	$ 21,546,133	$ 49,040,134

Step 5: Determine the remaining budgeted MEU's for both fiscal years. This is done by adding total sales volumes MEU's for both fiscal years used in step 3 (Tables 10 and 11) and subtracting the sales volumes from step 2 (Table 8). This calculation provides the budgeted MEU sales volumes over the remaining 16 months.

Table 13: Potable Water Remaining MEU Usage Required for FY 2021-22 and FY 2022-23

System	MEUs from Table 10 (1)	MEUs from Table 11 (2)	Total MEUs Requirement (3)	Less: Total MEUs from Table 8 (4)	Remaining MEU Sales (3) - (4)
Potable Water	3,256,612	3,276,612	6,533,224	2,081,752	4,451,472

Step 6: Determine monthly rate needed to cover the remaining 16-month period March 2022 through June 2023. This is done by dividing revenue required as calculated in step 4 (Table 12) by the units calculated in step 5 (Table 13). Service rates are rounded to the nearest $0.05.

Table 14: Sixteen-month Potable Water Monthly Fixed Service Rate per MEU

System	Revenue Required Table 12 (1)	Remaining Sales Table 13 (2)	Service Rate per MEU (1)/(2)
Potable Water	$ 49,040,134	4,451,472	$11.00

This rate was reviewed by the IRWD Finance and Personnel Committee. The Committee decided to recommend a slightly lower rate to reduce the overall impact to the average residential customer. The monthly fixed water service charge will be decreased by $0.25 funded from the Replacement Fund as shown below.

Table 15: Sixteen-month Adjusted Potable Water Monthly Fixed Service Rate per MEU

System	Service Rate Table 14 (1)	Replacement Fund Contribution Reduction (2)	Proposed Rate per MEU (1)-(2)
Potable Water	$11.00	$0.25	$10.75

Step 7: Determine the monthly rates for the remaining meter sizes. This is done by multiplying the proposed rate for the 5/8" disc by the meter ratio for each meter size and rounding to the nearest $0.05. This is because the 5/8" is the smallest and therefore used for the meter ratio basis. The meter ratio is based on gallons of flow per minute

(GPM). For example, the 5/8" disc has a meter ratio of 1 with a flow rate of 20 GPM. The ¾" disc has a flow rate of 30 GPM; therefore the meter ratio is 1.5.

Table 16: Sixteen-month Potable Water Monthly Fixed Service Rate by Meter Size

Meter Size	Meter Ratio (1)	Proposed Rates (1) * Rate from Table 15
5/8" Disc	1.0	$10.75
3/4" Disc	1.5	16.15
1" Disc	2.5	26.90
1 1/2" Disc	6.0	64.50
1 1/2" Single Jet	5.0	53.75
2" Disc	8.0	86.00
2" Single Jet	8.0	86.00
2" Turbo	12.5	134.40
3" Turbo	32.5	349.40
4" Turbo	62.5	671.90
4" Turbo Omni F-2	50.0	537.50
6" Mag Meter	139.9	1,503.40
6" Turbo	125.0	1,343.75
6" Turbo Omni F-2	100.0	1,075.00
8" Mag Meter	248.7	2,673.55
8" Turbo	235.0	2,526.25
8" Turbo Omni F-2	235.0	2,526.25
10" Turbo	350.0	3,762.50
16" Propeller	190.0	2,042.50

4.3. POTABLE WATER AGRICULTURAL RATE

Step 1: Identify the budgeted potable water agricultural sales volumes (CCF) July 2021 through February 2022.

Table 17: Potable Water Agricultural Sales Volumes /CCF

Customer Class	CCF's - 8 months
Agricultural	35,715

Step 2: Determine the revenue generated from July 2021through February 2022. This is done by multiplying the sales volumes from Step 1 by the actual rates in effect per CCF during that period.

Table 18: Potable Water Agricultural Revenue July 2021 through February 2022

Customer Class	FY 2021-22 Rate July-February (1)	8 Months Sales CCF (2)	8 Months Revenue (1)*(2)
Agricultural	$2.77	35,715	$98,931

Step 3: Determine the revenues required for cost of service equity for each fiscal year. See Appendices 2 and 3 Section 4.3.2 for the detailed calculation of rates. Revenue is calculated by multiplying the rate by the budgeted sales volume.

Table 19: Potable Water Agricultural FY 2021-22 Revenue

Customer Class	FY 2021-22 Cost of Service Rates	FY 2021-22 Sales CCF	FY 2021-22 Revenue
Agricultural	$3.05	53,725	$163,861

See Appendix 2 Table 19 in Section 4.3.2

Table 20: Potable Water Agricultural FY 2022-23 Revenue

Customer Class	FY 2022-23 Cost of Service Rates	FY 2022-23 Sales CCF	FY 2022-23 Revenue
Agricultural	$3.13	54,568	$170,797

See Appendix 3 Table 19 in Section 4.3.2

Step 4: Determine the remaining revenue required for cost equity. This is done by adding the total revenue requirements for both fiscal years as calculated in Step 3 (Tables 19 and 20) and subtracting the expected revenues based on the current rates (July 2021 through February 2022) as calculated in step 2 (Table 18). This calculation provides the revenues required over the remaining 16 months.

Table 21: Potable Water Agricultural Remaining Revenue Required for FY 2021-22 and FY 2022-23

Customer Class	Revenue from Table 19 (1)	Revenue from Table 20 (2)	Total Revenue Requirement (3)	less: Revenue From Table 18 (4)	Revenue Required (3) -(4)
Agricultural	$ 163,861	$ 170,797	$ 334,658	$ 98,931	$ 235,726

Step 5: Determine the remaining budgeted sales volumes for both fiscal years. This is done by adding total sales volumes for both fiscal years used in step 3 (Tables 19 and 20) and subtracting the sales volumes from step 2. This calculation provides the budgeted sales volumes over the remaining 16 months.

Table 22: Potable Water Agricultural Remaining Usage Required for FY 2021-22 and FY 2022-23

Customer Class	CCF From Table 19 (1)	CCF From Table 20 (2)	Total CCF Sales (3)	Less: CCF from Table 18 (4)	Remaining CCF Sales (3) - (4)
Agricultural	53,725	54,568	108,292	35,715	72,577

Step 6: Determine the rates needed to cover the remaining 16 month period March 2022 through June 2023. This is done by dividing revenue required as calculated in step 4 by the sales volumes calculated in step 5.

Table 23: Sixteen-month Potable Water Agricultural Monthly Rate per CCF

Customer Class	Revenue Required Table 21 (1)	Remaining Sales Table 22 (2)	Proposed Rate per CCF (1)/(2)
Agricultural	$ 235,726	72,577	$3.25

4.4. POTABLE WATER TEMPORARY USAGE RATE

Similar to commercial and agricultural customers, it is not possible to develop water budgets based on standardized metrics for customers who use water for temporary purposes, such as for new construction of buildings. Developing a customized budget is difficult without a history of water use needs. Therefore, IRWD uses a single base rate that proportionately combines base and wasteful usage. The District estimates usage percentages for this rate based on usage by commercial, industrial, and institutional customers (CII).

Table 24: Potable Water Temporary Usage Rate Calculation

Customer Class	FY 2021-22 Sales CCF (1)	FY 2022-23 Sales CCF (2)	24 Months Sales CCF (1)+ (2)	% Sales	Tier Rate from Table 7	Rate Contribution
CII Base Tier	6,062,065	6,154,874	12,216,940	96%	$2.42	$2.33
CII Wasteful Tier	238,082	241,816	479,898	4%	$14.64	$0.55
Totals	**6,300,147**	**6,396,691**	**12,696,838**	**100%**		

Table 25: Proposed Potable Water Temporary Usage Rate per CCF

Customer Class	Base Tier Rate Contribution from Table 24 (1)	Wasteful Tier Rate Contribution from Table 24 (1)	Proposed Rate (1) + (2)
Construction/Temporary	$2.33	$0.55	$2.88

4.5. POTABLE WATER MONTHLY PRIVATE FIRELINE RATES

For a complete discussion of the calculation method for private fireline rates, please see Sections 4.3.4 in the 2021 COS study. The methodology for monthly private fireline potable water service has changed since the last rate change. Due to the change in methodology, rather than calculating a sixteen- month rate based partially on revenue received using previous rates for eight months, the proposed rates are based on four months of the revenue requirement for FY 2021-22 plus the revenue requirement for FY 2022-23, both using the updated methodology.

Step 1: The new rates will be in effect for four months. Determine revenue required for FY 2021-22 by multiplying the number of firelines by the new fiscal year cost of service monthly rate times 4 months.

Table 26: Potable Water Monthly Private Fireline FY 2021-22 Four Month Revenue Requirement

Private Fireline Size	FY 2021-22 Cost of Service Rates (1)	Number of Firelines (2)	FY 2021-22 4 Months Revenue (1)*(2)*4
1"	$6.10	42	$1,025
2"	8.20	1,045	34,276
3"	13.00	31	1,612
4"	21.30	1,018	86,734
6"	51.00	1,173	239,292
8"	102.30	1,059	433,343
10"	179.40	127	91,135
11"	228.85	1	915
12"	286.25	5	5,725
Totals		**4,501**	**$ 894,057**

See Appendix 2 Table 22 in section 4.3.4 for rates and number of firelines.

Step 2: Determine the revenue required for FY 2022-23. This is done by multiplying the number of firelines by the fiscal year cost of service monthly rate (see Appendix 3 Table 22 in Section 4.3.4) times 12 months.

Table 27: Potable Water Monthly Private Fireline FY 2022-23 Revenue Requirement

Private Fireline Size	FY 2022-23 Cost of Service Rates (1)	Number of Firelines (2)	FY 2022-23 Revenue (1)*(2)*12
1"	$6.30	43	$3,251
2"	8.60	1,066	110,011
3"	13.85	32	5,318
4"	22.95	1,038	285,865
6"	55.55	1,196	797,254
8"	111.75	1,080	1,448,280
10"	196.30	130	306,228
11"	250.55	1	3,007
12"	313.50	5	18,810
Totals		**4,591**	**$ 2,978,024**

See Appendix 3 Table 22 in section 4.3.4

Step 3: Determine the revenue required for cost of service equity for each fiscal year. This is done by adding four months of revenue for the first fiscal year as calculated in step 1 to the total revenue requirements for the second fiscal year as calculated in step 2

Table 28: Sixteen-month Potable Water Private Fireline Revenue Requirement

Private Fireline Size	Revenue from Table 26 (1)	Revenue from Table 27 (2)	Revenue Required (1)+ (2)
1"	$1,025	$3,251	$4,276
2"	34,276	110,011	144,287
3"	1,612	5,318	6,930
4"	86,734	285,865	372,599
6"	239,292	797,254	1,036,546
8"	433,343	1,448,280	1,881,623
10"	91,135	306,228	397,363
11"	915	3,007	3,922
12"	5,725	18,810	24,535
Totals	**$ 894,057**	**$ 2,978,024**	**$ 3,872,081**

Step 4: Determine rates that are to be effective after Board approval in January 2022. This is done by dividing revenue required as calculated in step 3 by the number of firelines and dividing by 16 months (March 2022 through June 2023).

Table 29: Sixteen-month Potable Water Private Fireline Monthly Fixed Service Rate

Private Fireline Size	Revenue Required Table 28 (1)	Number of Firelines Table 27 (2)	Proposed Rates (1)/(2)/16
1"	$4,276	43	$ 6.20
2"	144,287	1,066	8.45
3"	6,930	32	13.55
4"	372,599	1,038	22.45
6"	1,036,546	1,196	54.15
8"	1,881,623	1,080	108.90
10"	397,363	130	191.05
11"	3,922	1	245.15
12"	24,535	5	306.70
Totals	**$ 3,872,081**	**4,591**	

5. Sewer Service Rates for FY 2021-22 and 2022-23 Steps

Step 1: Identify the sewer service sales volumes (number of accounts for block tiers (tiers) and sewer discharge CCF for Discharge over 10 CCF) that are used by each tier for July 2021 through February 2022.

Table 30: Sewer Service Accounts and/or Discharge CCF Used by Each Tier

Sewer Fixed Charge Tiers	Accounts - 1 months	Accounts - 8 months
Block 1	117,578	940,624
Block 2	37,216	297,728
Block 3	26,720	213,763
Totals	**181,514**	**1,452,116**
Sewer Variable Charge	**Discharge CCF - 1 months**	**Discharge CCF - 8 months**
Discharge over > 10ccf's	252,081	2,016,651

Step 2: Determine the revenue generated from July 2021through February 2022. This is done for the block tiers by multiplying accounts by the actual rates in effect during that period. For Discharge over 10 CCF, discharge is multiplied by the actual rate.

Table 31: Sewer Service Revenue by Tier July 2021 through February 2022

Sewer Fixed Charge Tiers	FY 2021-22 Rate July-February (1)	1 Month Accounts (2)	8 Months Accounts (2)*8=(3)	8 Months Revenue (1)*(3)
Block 1	$19.55	117,578	940,624	$18,389,209
Block 2	$23.50	37,216	297,728	6,996,606
Block 3	$26.10	26,720	213,763	5,579,220
Totals		**181,514**	**1,452,116**	**$ 30,965,034**
Sewer Variable Charge	**FY 2021-22 Rate July-February (1)**	**1 Month Discharge CCF**	**8 Months Discharge CCF**	**8 Months Revenue**
Discharge over > 10ccf's	$2.92	252,081	2,016,651	$5,880,553

Step 3: Determine the revenue required for cost of service equity for each fiscal year. See Appendices 2 and 3 Section 5.3.1 for the detailed calculation of rates. Revenue is calculated by multiplying the rates by the number of accounts.

Table 32: Sewer Service Revenue by Tier FY 2021-22

Sewer Fixed Charge Tiers	FY 2021-22 Cost of Service Rates	FY 2021-22 Accounts (12 Months)	FY 2021-22 Revenue
Block 1	$20.40	1,410,937	$28,783,109
Block 2	$25.05	446,592	11,187,126
Block 3	$28.75	322,934	9,284,365
Totals		**2,180,463**	**$ 49,254,600**
Sewer Variable Charge	**FY 2021-22 Cost of Service Rate**	**FY 2021-22 Discharge CCF**	**FY 2021-22 Revenue**
Discharge over > 10ccf's	$2.39	3,102,540	$7,415,069

See Appendix 2 Table 31 in Section 5.3.1

Table 33: Sewer Service Revenue by Tier FY 2022-23

Sewer Fixed Charge Tiers	FY 2022-23 Cost of Service Rates	FY 2022-23 Accounts (12 Months)	FY 2022-23 Revenue
Block 1	$21.25	1,425,046	$30,282,229
Block 2	$26.00	451,058	11,727,502
Block 3	$29.70	322,934	9,591,153
Totals		**2,199,038**	**$ 51,600,884**
Sewer Variable Charge	**FY 2022-23 Cost of Service Rate**	**FY 2022-23 Discharge CCF**	**FY 2022-23 Revenue**
Discharge over > 10ccf's	$2.46	3,100,415	$7,627,020

See Appendix 3 Table 31 in Section 5.3.1

Step 4: Determine the remaining revenue required needed for cost equity. This is done by adding the total revenue requirements for both full fiscal years as calculated in step 3 (Tables 32 and 33) and subtracting the expected revenue based on current rates (July 2021through February 2022) as calculated in step 2 (Table 31). This calculation provides the revenue required over the remaining 16 months.

Table 34: Sewer Service Remaining Revenue Required by Tier FY 2021-22 and FY 2022-23

Sewer Fixed Charge Tiers	Revenue from Table 32 (1)	Revenue from Table 33 (2)	Total Revenue Requirement (3)	less: Revenue From Table 31 (4)	Revenue Required (3) -(4)
Block 1	$28,783,109	$30,282,229	$59,065,338	$18,389,209	$40,676,130
Block 2	11,187,126	11,727,502	22,914,628	6,996,606	15,918,022
Block 3	9,284,365	9,591,153	18,875,518	5,579,220	13,296,298
Totals	**$ 49,254,600**	**$ 51,600,884**	**$ 100,855,484**	**$ 30,965,034**	**$ 69,890,450**
Sewer Variable Charge	**Revenue from Table 32 (1)**	**Revenue from Table 33 (2)**	**Total Revenue Requirement (3)**	**less: Revenue From Table 31 (4)**	**Revenue Required (3) -(4)**
Discharge over > 10ccf's	$7,415,069	$7,627,020	$15,042,089	$5,880,553	$9,161,536

Step 5: Determine the remaining budgeted accounts for both fiscal years. This is done by adding total accounts for both fiscal years used in step 3 (Tables 32 and 33) and subtracting accounts from step 2 (Table 31).

Table 35: Sewer Service Remaining Accounts for FY 2021-22 and FY 2022-23

Sewer Fixed Charge Tiers	Accounts from Table 32 (1)	Accounts from Table 33 (2)	Total Accounts Requirement (3)	Less: Total Accounts from Table 31 (4)	Remaining Account Total (3) - (4)
Block 1	1,410,937	1,425,046	2,835,983	940,624	1,895,359
Block 2	446,592	451,058	897,650	297,728	599,922
Block 3	322,934	322,934	645,868	213,763	432,105
Totals	**2,180,463**	**2,199,038**	**4,379,501**	**1,452,115**	**2,927,386**
Sewer Variable Charge	**Discharge CCF from Table 32 (1)**	**Discharge CCF from Table 33 (2)**	**Total Discharge CCF Requirement (3)**	**Less: Total Discharge CCF from Table 31 (4)**	**Remaining Discharge CCF (3) - (4)**
Discharge over > 10ccf's	3,102,540	3,100,415	6,202,954	2,016,651	4,186,303

Step 6: Determine rates needed to cover the remaining 16 month period March 2022 through June 2023. This is done by dividing revenue required as calculated in step 4 by the accounts calculated in step 5.

Table 36: Sixteen-month Sewer Service Rates

Sewer Fixed Charge Tiers	Revenue Required Table 34 (1)	Remaining Account Total Table 35 (2)	Service Rate per Account (1)/(2)
Block 1	$40,676,130	1,895,359	$21.45
Block 2	15,918,022	599,922	$26.55
Block 3	13,296,298	432,105	$30.75
Totals	**$ 69,890,450**	**2,927,386**	
Sewer Variable Charge	**Revenue Required Table 34 (1)**	**Remaining Discharge CCF Table 35 (2)**	**Service Rate per CCF (1)/(2)**
Discharge over > 10ccf's	$9,161,536	4,186,303	$2.19

These rates were reviewed by the IRWD Finance and Personnel Committee. The Committee decided to recommend a slightly lower rate to reduce the overall impact to the average residential customer. The monthly sewer fixed service charge will be reduced by contributions funded from the Replacement Fund as shown below.

Table 37: Adjusted Sixteen-month Sewer Service Rates

Sewer Fixed Charge Tiers	Monthly Service Rate Table 36	Replacement Fund Contribution Reduction	Proposed Rates
Block 1	$21.45	$1.00	$20.45
Block 2	$26.55	$1.05	$25.50
Block 3	$30.75	$1.00	$29.75
Sewer Variable Charge	**Monthly Service Rate Table 36**	**Replacement Fund Contribution Reduction**	**Proposed Rate**
Discharge over > 10ccf's	$2.19	$0.00	$2.19

6. Recycled Water Service Rates for FY 2021-22 and 2022-23 Steps

6.1. RECYCLED WATER COMMODITY RATES

Step 1: Identify the budgeted recycled water sales volumes (CCF) used by each tier for July 2021 through February 2022.

Table 38: Recycled Water Sales Volumes/ CCF Used by Each Tier

Consumption Tier	Sales CCF - 8 months
T1: Low Volume	4,163,656
T2: Base	4,387,481
T3: Inefficient	465,655
T4: Wasteful	325,215
Totals	**9,342,007**

Step 2: Determine the revenue generated from July 2021 through February 2022. This is done by multiplying the sales volumes from step 1 by the actual rates in effect per CCF during that period.

Table 39: Recycled Water Commodity Revenue by Tier July 2021 through February 2022

Consumption Tier	FY 2021-22 Rate July-February (1)	8 Months Sales CCF (2)	8 Months Revenue (1)*(2)
T1: Low Volume	$1.19	4,163,656	$4,954,751
T2: Base	$1.57	4,387,481	6,888,345
T3: Inefficient	$3.15	465,655	1,466,814
T4: Wasteful	$6.62	325,215	2,152,925
Totals		**9,342,007**	**$ 15,462,835**

Step 3: Determine the revenues required for cost of service equity for each fiscal year. See Appendices 2 and 3 Section 6.1.3 for the detailed calculation of rates. Revenue is calculated by multiplying the rate for each tier by the budgeted sales volume.

Table 40: Recycled Water Commodity Revenue by Tier FY 2021-22

Consumption Tier	FY 2021-22 Cost of Service Rates (1)	FY 2021-22 Sales CCF (2)	FY 2021-22 Revenue (1)*(2)
T1: Low Volume	$1.21	5,997,595	$7,257,090
T2: Base	$1.93	5,973,998	11,529,816
T3: Inefficient	$3.54	584,675	2,069,750
T4: Wasteful	$6.83	394,297	2,693,050
Totals		**12,950,566**	**$ 23,549,707**

See Appendix 2 Table 39 in Section 6.1.3

Table 41: Recycled Water Commodity Revenue by Tier FY 2022-23

Consumption Tier	FY 2022-23 Cost of Service Rates (1)	FY 2022-23 Sales CCF (2)	FY 2022-23 Revenue (1)*(2)
T1: Low Volume	$1.22	6,141,768	$7,492,957
T2: Base	$1.96	6,117,604	11,990,503
T3: Inefficient	$3.83	598,730	2,293,135
T4: Wasteful	$7.10	403,776	2,866,807
Totals		**13,261,878**	**$ 24,643,403**

See Appendix 3 Table 39 in Section 6.1.3

Step 4: Determine the remaining revenues needed for cost equity. This is done by adding the total revenue requirements for both full fiscal years as calculated in step 3 (Tables 40 and 41) and subtracting the expected revenue based on current rates (July 2021 through February 2022) as calculated in step 2 (Table 39). This calculation provides the revenue required over the remaining 16 months.

Table 42: Recycled Water Remaining Revenue Required by Tier FY 2021-22 and FY 2022-23

Consumption Tier	Revenue from Table 40 (1)	Revenue from Table 41 (2)	Total Revenue Requirement (3)	less: Revenue From Table 39 (4)	Revenue Required (3) -(4)
T1: Low Volume	$7,257,090	$7,492,957	$14,750,048	$4,954,751	$9,795,297
T2: Base	11,529,816	11,990,503	23,520,320	6,888,345	16,631,975
T3: Inefficient	2,069,750	2,293,135	4,362,885	1,466,814	2,896,072
T4: Wasteful	2,693,050	2,866,807	5,559,857	2,152,925	3,406,932
Totals	**$ 23,549,707**	**$ 24,643,403**	**$ 48,193,110**	**$ 15,462,835**	**$ 32,730,276**

Step 5: Determine the remaining budgeted sales volumes for both fiscal years. This is done by adding total sales volumes for both fiscal years used in step 3 (Tables 40 and 41) and subtracting the sales volumes from step 2. This calculation provides the budgeted sales volumes over the remaining 16 months.

Table 43: Recycled Water Remaining CCF Sales Volumes by Tier FY 2021-22 and FY 2022-23

Consumption Tier	CCF From Table 40 (1)	CCF From Table 41 (2)	Total CCF Sales (3)	Less: CCF from Table 39 (4)	Remaining CCF Sales (3) - (4)
T1: Low Volume	5,997,595	6,141,768	12,139,364	4,163,656	7,975,708
T2: Base	5,973,998	6,117,604	12,091,602	4,387,481	7,704,121
T3: Inefficient	584,675	598,730	1,183,405	465,655	717,750
T4: Wasteful	394,297	403,776	798,073	325,215	472,858
Totals	**12,950,566**	**13,261,878**	**26,212,444**	**9,342,007**	**16,870,436**

Step 6: Determine the rates needed to cover the remaining 16 month period March 2022-June 2023. This is done by dividing revenue required as calculated in step 4 by the sales volumes calculated in step 5.

Table 44: Sixteen-month Recycled Water Commodity Rates per CCF

Consumption Tier	Revenue Required Table 42 (1)	Remaining Sales Table 43 (2)	Proposed Rates per CCF (1)/(2)
T1: Low Volume	$9,795,297	7,975,708	$1.23
T2: Base	16,631,975	7,704,121	$2.16
T3: Inefficient	2,896,072	717,750	$4.03
T4: Wasteful	3,406,932	472,858	$7.20
Totals	**$ 32,730,276**	**16,870,436**	

6.2. RECYCLED WATER AGRICULTURAL RATE

Step 1: Identify the budgeted recycled water agricultural sales volumes (CCF) for July 2021 through February 2022.

Table 45: Recycled Water Agricultural Sales Volumes

Customer Class	CCF - 8 months
Agricultural	900,157

Step 2: Determine the revenue generated from July 2021 through February 2022. This is done by multiplying the sales volumes from step 1 by the actual monthly rate in effect per CCF during that period.

Table 46: Recycled Water Agricultural Revenue July 2021 through February 2022

Customer Class	FY 2021-22 Rate July-February (1)	8 Months Sales CCF (2)	8 Months Revenue (3)
Agricultural	$1.64	900,157	$1,476,257

Step 3: Determine the revenues required for cost of service equity for each fiscal year. See Appendices 2 and 3 Section 6.1.2 for the detailed calculation of rates. Revenue is calculated by multiplying the rate by the budgeted sales volume.

Table 47: Recycled Water Agricultural Revenue for FY 2021-22

Customer Class	FY 2021-22 Cost of Service Rates (1)	FY 2021-22 Sales CCF (2)	FY 2021-22 Revenue (1)*(2)
Agricultural	$1.66	1,300,894	$2,159,484

See Appendix 2 Table 40 in Section 6.1.5

Table 48: Recycled Water Agricultural Revenue for FY 2022-23

Customer Class	FY 2022-23 Cost of Service Rates (1)	FY 2022-23 Sales CCF (2)	FY 2022-23 Revenue (1)*(2)
Agricultural	$1.70	1,332,165	$2,264,681

See Appendix 3 Table 40 in Section 6.1.5

Step 4: Determine the remaining revenues required for cost equity. This is done by adding the total revenue requirements for both full fiscal years as calculated in step 3 (Tables 47 and 48) and subtracting the expected revenue based on current rates (July 2021 through February 2022) as calculated in step 2 (Table 46). This calculation provides the revenue required over the remaining 16 months.

Table 49: Recycled Water Agricultural Remaining Revenue Required for FY 2021-22 and FY 2022-23

Customer Class	Revenue from Table 47 (1)	Revenue from Table 48 (2)	Total Revenue Requirement (3)	less: Revenue From Table 46 (4)	Revenue Required (3) -(4)
Agricultural	$ 2,159,484	$ 2,264,681	$ 4,424,164	$ 1,476,257	$ 2,947,907

Step 5: Determine the remaining budgeted sales volumes for both fiscal years. This is done by adding total sales for both fiscal years used in step 3 (Tables 47 and 48) and subtracting the sales volumes in step 2. This calculation provides the budgeted sales volumes over the remaining 16 months.

Table 50: Recycled Water Agricultural Remaining CCF Sales Volumes for FY 2021-22 and FY 2022-23

Customer Class	CCF From Table 47 (1)	CCF From Table 48 (2)	Total CCF Sales (3)	Less: CCF from Table 45 (4)	Remaining CCF Sales (3) - (4)
Agricultural	1,300,894	1,332,165	2,633,059	900,157	1,732,902

Step 6: Determine the rates needed to cover the remaining 16 month period March 2022-June 2023. This is done by dividing revenue required as calculated in step 4 by the sales volumes calculated in step 5.

Table 51: Sixteen-month Recycled Water Agricultural Monthly Agricultural Rate per CCF

Customer Class	Revenue Required Table 49 (1)	Remaining Sales Table 50 (2)	Proposed Rate per CCF (1)/(2)
Agricultural	$ 2,947,907	1,732,902	$1.70

6.3. RECYCLED WATER TEMPORARY USAGE RATE

Similar to commercial and agricultural customers, it is not possible to develop water budgets based on standardized metrics for customers who use water for temporary purposes, such as for new construction of buildings. Developing a customized budget is difficult without a history of water use needs. Therefore, IRWD uses a single base rate that proportionately combines base and wasteful usage. The District estimates usage percentages for this rate based on budgeted usage (which is based on historical usage) by commercial, industrial, and institutional customers (CII).

Table 52: Recycled Water Temporary Usage Rate Calculation

Customer Class	FY 2021-22 Sales CCF (1)	FY 2022-23 Sales CCF (2)	24 Months Sales CCF (1)+ (2)	% Sales	Tier Rate from Table 44*	Rate Contribution
CII Base Tier	210,412	215,470	425,882	97%	$1.23	$1.20
CII Wasteful Tier	6,120	6,268	12,388	3%	$7.20	$0.20
Totals	**216,533**	**221,738**	**438,270**	**100%**		

* The base cost for CII customers who use recycled water is the cost of produced water, which is the same as the low volume tier rate.

Table 53: Recycled Water Temporary Usage Rate per CCF

Customer Class	Base Tier Rate Contribution from Table 52 (1)	Wasteful Tier Rate Contribution from Table 52 (1)	Proposed Rate per CCF (1) + (2)
Construction/Temporary	$1.20	$0.20	$1.40

6.4. RECYCLED WATER MONTHLY METER SERVICE CHARGE

Recycled water fixed charges are the same as potable water fixed charges (see Table 15 in Section 4.2).

8. Untreated Water Service Rates for FY 2021-22 and 2022-23

The rates addressed in this area were not addressed in the 2021 Cost of Service generated by Raftelis.
The untreated commodity rate is based on water costs for all untreated imported water uses, which include Baker Treatment Plant, recycled water production, and untreated water sold directly to customers. As a result, the revenue requirement for these costs is partially recovered through the commodity costs for potable and recycled commodity rates. Therefore the sixteen-month rate is based on the cost of water using the following steps.

Step 1: Determine the percentage to apply to each rate. The FY 2021-22 rates will be in effect for four months, which is 25% of the sixteen months. The FY 2022-23 rates will be in effect for twelve months, which is 75% of sixteen months.

Step 2: Multiply the FY 2021-22 rates by 25% and the FY 2022-23 rates by 75%.

Step 3: Determine rates needed to cover the remaining sixteen-month period March 2022 through June 2023. This is done by adding the Year 1 contribution to the Year 2 contribution as shown in the following tables.

Table 54: Sixteen-Month Untreated Water Commodity Rate per CCF

Water Type	Year 1 Rate (1)	Year 2 Rate (2)	Year 1 % (3)	Year 2 % (4)	Year 1 Contribution (1)*(3)= (5)	Year 1 Contribution (2)*(4)= (6)	Proposed Rate (5)+(6)
Untreated	$1.78	$1.83	25%	75%	$0.45	$1.37	$1.82

(1) See Appendix 2 Table 41 in Section 8.1
(2) See Appendix 3 Table 41 in Section 8.1

Table 55: Sixteen-Month Untreated Water Agricultural Rate per CCF

Customer Class	Year 1 Rate (1)	Year 2 Rate (2)	Year 1 % (3)	Year 2 % (4)	Year 1 Contribution (1)*(3)= (5)	Year 1 Contribution (2)*(4)= (6)	Proposed Rate (5)+(6)
Agricultural	$1.88	$1.92	25%	75%	$0.47	$1.44	$1.91

(1) See Appendix 2 Table 42 in Section 8.1
(2) See Appendix 3 Table 42 in Section 8.1

9. Potable and Recycled Pumping Surcharges

The rates addressed in this area were not included in the 2021 Cost of Service potable or recycled sections generated by Raftelis.

The District used Navigant Consulting, Inc. (Navigant) to generate pumping surcharge rates for District customers in elevated zones in March 2019. These customers live in zones which are higher in elevation and therefore require additional energy costs to pump the water to their service addresses. The work represents Navigant's professional judgment based on the information available at the time the report was prepared.

9.1. BACKGROUND

Navigant provided information required to develop a pumping surcharge recommendation. The report consisted of several tasks used to establish pumping surcharge areas including:

1. Calculating total energy use and historic embedded energy on an annual basis from 2014 to 2018 for each of IRWD's major systems.
2. Developing estimates of embedded energy in each of the 109 potable geo-pressure zones and 33 non-potable geo- pressure zones within the IRWD territory.
3. Analyzing historic potable and non-potable water use in IRWD territory on an annual basis from 2014 to 2018, as well as the associated wastewater collection.

9.2. PUMPING SURCHARGE ESTIMATE

The cost of distributing potable water and non-potable water (including recycled water) varies throughout IRWD's service area based on elevation. Navigant assessed the variation in cost of pumping water to different regions throughout IRWD's service area and developed a "pumping surcharge" by region or area.

Consistent with IRWD's historic pumping surcharge costs, the analysis did not include costs associated with water supply, water treatment, sewage collection, or any sewage treatment processes because these costs are already included in our commodity rates. Furthermore, the analysis only considered energy costs directly paid by IRWD; it did not consider energy costs that may be incurred by wholesale water agencies from which IRWD imports water as those costs are already included in our commodity rates. It excluded capital cost recovery and any non-energy operation and maintenance costs associated with delivering water because these costs are already included in our fixed service charge.

Each customer within each pumping area has the same pumping surcharge applied to their bill as every other customer within the same pumping area.

9.3. SURCHARGE SUMMARY

Navigant identified three potable surcharge areas based on similar energy use plus a base area that receives no surcharge. The cost to pump water to the base area is included as part of IRWD's commodity rates shown in Table 7 (potable) and Table 44 (Recycled). Due to the complexity of calculating usage and embedded energy costs by month, pumping surcharges were calculated for both fiscal years using 24 months of costs and usage.

9.4. POTABLE WATER PUMPING SURCHARGE

Step 1: Identify the estimated usage for 24 months. The usage in AF per year as calculated by Navigant is multiplied by 435.6 to convert to CCF and multiplied by 2 for 24 months usage.

Table 56: Potable Water Sales Volumes /CCF by Area

Surcharge Areas	Number of Pressure Zones	AF per Year* (1)	CCF (1) * 435.6 (2)	24 months CCF (2) *2
Base	81			
1	14	2,741	1,193,980	2,387,959
2	6	925	402,930	805,860
3	8	857	373,309	746,618
Totals	**109**	**4,523**	**1,970,219**	**3,940,438**

* Section 9.1 item 3

Step 2: The revenue requirement is determined by multiplying the pumping energy cost as calculated by Navigant in 2019 by the estimated increase since 2019 (10%) and multiplied by 2 for estimated costs for both fiscal years.

Table 57: Potable Water Surcharge Revenue by Area for FY 2021-22 & FY 2022-23

Surcharge Areas	Number of Pressure Zones	Pumping Energy Cost in 2019* (1)	Estimated Energy Costs (1)* 10% Increase (2)	24 Months Revenue Requirement (2)* 2
Base	81	$0	$0	$0
1	14	355,611	391,172	782,344
2	6	166,813	183,494	366,989
3	8	266,422	293,064	586,128
Totals	**109**	**$788,846**	**$867,731**	**$1,735,461**

* Section 9.1 item 2

Step 3: Determine the rates needed to cover the revenue requirement by dividing the revenue requirement by CCF.

Table 58: Pumping Zone Surcharges per CCF

Surcharge Areas	Number of Pressure Zones	CCF (Table 56) (1)	Estimated Energy Costs (Table 57) (2)	Proposed Surcharge per CCF (2)/(1)
Base	81		$0	$0.00
1	14	2,387,959	782,344	$0.33
2	6	805,860	366,989	$0.46
3	8	746,618	586,128	$0.79
Totals	**109**	**3,940,438**	**$1,735,461**	

9.5. RECYCLED WATER PUMPING SURCHARGE

Step 1: Identify the estimated usage for 24 months. The usage in AF per year as calculated by Navigant is multiplied by 435.6 to convert to CCF and multiplied by 2 for 24 months usage.

Table 59: Recycled Water Sales Volumes /CCF by Area

Surcharge Areas	Number of Pressure Zones	AF per Year* (1)	CCF (1) * 435.6 (2)	24 months CCF (2) *2
Base	15			
1	8	2,678	1,166,537	2,333,074
2	9	2,168	944,381	1,888,762
3	1	55	23,958	47,916
Totals	**33**	**4,901**	**2,134,876**	**4,269,751**

* Section 9.1 item 3

Step 2: The revenue requirement is determined by multiplying the pumping energy cost as calculated by Navigant in 2019 by the estimated increase since 2019 (10%) and multiplied by 2 for estimated costs for both fiscal years.

Table 60: Recycled Water Surcharge Revenue by Area for FY 2021-22 & FY 2022-23

Surcharge Areas	Number of Pressure Zones	Pumping Energy Cost in 2019* (1)	Estimated Energy Costs (1)* 10% Increase (2)	24 Months Revenue Requirement (2)* 2
Base	81	$0	$0	$0
1	14	147,984	162,782	325,565
2	6	212,486	233,735	467,469
3	8	10,135	11,149	22,297
Totals	**109**	**$370,605**	**$407,666**	**$815,331**

* Section 9.1 item 2

Step 3: Determine the rates needed to cover the revenue requirement by dividing the revenue requirement by CCF.

Table 61: Pumping Zone Surcharges per CCF

Surcharge Areas	Number of Pressure Zones	CCF From Table 59 (1)	Estimated Energy Costs From Table 60 (2)	Proposed Surcharge per CCF (2)/(1)
Base	81		$0	$0.00
1	14	2,333,074	325,565	$0.14
2	6	1,888,762	467,469	$0.25
3	8	47,916	22,297	$0.47
Totals	**109**	**4,269,751**	**$815,331**	

10. Other Sewer Related Rates

The rates addressed in this area were not addressed in the 2021 Cost of Service sewer section generated by Raftelis. The remaining areas that require analysis include:

- Industrial Waste Charge – Included in the sewer quantity charge to address sewer discharge that is stronger in terms of its organic waste strength and solids content than that of a typical user.
- Sewer Service Charge Separation – Monthly fixed sewer service charges for a collection-only rate and a treatment-only rate for customers receiving only one of the two services.

10.1. INDUSTRIAL WASTE CHARGE

This cost is included as a component of the sewer service quantity charge. Firms are required to sign industrial sewer discharge permits with OC San when their flow is expected to fall into this category. The flow is measured and the fees paid are based on OC San rates.

The District's CII waste may contain stronger organic waste strength and solids content than typical users. Using this assumption, the cost is included as a component of the quantity charge and not included in the fixed monthly service charge. The cost added to the quantity charge does not include a component for capital replacement. The

District estimates that 2.75% of the treatment and bio-solids disposal costs are allocated for industrial waste costs to treat and dispose of higher concentration waste. This estimate is based on OC San's percentage of total revenue generated from industrial waste and IRWD's CII customer base.

Step 1: Determine the total industrial waste revenue requirement. Allocate cost using the industrial waste factor.

Table 62: Industrial Waste Total Revenue Requirement

Industrial Waste Treatment and Disposal	FY 2021-22	FY 2021-23	Total	Allocation*
Sewer Treatment	$8,098,767	$8,263,371	$16,362,138	$449,959
Bio-solids Treatment and Disposal	4,974,265	5,011,321	9,985,586	274,604
Totals	**$13,073,032**	**$13,274,692**	**$26,347,724**	**$724,562**

* 2.75% of costs allocated to industrial waste handling.

Step 2: Determine the revenue generated from July 2021 through February 2022. This is done by multiplying 8 months discharge from table 31 multiplied by the actual rate.

Table 63: Industrial Waste Revenue July 2021 through February 2022

Industrial Waste Treatment and Disposal	Discharge CCF - 8 months From Table 31 (1)	FY 2021-22 Rate July-January (2)	Revenue 8 months (1) * (2)
Discharge	2,016,651	$0.136	$274,264

Step 3: Determine the revenue required for cost of service equity for each fiscal year.

Table 64: Industrial Waste Revenue July 2021 through February 2022

Customer Class	Total Revenue From Table 62 (1)	Revenue 8 months From Table 63 (2)	16 Months Revenue Required (1) - (2)
Industrial Waste Treatment and Disposal	$724,562	$274,264	$450,298

Step 4: Determine rates needed to cover the remaining 16 month period March 2022 through June 2023. This is done by dividing revenue required as calculated in step 3 by the discharge calculated in Table 35.

Table 65: Industrial Waste Charge

Customer Class	Revenue Required From Table 64 (1)	Discharge From Table 35 (2)	Proposed Rate per CCF (1)/(2)
Industrial Waste Treatment and Disposal	$450,298	4,186,303	$0.107

10.2. SEWAGE COLLECTION AND TREATMENT RATES

The District has some areas that receive only sewage collection (Newport Coast) or treatment services (Orange Park Acres). Collection only customers have their sewage flows sent directly to OC San where the treatment is provided. This is due to the service address location of the customer which makes it easier to send the sewage flows directly to OC San for treatment. For those customers who receive treatment-only services from IRWD, due to the location of their service address, these customers use OC San pipelines for collection which then flows into Michelson Water Recycling Plant (MWRP) for treatment. In both of these cases, the District allocates appropriate expenses based on the cost of service.

Sewer costs were discussed in Section (5.0) of Appendices 2, 3, and consolidated in 4. For customers who receive only collection or treatment services, the majority of those customers fall into the middle block (Block 2) of the three block sewer structure (see Table 37). The cost of service calculation for only collection or treatment services are shown in Table 60 below.

The total charge for the middle tier of $25.50 is based on a fixed charge of $7.00, a variable charge of $8.85 and a replacement cost of $9.65. The rates for collection or treatment services only are based on an allocation of fixed and variable costs plus a capital component to provide for the necessary eventual replacement of the infrastructure assets. For the fixed cost component, the collection and treatment rates are allocated equally between collection and treatment services since the benefits received by each are similar. The variable O&M component is allocated entirely to treatment services because these costs are associated entirely with treatment. For the replacement component, the percentage allocation is based on the proportionate estimated useful lives of the assets. Collection assets are primary pipes which have an estimated average useful life of 50 years. Treatment plants have an estimated average useful life of 75+ years, therefore the allocation for collection only replacement cost is 1-(50/125) or 60% of the $9.65 and treatment services allocation is 1-(75/125) or 40% of the $9.65. Pipes have to be replaced more often therefore the larger replacement percentage is allocated to pipes. Costs are rounded to the nearest $.05. Adding columns across in column 5 of Table 60, for the fixed, variable and replacement components, the collection only service costs are $9.25 and the treatment only costs are $16.25.

Table 60: Collection and Treatment Rates

Sewer Charges	Block 2 * (1)	Fixed Charge Split Equally (2)	O&M Allocated to Discharge ** (3)	Replacement *** (4)	Total (2+3+4) (5)
Block 2	$25.50	$7.00	$8.85	$9.65	$25.50
Collection		$3.50	-	$5.75	$9.25
Treatment		$3.50	$8.85	$3.90	$16.25

* from Table 37.
** Variable costs allocated based on cost of treatment.
*** Replacement capital allocated 60% to collection and 40% to treatment.

FY 2021-22

Technical Memo
Determination of Costs of Public Fire Water Service
For Irvine Ranch Water District

In February 2020, a statewide lawsuit entitled *Kessner v. City of Santa Clara* (Santa Clara Superior Court Case No. 20CV364054), was filed against over 75 public water suppliers in California, including Irvine Ranch Water District ("IRWD" or the "District"). The plaintiffs alleged that public fire water service is a "general governmental service" and not a property-related service for which customers can be charged.

As discussed in Exhibit A, and as is the custom throughout California, IRWD treats public fire water service as a property-related service. California Government Code Section 53750.5(b) explicitly authorizes this:

> *The fees or charges for property-related water service imposed or increased pursuant to Section 6 of Article XIII D of the California Constitution may include the costs to construct, maintain, repair, or replace hydrants as needed or consistent with applicable fire codes and industry standards, and may include the cost of water distributed through hydrants. In addition to any other method consistent with Section 6 of Article XIII D of the California Constitution, fees or charges for the aspects of water service related to hydrants and the water distributed through them may be fixed and collected as a separate fee or charge, or included in the other water rates and charges fixed and collected by a public agency, as provided for in Section 53069.9 of the Government Code.*

The purpose of this memo is to identify the costs for public fire water service for District customers and to describe how the District allocates these costs among all customers who receive fire water service.

Executive Summary

There are two cost components associated with public fire water service: direct costs and indirect costs. The budgeted costs for FY 2021-22 are:

Direct costs	$ 523,000
Indirect costs	$2,490,000
Total Public Fire Water Service Costs	$3,013,000

Direct costs are associated primarily with maintenance of the fire hydrants. These include inspections, painting, and flushing of the hydrants. Flushing is an important maintenance activity that verifies the proper operation of the hydrant to ensure adequate water flow will be available when the need to extinguish a structure fire arises. Flushing also removes the sediment that naturally accumulates in the hydrant.

Indirect costs are the District's costs for design and sizing of the infrastructure to support the "fire flow" (volume and pressure of water) prescribed to meet peak firefighting water demand. The District's water system is designed to provide capacity to handle two defined hypothetical fires. Capacity is measured in terms of maximum hourly and maximum daily water flow. See Table J below. The annual costs to provide that fire flow capacity are the indirect costs.

Details as to how these costs are calculated are described in this memo. Both direct and indirect costs are incurred by IRWD to ensure that fire hydrants can immediately provide the prescribed water flows to fight structure fires on adjacent and proximate real property served by IRWD. IRWD's rate structure, including public fire water service, complies with Proposition 218's cost-of-service and proportionality principles.

Calculation of Public Fire Water Service Costs

As discussed in the Cost of Service Design Study (the "Study"), IRWD's existing rate structure allocates fire water service costs among customers through a monthly fixed water meter service charge (see Sections 4.3.3 and 4.3.5 in the Study for further discussion). The monthly charges are for fixed expenditures that relate to the overall asset maintenance and operational activities of the District, including operational support activities such as accounting, billing, customer service, and administrative and technical support. These expenditures are common to all customers and are reasonably uniform across the different customer classes. The service charges also include meter- and capacity-related costs, such as meter maintenance and peaking charges, to meet peak fire water demand requirements that are included based on the meter's hydraulic capacity (measured in gallons per minute [gpm]). The total cost for public fire water service is allocated to all customers - residential, commercial, industrial, institutional, irrigation, and agricultural – because all those customers benefit from the protection of fire flows to extinguish fires on sites connected to the water system, both with and without structures.

There are two cost components associated with public fire water service: direct costs and indirect costs.

Direct Costs: Direct costs of fire water service include triennial fire hydrant maintenance. This is based on inspections and services to all District fire hydrants, of which approximately one-third are serviced or inspected annually on a rotating basis. The direct cost component also includes the amount of water used for flushing. The budget for direct costs for FY 2021-22 is $523,000. Budgeted costs are based on historical unit costs, inflation factors, and projected maintenance activity.

Indirect Costs: The second component of public fire water service costs is indirect costs. Indirect costs are those associated with designing, building, operating, and maintaining the infrastructure to support the fire flow necessary to meet peak fire flow demand requirements (called "peaking factors"), which are set generally by the relevant land use agency as a condition for subdivision or construction permitting, as well as the water used for firefighting. These costs are included in IRWD's normal operating expenses and allocated to District customers through the monthly meter service charge. Indirect costs for FY 2021-22 are budgeted at $2,490,000.

The District uses a detailed method to calculate the annual indirect costs of fire water service. There are two primary components of indirect fire water service costs: asset maintenance and operating expense. For the first component, the District categorizes its assets by function and calculates the costs of asset maintenance allocated to fire water service. For the second component, the District breaks down system operating costs and determines allocations to fire water service based on demand categories.

The following steps are used to calculate indirect fire water service costs:

a. Identify total system peaking factors allocated to Base, Max Day, and Max Hour demands;
b. Apply functional allocation percentages to the asset categories;
c. Allocate asset values by function;
d. Allocate functions to peaking factors;
e. Determine asset value by peaking factor;
f. Allocate operating costs by their demands on the system;
g. Summarize peaking factor percentages for all operating costs by demand category;
h. Identify operating costs by demand category;
i. Calculate the cost of service by peaking factor;

j. Determine capacity requirements for fire flow and the allocation to public fire water supply capacity; and
k. Compute the public fire water supply cost-of-service.

The result is the cost estimate for the indirect component related to public fire water service. Each of these steps is discussed in more detail below:

a. Identify total system peaking factors – Peak water system demand factors, or "peaking factors," are based on the District's Master Plan, which uses the requirements of the city or other land use agency in which the hydrants are located. The factors are calculated based on the following demands on the system:

1. Base demand, which is equivalent to the average daily demand on the water system within a given year;
2. Maximum day or Max Day demand, which represents the maximum volume of water used during a 24 hour period within a year. Based on historical experience, the Master Plan sets Max Day demand equal to 1.8 times the Base demand. The Base demand component of Max Day (1.0/1.8) is 55.6%, while the incremental Max Day demand (the portion in excess of the Base demand component) is (0.8/1.8) is 44.4%; and
3. Maximum hour or Max Hour demand, which represents the maximum volume of water used within a one hour period within a year. Based on historical experience, the Master Plan sets Max Hour demand equal to 2.5 times the Base demand. The Base demand component of Max Hour (1.0/2.5) is 40%, while the Max Day component (0.8/2.5) is 32% and the incremental Max Hour demand (0.7/2.5) is 28%.

Table A: Identify Peaking Factors

Allocation Factor	System Peaking Factor	Base	Max Day	Max Hour	Total
Base	1.00	100%	0%	0%	100%
Max Day	1.80	56%	44%	0%	100%
Max Hour	2.50	40%	32%	28%	100%

First Component – asset maintenance: To allocate annual asset maintenance costs to Base demand, Max Day demand, and Max Hour demand capacity, the District first allocates the value of its assets to functional categories (Tables B and C below), then assigns the functionalized assets to the several peaking factors (Table D below), and then calculates the values per peaking factor (Table E below).

b. Apply functional allocation percentages to the asset categories - The asset categories are based on the District's historic asset groupings as identified in the District's accounting system. Raftelis Financial Consultants (Raftelis) has identified the several functions performed by District assets. Based on their professional judgement and experience, Raftelis has assigned the percentage of each asset type allocable to each function.

Table B: Functional Allocation Percentages

	Asset Functions							
Asset Type	Supply	Storage	Pumping	Transmis-sion	Distrib-ution	Meters	Fire	Total
Pipes				30%	70%			100%
Reservoirs	80%	20%						100%
Hydrants							100%	100%
System Valves				30%	70%			100%
Pump Stations			100%					100%
Meters						100%		100%
Pressure Regulating Stations					100%			100%
Wells	100%							100%

c. **Allocate asset values by function –** The total value of each asset category, as shown in the District's fiscal year end 2019-20 accounting records, is allocated to the several asset functions according to the percentages identified in Table B. FY 2019-20 was used because the data for FY 2020-21 was not available until recently, the change in assets from FY 2019-20 to FY 2020-21 is immaterial and the impact to allocations is minimal.

Table C: Allocation of Asset Values to Functions

	Asset Functions (dollars in millions)							
Asset Type	Supply	Storage	Pumping	Transmis-sion	Distrib-ution	Meters	Fire	Total
Pipes	$ -	$ -	$ -	$ 688.4	$ 1,606.3	$ -	$ -	$ 2,294.7
Reservoirs	282.1	70.5	-	-	-	-	-	352.6
Hydrants	-	-	-	-	-	-	228.7	228.7
System Valves	-	-	-	51.3	119.8	-	-	171.1
Pump Stations	-	-	92.8	-	-	-	-	92.8
Meters	-	-	-	-	-	40.9	-	40.9
Pressure Regulating Stati	-	-	-	-	7.8	-	-	7.8
Wells	3.6	-	-	-	-	-	-	3.6
Total Allocation	**$ 285.7**	**$ 70.5**	**$ 92.8**	**$ 739.7**	**$ 1,733.9**	**$ 40.9**	**$ 228.7**	**$ 3,192.2**

d. **Allocate functions to peaking factors** - Peaking factor allocation percentages in Table A are assigned to the functions in Table B. These assignments are based on the professional judgement and experience of Raftelis. Meter and direct fire hydrant maintenance expenses do not change with peaking factors and are allocated separately to become a component in the customer's fixed meter service charge.

Table D: Peaking Factor Percentages Allocated to Asset Functions

Asset Functions	Allocation Basis	Base	Max Day	Max Hour	Customer	Fire	Total
Supply	**Base**	100%	0%	0%			100%
Storage	**Max Hour**	40%	32%	28%			100%
Pumping	**Max Hour**	40%	32%	28%			100%
Transmission	**Max Day**	56%	44%	0%			100%
Distribution	**Max Hour**	40%	32%	28%			100%
Meters					100%		100%
Fire						100%	100%

e. **Determine asset value by peaking factor** - The asset values in Table C are multiplied by the percentages identified in Table D. The assets that are assigned directly to fire water supply (i.e., the hydrants) are then reallocated to peaking factors based on the total allocation value component percentages. The percentage of annual maintenance costs allocated to each demand factor is then determined based on the reallocated values.

Table E: Asset Values Allocated by Peaking Factor Percentages

Functionalized Expenses (millions)	Allocation Basis	Base	Max Day	Max Hour	Customer	Fire	Total
Supply	Base	$ 285.7	$ -	$ -	$ -	$ -	$ 285.7
Storage	Max Hour	28.2	22.6	19.7	-	-	70.5
Pumping	Max Hour	37.1	29.7	26.0	-	-	92.8
Transmission	Max Day	411.0	328.7	-	-	-	739.7
Distribution	Max Hour	693.6	554.8	485.5	-	-	1,733.9
Meters		-	-	-	40.9	-	40.9
Fire		-	-	-	-	228.7	228.7
Total Allocation		**$ 1,455.6**	**$ 935.8**	**$ 531.2**	**$ 40.9**	**$ 228.7**	**$ 3,192.2**
Reallocation of Fire		$ 112.3	$ 72.2	$ 41.0	$ 3.2	$ (228.7)	$ -
Revised Allocation		**$ 1,567.9**	**$ 1,008.0**	**$ 572.2**	**$ 44.1**	**$ -**	**$ 3,192.2**
Asset Maintenance		*49.1%*	*31.6%*	*17.9%*	*1.4%*	*0.0%*	*100%*

Second component – operating costs: To allocate annual operating costs to Base demand, Max Day demand, and Max Hour demand capacity, the District first allocates each of the nine demand categories of operating costs (see list and Table G below) to the three demand factors. The District then assigns costs to each of the demand categories (Table H below). Finally, the District calculates the costs per peaking factor (Exhibit I below).

f. Categorize operating costs by their demands on the system – The strategy for allocating operating expenses is based on demands on the system. Table F below shows the nine operating cost demand categories and the asset maintenance cost demand category, assigned to variable and fixed revenue requirement groups. The net costs include all potable operating costs, capital contributions, and offsets. (See Table 13 [variable revenue requirement] and Table 14 [fixed revenue requirement] in the Study for the identification of the demand categories and the costs assigned to each one).

Table F: Operating and Asset Maintenance Cost System Demand Categories

	Cost Group	Demand Category
Variable:	Water Supplies	Base Supply
	Water Supplies	Excess Supply
	Conservation and Supply Reliability	Water Banking
	Conservation and Supply Reliability	Conservation and NTS
	Conservation and Supply Reliability	Universal Conservation
Fixed:	Fixed Operating Costs	Customer Service
	Fixed Operating Costs	System Maintenance
	Fixed Operating Costs	G&A and Administrative
	Fixed Operating Costs	G&A Plant
	Fixed Operating Costs	Asset Maintenance (1)

(1) Includes fleet and building maintenance.

The demands for each operating expense category on the system, based on the professional judgment and experience of Raftelis, are as follows:

1. Base Supply – Primary water supply sources meeting low volume and most base rate demands. This is included as 100% Base demand.
2. Excess Supply – Imported water is used to meet a portion of the base and all over-allocation demands. The distribution between Base, Max Day, and Max Hour is based on allocated use of imported water between the base, inefficient, and wasteful tiers (Table 16 Cost of Service Report).

3. Water Banking – Similarly, water banking is a source of supply that is only necessary during severe water limitations. This is allocated entirely to Max Hour.
4. Targeted Conservation and NTS – These expenses are used to manage and reduce water overuse. Targeted conservation is outreach to customers exceeding budget use while NTS provides for treatment of overuse flows prior to flowing to the ocean. These costs are allocated to Max Day and Max Hour based on demands (Table 17 Cost of Service Report).
5. Universal Conservation – These costs include District efforts to educate customers on ways to conserve water. This is allocated to all sales except low volume. Low volume sales are excluded because remaining within low volume usage provides a high level of conservation. These costs are allocated to Base, Max Day, and Max Hour based on the respective percentage of sales to the base, inefficient and wasteful tiers (Table 17 Cost of Service Report).
6. Customer Service – This is primarily costs associated with providing communication to District customers. It includes responding to bill payment questions, requests for service, reading meters, etc. This has no impact on peaking factors and is included in the fixed charges allocated to meters.
7. System Maintenance – This includes costs related to the overall maintenance and operational activities of the District. It is a Base cost and excludes the direct cost of fire hydrant maintenance.
8. General and Administrative (G&A) – This includes indirect operating costs that are not directly allocable to a system but provide a benefit for all systems. This is allocated to Base, Max Day, Max Hour, customer, and direct fire hydrant maintenance based on their respective portion of total costs.
9. General Plant - This includes costs associated with the purchase of assets used within the office, District fleet, etc. They are allocated between Base and Max Day using the Max Day peaking factor percentage.

g. Summarize peaking factor percentages for all operating costs by demand category - Peaking factor percentages for operating expenses by demand category are summarized in the table below. These are assigned based on the professional judgment and experience of Raftelis.

Table G: Summarized Peaking Factor Percentages for all Operating Costs

Demand Category	Base	Max Day	Max Hour	Customer	Fire	General	Total
Base Supply	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Excess Supply	21.5%	43.2%	35.2%	0.0%	0.0%	0.0%	100%
Conservation and Supply Reliability	5.9%	45.0%	49.1%	0.0%	0.0%	0.0%	100%
Customer Service	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100%
System Maintenance	94.8%	0.0%	0.0%	0.0%	3.1%	0.0%	98%
Asset Maintenance	49.1%	31.6%	17.9%	1.4%	0.0%	0.0%	100%
G & A	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100%
GP	55.6%	44.4%	0.0%	0.0%	0.0%	0.0%	100%

h. Identify operating costs by demand category – Amounts are assigned to demand categories shown in Table F. The net costs are explained in further detail in section 4.3 in the Study and as stated above, are shown in Table 13 (variable revenue requirement) and Table 14 (fixed revenue requirement).

Table H: Operating and Asset Maintenance Costs by System Demands FY 2021-22

	Cost Group	Demand Category	Cost (Thousands)	Totals
Variable:	Water Supplies	Base Supply	$34,774	
	Water Supplies	Excess Supply	8,983	
	Conservation and Supply Reliability	Water Banking	1,889	
	Conservation and Supply Reliability	Conservation and NTS	11,725	
	Conservation and Supply Reliability	Universal Conservation	1,522	58,892
Fixed:	Fixed Operating Costs	Customer Service	$4,548	
	Fixed Operating Costs	System Maintenance	15,352	
	Fixed Operating Costs	G&A and Administrative	9,046	
	Fixed Operating Costs	G&A Plant	850	
	Fixed Operating Costs	Asset Maintenance	2,489	32,284
		Net allocated Costs	$91,177	$91,177

i. Calculate cost-of-service by peaking factor - The allocated percentages identified in Table G are applied to the operating costs identified in Table H to calculate the cost by peaking factor. General and Administrative (G&A) is reallocated based on the total cost of service.

Table I: Calculate Cost-of-Service by Peaking Factor for FY 2021-22

	Cost Allocation (thousands)						
Demand Category	**Base**	**Max Day**	**Max Hour**	**Customer**	**Fire**	**G&A**	**Total**
Base Supply	$ 34,572	$ -	$ -	$ 203	$ -	$ -	$ 34,774
Excess Supply	1,934	3,884	3,164	-	-	-	8,983
Conservation and Supply Reliability	1,286	6,591	7,258	-	-	-	15,136
Customer Service	-	-	-	4,548	-	-	4,548
System Maintenance	14,876	-	-	-	476	-	15,352
Asset Maintenance	1,222	786	446	34	-	-	2,489
G & A	-	-	-	-	-	9,046	9,046
GP	472	378	-	-	-	-	850
Total Allocated Costs	**$ 54,363**	**$ 11,639**	**$ 10,869**	**$ 4,785**	**$ 476**	**$ 9,046**	**$ 91,177**

j. Determine capacity requirements for fire flow and the allocation to public fire water supply capacity - To estimate the costs associated with (and to provide capacity for) public fire water service, the methodology put forth in the AWWA M1 Manual was used.

To determine the capacity requirements for fire flow, the District uses two hypothetical fires with varying fire flow. The first fire requires flows of 2,500 gallons per minute for a minimum of 4 hours, and the second requires 8,000 gallons per minute for a minimum of 8 hours as shown below. These hypothetical fires were chosen based on the professional judgement and experience of Raftelis.

Fire flows as a percentage of total capacity is converted to a percentage and used to identify the indirect cost allocated to water supply for public and private fire protection. The water supply demand capacity for public and private fire water service are based on firelines and hydrant capacity.

Water is supplied for private fire service through pipes and appurtenances on private property. These include all water-based fire protection systems, such as fire protection sprinklers and fire hydrants that are not part of, but are connected to, the public water service. Costs are allocated to these systems in a similar fashion and billed separately to the individual customers owning the private fire protection systems.

Max Day capacity is the amount of water needed for the duration of a fire in one day (fire flow gallons per minute multiplied by the duration of fire in minutes).

Max Hour capacity is the amount of water needed if a similar fire lasted an entire day (fire flow gallons per minute multiplied by the number of minutes in a day), less the capacity already allocated to Max Day. Capacity amounts in gallons are converted to CCF in the table below. (One CCF = 748.05 gallons.)

Table J: Capacity Requirements for Fire Flow and Public Fire Allocation

	Fire #1		Fire #2		Total	
Fire Flow Estimate	**Max Day (1)**	**Max Hour (2)**	**Max Day (1)**	**Max Hour (2)**	**Max Day**	**Max Hour**
Duration of Fire (Hours)	4.00		4.00		8.00	
Fire Flow (gpm)	2,500	2,500	8,000	8,000	10,500	10,500
Percent Allocated to Public Fire	74.9%	74.9%	74.9%	74.9%	74.9%	74.9%
Capacity Demanded for Fire (ccf)	802	4,010	2,567	12,833	3,369	16,844
Public Fire Capacity (ccf) (3)	601	3,005	1,923	9,616	2,524	12,621
Private Fire Capacity (ccf) (4)	201	1,005	643	3,217	845	4,223
Total Potable Capacity	84,624	72,789				
Public Fire Allocation (Max Day: 2,524/84624;Max Hour 12,621/72789)					**3.0%**	**17.3%**
Private Fire Allocation (Max Day: 845/84,624;Max Hour 4,223/72,789)					1.0%	5.8%

(2) Max Day Capacity demanded for fire = (hours*minutes*gallons)/748.05.
(3) Max Hour Capacity demanded for fire = (hours*minutes*gallons)/748.05 – Max Day Capacity.
(4) Split is based on total system hydrants =2,784,809/fireline meter capacity= 698,174
(5) Total potable capacity is max day and max hour demands for all customer classes.

k. Compute the public fire water service cost –

The Max Day and Max Hour percentages identified in Table J for public fire water service are applied to the total cost-of-service by peaking factor to reallocate expenses included in Max Day and Max Hour fire protection water service costs to customer costs:

Max Day Public Fire Water Service costs: 3.0% * $ $13,086K = $ 390k

Max Hour Public Fire Water Service costs: 17.3% * $12,110K = $2,100k

Total indirect costs of Public Fire Water Service: $2,490k

Table K: Public Fire Water Service Cost-of-Service for FY 2021-22

Cost Allocation (thousands)	Base	Max Day	Max Hour	Customer	Direct Fire	Private Fire	Total
Total Operating Costs	$ 60,188	$ 13,086	$ 12,110	$ 5,270	$ 523	$ -	$ 91,177
Allocation of Direct Public Fire to Customer				**523**	**(523)**		-
Allocation of Indirect Public Fire to Customer (1)		**(390)**	**(2,100)**	**2,490**			-
Allocation to Private Fire		(147)	(789)	-		936	-
Adjusted Cost of Service	**$ 60,188**	**$ 12,549**	**$ 9,221**	**$ 8,282**	**$ -**	**$ 936**	**$ 91,177**
Total Cost of Public Fire Included in "Customer"				**$ 3,013**			

(1) As described above, public fire water is calculated as follows:
Max day - $ $13,086K (Table J) * 3.0% = $390K
Max Hour - $12,110K (Table J) * 17.3% = $2,100K

As identified in Table K, there are two cost components associated with public fire water service: direct and indirect. The total cost of public fire water service is $3,013,000 including the direct cost of $523,000 and the indirect cost of $2,490,000.

Total public fire water service costs are allocated to all customers through the fixed meter charge through the IRWD's rate structure. This complies with Proposition 218's cost-of-service and proportionality principles because meter charges are proportional to a given property's water demand, and that water demand is proportional to the property's use and need for fire water service.

FY 2022-23

Technical Memo
Determination of Costs of Public Fire Water Service
For Irvine Ranch Water District

In February 2020, a statewide lawsuit entitled *Kessner v. City of Santa Clara* (Santa Clara Superior Court Case No. 20CV364054), was filed against over 75 public water suppliers in California, including Irvine Ranch Water District ("IRWD" or the "District"). The plaintiffs alleged that public fire water service is a "general governmental service" and not a property-related service for which customers can be charged.

As discussed in Exhibit A, and as is the custom throughout California, IRWD treats public fire water service as a property-related service. California Government Code Section 53750.5(b) explicitly authorizes this:

> *The fees or charges for property-related water service imposed or increased pursuant to Section 6 of Article XIII D of the California Constitution may include the costs to construct, maintain, repair, or replace hydrants as needed or consistent with applicable fire codes and industry standards, and may include the cost of water distributed through hydrants. In addition to any other method consistent with Section 6 of Article XIII D of the California Constitution, fees or charges for the aspects of water service related to hydrants and the water distributed through them may be fixed and collected as a separate fee or charge, or included in the other water rates and charges fixed and collected by a public agency, as provided for in Section 53069.9 of the Government Code.*

The purpose of this memo is to identify the costs for public fire water service for District customers and to describe how the District allocates these costs among all customers who receive fire water service.

Executive Summary

There are two cost components associated with public fire water service: direct costs and indirect costs. The budgeted costs for FY 2022-23 are:

Direct costs	$ 541,000
Indirect costs	$2,532,000
Total Public Fire Water Service Costs	$3,073,000

Direct costs are associated primarily with maintenance of the fire hydrants. These include inspections, painting, and flushing of the hydrants. Flushing is an important maintenance activity that verifies the proper operation of the hydrant to ensure adequate water flow will be available when the need to extinguish a structure fire arises. Flushing also removes the sediment that naturally accumulates in the hydrant.

Indirect costs are the District's costs for design and sizing of the infrastructure to support the "fire flow" (volume and pressure of water) prescribed to meet peak firefighting water demand. The District's water system is designed to provide capacity to handle two defined hypothetical fires. Capacity is measured in

terms of maximum hourly and maximum daily water flow. See Table J below. The annual costs to provide that fire flow capacity are the indirect costs.

Details as to how these costs are calculated are described in this memo. Both direct and indirect costs are incurred by IRWD to ensure that fire hydrants can immediately provide the prescribed water flows to fight structure fires on adjacent and proximate real property served by IRWD. IRWD's rate structure, including public fire water service, complies with Proposition 218's cost-of-service and proportionality principles.

Calculation of Public Fire Water Service Costs

As discussed in the Cost of Service Design Study (the "Study"), IRWD's existing rate structure allocates fire water service costs among customers through a monthly fixed water meter service charge (see Sections 4.3.3 and 4.3.5 in the Study for further discussion). The monthly charges are for fixed expenditures that relate to the overall asset maintenance and operational activities of the District, including operational support activities such as accounting, billing, customer service, and administrative and technical support. These expenditures are common to all customers and are reasonably uniform across the different customer classes. The service charges also include meter- and capacity-related costs, such as meter maintenance and peaking charges, to meet peak fire water demand requirements that are included based on the meter's hydraulic capacity (measured in gallons per minute [gpm]). The total cost for public fire water service is allocated to all customers - residential, commercial, industrial, institutional, irrigation, and agricultural – because all those customers benefit from the protection of fire flows to extinguish fires on sites connected to the water system, both with and without structures.

There are two cost components associated with public fire water service: direct costs and indirect costs.

Direct Costs: Direct costs of fire water service include triennial fire hydrant maintenance. This is based on inspections and services to all District fire hydrants, of which approximately one-third are serviced or inspected annually on a rotating basis. The direct cost component also includes the amount of water used for flushing. The budget for direct costs for FY 2022-23 is $541,000. Budgeted costs are based on historical unit costs, inflation factors, and projected maintenance activity.

Indirect Costs: The second component of public fire water service costs is indirect costs. Indirect costs are those associated with designing, building, operating, and maintaining the infrastructure to support the fire flow necessary to meet peak fire flow demand requirements (called "peaking factors"), which are set generally by the relevant land use agency as a condition for subdivision or construction permitting, as well as the water used for firefighting. These costs are included in IRWD's normal operating expenses and allocated to District customers through the monthly meter service charge. Indirect costs for FY 2022-23 are budgeted at $2,532,000.

The District uses a detailed method to calculate the annual indirect costs of fire water service. There are two primary components of indirect fire water service costs: asset maintenance and operating expense. For the first component, the District categorizes its assets by function and calculates the costs of asset maintenance allocated to fire water service. For the second component, the District breaks down system operating costs and determines allocations to fire water service based on demand categories.

The following steps are used to calculate indirect fire water service costs:

a. Identify total system peaking factors allocated to Base, Max Day, and Max Hour demands;
b. Apply functional allocation percentages to the asset categories;
c. Allocate asset values by function;
d. Allocate functions to peaking factors;
e. Determine asset value by peaking factor;
f. Allocate operating costs by their demands on the system;

g. Summarize peaking factor percentages for all operating costs by demand category;
h. Identify operating costs by demand category;
i. Calculate the cost of service by peaking factor;
j. Determine capacity requirements for fire flow and the allocation to public fire water supply capacity; and
k. Compute the public fire water supply cost-of-service.

The result is the cost estimate for the indirect component related to public fire water service. Each of these steps is discussed in more detail below:

a. Identify total system peaking factors – Peak water system demand factors, or "peaking factors," are based on the District's Master Plan, which uses the requirements of the city or other land use agency in which the hydrants are located. The factors are calculated based on the following demands on the system:

1. Base demand, which is equivalent to the average daily demand on the water system within a given year;
2. Maximum day or Max Day demand, which represents the maximum volume of water used during a 24 hour period within a year. Based on historical experience, the Master Plan sets Max Day demand equal to 1.8 times the Base demand. The Base demand component of Max Day (1.0/1.8) is 55.6%, while the incremental Max Day demand (the portion in excess of the Base demand component) is (0.8/1.8) is 44.4%; and
3. Maximum hour or Max Hour demand, which represents the maximum volume of water used within a one hour period within a year. Based on historical experience, the Master Plan sets Max Hour demand equal to 2.5 times the Base demand. The Base demand component of Max Hour (1.0/2.5) is 40%, while the Max Day component (0.8/2.5) is 32% and the incremental Max Hour demand (0.7/2.5) is 28%.

Table A: Identify Peaking Factors

Allocation Factor	System Peaking Factor	Base	Max Day	Max Hour	Total
Base	1.00	100%	0%	0%	100%
Max Day	1.80	56%	44%	0%	100%
Max Hour	2.50	40%	32%	28%	100%

First Component – asset maintenance: To allocate annual asset maintenance costs to Base demand, Max Day demand, and Max Hour demand capacity, the District first allocates the value of its assets to functional categories (Tables B and C below), then assigns the functionalized assets to the several peaking factors (Table D below), and then calculates the values per peaking factor (Table E below).

b. Apply functional allocation percentages to the asset categories – The asset categories are based on the District's historic asset groupings as identified in the District's accounting system. Raftelis Financial Consultants (Raftelis) has identified the several functions performed by District assets. Based on their professional judgement and experience, Raftelis has assigned the percentage of each asset type allocable to each function.

Table B: Functional Allocation Percentages

	Asset Functions							
Asset Type	Supply	Storage	Pumping	Transmis-sion	Distrib-ution	Meters	Fire	Total
Pipes				30%	70%			100%
Reservoirs	80%	20%						100%
Hydrants							100%	100%
System Valves				30%	70%			100%
Pump Stations			100%					100%
Meters						100%		100%
Pressure Regulating Stations					100%			100%
Wells	100%							100%

c. **Allocate asset values by function –** The total value of each asset category, as shown in the District's fiscal year end 2019-20 accounting records, is allocated to the several asset functions according to the percentages identified in Table B. FY 2019-20 was used because the data for FY 2020-21 was not available until recently, the change in assets from FY 2019-20 to FY 2020-21 is immaterial and the impact to allocations is minimal.

Table C: Allocation of Asset Values to Functions

	Asset Functions (dollars in millions)							
Asset Type	Supply	Storage	Pumping	Transmis-sion	Distrib-ution	Meters	Fire	Total
Pipes	$ -	$ -	$ -	$ 688.4	$ 1,606.3	$ -	$ -	$ 2,294.7
Reservoirs	282.1	70.5	-	-	-	-	-	352.6
Hydrants	-	-	-	-	-	-	228.7	228.7
System Valves	-	-	-	51.3	119.8	-	-	171.1
Pump Stations	-	-	92.8	-	-	-	-	92.8
Meters	-	-	-	-	-	40.9	-	40.9
Pressure Regulating Stati	-	-	-	-	7.8	-	-	7.8
Wells	3.6	-	-	-	-	-	-	3.6
Total Allocation	**$ 285.7**	**$ 70.5**	**$ 92.8**	**$ 739.7**	**$ 1,733.9**	**$ 40.9**	**$ 228.7**	**$ 3,192.2**

d. **Allocate functions to peaking factors –** Peaking factor allocation percentages in Table A are assigned to the functions in Table B. These assignments are based on the professional judgement and experience of Raftelis. Meter and direct fire hydrant maintenance expenses do not change with peaking factors and are allocated separately to become a component in the customer's fixed meter service charge.

Table D: Peaking Factor Percentages Allocated to Asset Functions

Asset Functions	Allocation Basis	Base	Max Day	Max Hour	Customer	Fire	Total
Supply	**Base**	100%	0%	0%			100%
Storage	**Max Hour**	40%	32%	28%			100%
Pumping	**Max Hour**	40%	32%	28%			100%
Transmission	**Max Day**	56%	44%	0%			100%
Distribution	**Max Hour**	40%	32%	28%			100%
Meters					100%		100%
Fire						100%	100%

e. **Determine asset value by peaking factor –** The asset values in Table C are multiplied by the percentages identified in Table D. The assets that are assigned directly to fire water supply (i.e., the hydrants) are then reallocated to peaking factors based on the total allocation value component percentages. The percentage of annual maintenance costs allocated to each demand factor is then determined based on the reallocated values.

Table E: Asset Values Allocated by Peaking Factor Percentages

Functionalized Expenses (millions)	Allocation Basis	Base	Max Day	Max Hour	Customer	Fire	Total
Supply	Base	$ 285.7	$ -	$ -	$ -	$ -	$ 285.7
Storage	Max Hour	28.2	22.6	19.7	-	-	70.5
Pumping	Max Hour	37.1	29.7	26.0	-	-	92.8
Transmission	Max Day	411.0	328.7	-	-	-	739.7
Distribution	Max Hour	693.6	554.8	485.5	-	-	1,733.9
Meters		-	-	-	40.9	-	40.9
Fire		-	-	-	-	228.7	228.7
Total Allocation		**$ 1,455.6**	**$ 935.8**	**$ 531.2**	**$ 40.9**	**$ 228.7**	**$ 3,192.2**
Reallocation of Fire		$ 112.3	$ 72.2	$ 41.0	$ 3.2	$ (228.7)	$ -
Revised Allocation		**$ 1,567.9**	**$ 1,008.0**	**$ 572.2**	**$ 44.1**	**$ -**	**$ 3,192.2**
Asset Maintenance		*49.1%*	*31.6%*	*17.9%*	*1.4%*	*0.0%*	*100%*

Second component – operating costs: To allocate annual operating costs to Base demand, Max Day demand, and Max Hour demand capacity, the District first allocates each of the nine demand categories of operating costs (see list and Table G below) to the three demand factors. The District then assigns costs to each of the demand categories (Table H below). Finally, the District calculates the costs per peaking factor (Exhibit I below).

f. Allocate operating costs by their demands on the system – The strategy for allocating operating expenses is based on demands on the system. Table F below shows the nine operating cost demand categories and the asset maintenance cost demand category, assigned to variable and fixed revenue requirement groups. The net costs include all potable operating costs, capital contributions, and offsets. (See Table 13 [variable revenue requirement] and Table 14 [fixed revenue requirement] in the Study for the identification of the demand categories and the costs assigned to each one).

Table F: Operating and Asset Maintenance Cost System Demand Categories

	Cost Group	Demand Category
Variable:	Water Supplies	Base Supply
	Water Supplies	Excess Supply
	Conservation and Supply Reliability	Water Banking
	Conservation and Supply Reliability	Conservation and NTS
	Conservation and Supply Reliability	Universal Conservation
Fixed:	Fixed Operating Costs	Customer Service
	Fixed Operating Costs	System Maintenance
	Fixed Operating Costs	G&A and Administrative
	Fixed Operating Costs	G&A Plant
	Fixed Operating Costs	Asset Maintenance (1)

(1) Includes fleet and building maintenance.

The demands for each operating expense category on the system, based on the professional judgment and experience of Raftelis, are as follows:

1. Base Supply – Primary water supply sources meeting low volume and most base rate demands. This is included as 100% Base demand.
2. Excess Supply – Imported water is used to meet a portion of the base and all over-allocation demands. The distribution between Base, Max Day, and Max Hour is based on allocated use of imported water between the base, inefficient, and wasteful tiers (Table 16 Cost of Service Report).

3. Water Banking – Similarly, water banking is a source of supply that is only necessary during severe water limitations. This is allocated entirely to Max Hour.
4. Targeted Conservation and NTS – These expenses are used to manage and reduce water overuse. Targeted conservation is outreach to customers exceeding budget use while NTS provides for treatment of overuse flows prior to flowing to the ocean. These costs are allocated to Max Day and Max Hour based on demands (Table 17 Cost of Service Report).
5. Universal Conservation – These costs include District efforts to educate customers on ways to conserve water. This is allocated to all sales except low volume. Low volume sales are excluded because remaining within low volume usage provides a high level of conservation. These costs are allocated to Base, Max Day, and Max Hour based on the respective percentage of sales to the base, inefficient and wasteful tiers (Table 17 Cost of Service Report).
6. Customer Service – This is primarily costs associated with providing communication to District customers. It includes responding to bill payment questions, requests for service, reading meters, etc. This has no impact on peaking factors and is included in the fixed charges allocated to meters.
7. System Maintenance – This includes costs related to the overall maintenance and operational activities of the District. It is a Base cost and excludes the direct cost of fire hydrant maintenance.
8. General and Administrative (G&A) – This includes indirect operating costs that are not directly allocable to a system but provide a benefit for all systems. This is allocated to Base, Max Day, Max Hour, customer, and direct fire hydrant maintenance based on their respective portion of total costs.
9. General Plant - This includes costs associated with the purchase of assets used within the office, District fleet, etc. They are allocated between Base and Max Day using the Max Day peaking factor percentage.

g. Summarize peaking factor percentages for all operating costs by demand category – Peaking factor percentages for operating expenses by demand category are summarized in the table below. These are assigned based on the professional judgment and experience of Raftelis.

Table G: Summarized Peaking Factor Percentages for all Operating Costs

Demand Category	Base	Max Day	Max Hour	Customer	Fire	General	Total
Base Supply	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Excess Supply	21.5%	43.2%	35.2%	0.0%	0.0%	0.0%	100%
Conservation and Supply Reliability	5.9%	45.0%	49.1%	0.0%	0.0%	0.0%	100%
Customer Service	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100%
System Maintenance	94.8%	0.0%	0.0%	0.0%	3.1%	0.0%	98%
Asset Maintenance	49.1%	31.6%	17.9%	1.4%	0.0%	0.0%	100%
G & A	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100%
GP	55.6%	44.4%	0.0%	0.0%	0.0%	0.0%	100%

h. Identify operating costs by demand category – Amounts are assigned to demand categories shown in Table F. The net costs are explained in further detail in section 4.3 in the Study and as stated above, are shown in Table 13 (variable revenue requirement) and Table 14 (fixed revenue requirement).

Table H: Operating and Asset Maintenance Costs by System Demands FY 2022-23

	Cost Group	Demand Category	Cost (Thousands)	Totals
Variable:	Water Supplies	Base Supply	$36,644	
	Water Supplies	Excess Supply	9,748	
	Conservation and Supply Reliability	Water Banking	1,907	
	Conservation and Supply Reliability	Conservation and NTS	11,820	
	Conservation and Supply Reliability	Universal Conservation	1,629	61,749
Fixed:	Fixed Operating Costs	Customer Service	$4,819	
	Fixed Operating Costs	System Maintenance	15,903	
	Fixed Operating Costs	G&A and Administrative	9,437	
	Fixed Operating Costs	G&A Plant	756	
	Fixed Operating Costs	Asset Maintenance	2,559	33,474
		Net allocated Costs	$95,223	$95,223

i. Calculate cost-of-service by peaking factor – The allocated percentages identified in Table G are applied to the operating costs identified in Table H to calculate the cost by peaking factor. General and Administrative (G&A) is reallocated based on the total cost of service.

Table I: Calculate Cost-of-Service by Peaking Factor for FY 2022-23

	Cost Allocation (thousands)						
Demand Category	**Base**	**Max Day**	**Max Hour**	**Customer**	**Fire**	**G&A**	**Total**
Base Supply	$ 36,423	$ -	$ -	$ 221	$ -	$ -	$ 36,644
Excess Supply	2,099	4,215	3,434	-	-	-	9,748
Conservation and Supply Reliability	1,377	6,653	7,327	-	-	-	15,357
Customer Service	-	-	-	4,819	-	-	4,819
System Maintenance	15,411	-	-	-	493	-	15,903
Asset Maintenance	1,257	808	459	35	-	-	2,559
G & A	-	-	-	-	-	9,437	9,437
GP	420	336	-	-	-	-	756
Total Allocated Costs	**$ 56,986**	**$ 12,012**	**$ 11,220**	**$ 5,075**	**$ 493**	**$ 9,437**	**$ 95,223**

j. Determine capacity requirements for fire flow and the allocation to public fire water supply capacity – To estimate the costs associated with (and to provide capacity for) public fire water service, the methodology put forth in the AWWA M1 Manual was used.

To determine the capacity requirements for fire flow, the District uses two hypothetical fires with varying fire flow. The first fire requires flows of 2,500 gallons per minute for a minimum of 4 hours, and the second requires 8,000 gallons per minute for a minimum of 8 hours as shown below. These hypothetical fires were chosen based on the professional judgement and experience of Raftelis.

Fire flows as a percentage of total capacity is converted to a percentage and used to identify the indirect cost allocated to water supply for public and private fire protection. The water supply demand capacity for public and private fire water service are based on firelines and hydrant capacity.

Water is supplied for private fire service through pipes and appurtenances on private property. These include all water-based fire protection systems, such as fire protection sprinklers and fire hydrants that are not part of, but are connected to, the public water service. Costs are allocated to these systems in a similar fashion and billed separately to the individual customers owning the private fire protection systems.

Max Day capacity is the amount of water needed for the duration of a fire in one day (fire flow gallons per minute multiplied by the duration of fire in minutes).

Max Hour capacity is the amount of water needed if a similar fire lasted an entire day (fire flow gallons per minute multiplied by the number of minutes in a day), less the capacity already allocated to Max Day. Capacity amounts in gallons are converted to CCF in the table below. (One CCF = 748.05 gallons.)

Table J: Capacity Requirements for Fire Flow and Public Fire Allocation

	Fire #1		Fire #2		Total	
Fire Flow Estimate	**Max Day (1)**	**Max Hour (2)**	**Max Day (1)**	**Max Hour (2)**	**Max Day**	**Max Hour**
Duration of Fire (Hours)	4.00		4.00		8.00	
Fire Flow (gpm)	2,500	2,500	8,000	8,000	10,500	10,500
Percent Allocated to Public Fire	74.7%	74.7%	74.7%	74.7%	74.7%	74.7%
Capacity Demanded for Fire (ccf)	802	4,010	2,567	12,833	3,369	16,844
Public Fire Capacity (ccf) (3)	599	2,995	1,916	9,582	2,515	12,577
Private Fire Capacity (ccf) (4)	203	1,016	650	3,251	853	4,267
Total Potable Capacity	85,917	73,663				
Public Fire Allocation (Max Day: 2,515/85,917;Max Hour 12,577/73,663)					**2.9%**	**17.1%**
Private Fire Allocation (Max Day: 853/85,917;Max Hour 4,267/73,663)					1.0%	5.8%

(2) Max Day Capacity demanded for fire = (hours*minutes*gallons)/748.05.
(3) Max Hour Capacity demanded for fire = (hours*minutes*gallons)/748.05 – Max Day Capacity.
(4) Split is based on total system hydrants =2,794,545/fireline meter capacity= 707,911
(5) Total potable capacity is max day and max hour demands for all customer classes.

k. Compute the public fire water service cost –

The Max Day and Max Hour percentages identified in Table J for public fire water service are applied to the total cost-of-service by peaking factor to reallocate expenses included in Max Day and Max Hour fire protection water service costs to customer costs:

Max Day Public Fire Water Service costs: 2.9% * $13,516K = $ 396k

Max Hour Public Fire Water Service costs: 17.1% * $12,504K = $2,136k

Total indirect costs of Public Fire Water Service: $2,532k

Table K: Public Fire Water Service Cost-of-Service for FY 2022-23

Cost Allocation (thousands)	Base	Max Day	Max Hour	Customer	Direct Fire	Private Fire	Total
Total Operating Costs	$ 63,076	$ 13,516	$ 12,504	$ 5,586	$ 541	$ -	$ 95,223
Allocation of Direct Public Fire to Customer				**541**	**(541)**		-
Allocation of Indirect Public Fire to Customer (1)		**(396)**	**(2,136)**	**2,532**			-
Allocation to Private Fire		(152)	(821)	-		973	-
Adjusted Cost of Service	**$ 63,076**	**$ 12,968**	**$ 9,547**	**$ 8,660**	**$ -**	**$ 973**	**$ 95,223**
Total Cost of Public Fire Included in "Customer"				**$ 3,073**			

(1) As described above, public fire water is calculated as follows:
Max day - $13,516K (Table J) * 2.9% = $396K
Max Hour - $12,504K (Table J) * 17.1% = 2,136K

As identified in Table K, there are two cost components associated with public fire water service: direct and indirect. The total cost of public fire water service is $3,073,000 including the direct cost of $541,000 and the indirect cost of $2,532,000.

Total public fire water service costs are allocated to all customers through the fixed meter charge through the IRWD's rate structure. This complies with Proposition 218's cost-of-service and proportionality principles because meter charges are proportional to a given property's water demand, and that water demand is proportional to the property's use and need for fire water service.

1. Executive Summary

In compliance with California Water Codes Section 10632 the IRWD Board of Directors adopted an updated Water Shortage Contingency Plan (WSCP) in June 2021. The WSCP includes a "toolbox" of potential strategies for responding to each level of potable water shortage. One of the potential strategies included within each water shortage level is adjustments to water budgets as a means to achieve the savings needed to respond to a prescribed level of water shortage. The WSCP, allows the District to strategically reduce water use through a number of potential actions that are staged dependent upon the severity of water shortages. The WSCP incorporates six standard water shortage levels corresponding to progressive ranges of up to 10%, 20%, 30%, 40%, 50%, and greater shortages. For each level or shortage, the WSCP includes a list of voluntary measures, non-rate response measures, and potential cost-of-service based rate response strategies. The WSCP outlines how the District will reduce water demands or augment supplies if it were to experience a water shortage within each of the six levels of water shortage. Table 1 shows the potable water shortage amounts that the District would need to either reduce or makeup via supply augmentation for each level of shortage.

Table 1: WSCP Augmentation or Demand Reduction Need Based on Level of Shortage

Water Shortage Contingency Plan Stage	Range of Shortage Within the Stage	Needed Augmentation or Reduction at Mid-Point of the Stage
1	0-10%	2,500 AF
2	11-20%	7,700 AF
3	21-30%	12,800 AF
4	31-40%	18,000 AF
5	41-50%	23,000 AF
6	51% +	28,200 AF

This Technical Memo describes the maximum potential adjustments to customer water budgets and rates based on each level of potable water supply shortage and the corresponding maximum rate adjustments.

1.1. Customer Water Budget Rate Structure

IRWD's water budget-based rate structure is a cost-of-service based rate structure that provides revenue stability in both non-shortage and water shortage periods. Additionally, it allocates the water – and the associated costs with its use – based on the monthly water budget assigned to each customer providing the lowest cost water for efficient use and higher cost water for uses beyond efficient use.

As discussed in the 2021 Cost of Service Study (November 2021), the District uses a "budget-based" rate structure to recover the variable costs of providing potable and recycled water service to customers. Under this approach, a customized monthly budget (i.e., monthly water usage allocation) is developed for each customer. The commodity rates charged by the District in each consumption tier are designed to:

- Reflect and recover the increased cost of meeting consumption demands within each tier.
- Fund demand reduction and reliability programs.
- Mitigate for costs arising from customers' wasteful use that causes urban runoff requiring treatment by the Natural Treatment System (NTS).

When IRWD experiences a water shortage, it may have less water or different costs of water than in normal times. IRWD initially would rely on public outreach and non-rate response measures during a declared shortage. When the District has less water available, the WSCP outlines the strategies it will use to reduce demands to align with the available supplies. Adjustments to customer water budgets are a key response measure in the WSCP that are implemented by equitably reducing water budget allocations based on the available water supply under the water shortage circumstances under each level.

Such changes would be implemented at the discretion of IRWD's Board of Directors during a declared shortage. The changes in water budgets and rates are set using cost-of-service principles and would not exceed the District's cost of providing water service to each customer.

1.1.1. WATER SHORTAGE MAXIMUM WATER BUDGET ADJUSTMENTS

IRWD has modeled maximum water budget allocation adjustments that are designed as response measures to target a percentage reduction from 2020 demands for each of the six WSCP shortage levels. The mid-point of the targeted water reduction goal for each WSCP level was used. For example, a Level 1 shortage ranges from 0% to 10%, so the reduction target used is 5%. The proposed maximum water budget adjustments, shown in Table 2 follow the WSCP by first targeting discretionary outdoor potable uses, then indoor uses, and finally commercial, industrial, and institutional (CII) indoor uses as the shortage levels increase in severity.

Table 2: Maximum Adjustments to Water Budgets for Each Level of Water Shortage

Water Shortage Contingency Plan level	Target reduction Midpoint of the level	Messaging and outreach	Outdoor potable landscape Includes residential, dedicated irrigation and CII outdoor	ET Factor	Indoor gallons per capita	Commercial, Industrial, and Institutional (CII) percent indoor reduction
None	0	Water efficiency programs and outreach	40% drought-tolerant plants	.75	50	
Level 1 **0-10%**	5% 2,500 AF	Expanded messaging and targeted outreach	40% drought-tolerant plants	.75	50	
Level 2 **11-20%**	15% 7,700 AF	Expanded messaging and targeted outreach	No turf; 100% drought-tolerant plants	.625	50	
Level 3 **21-30%**	25% 12,800 AF	Expanded messaging and targeted outreach	No turf; tree health affected; 75% native plants; 25% drought-tolerant plants	.35	40	
Level 4 **31-40%**	35% 18,000 AF	Expanded messaging and targeted outreach	No turf; tree health affected; 100% native plants only	.25	32.5	10%
Level 5 **41-50%**	45% 23,000 AF	Expanded messaging and targeted outreach	No landscape	0	30	20%
Level 6 **51%+**	55% 28,200 AF	Expanded messaging and targeted outreach	No landscape	0	Basic needs only; 20	30%

1.1.2. WATER SHORTAGE CONTINGENCY WATER BUDGET ADJUSTMENTS

The maximum water budget adjustments are calculated to proportionately reduce potable water budgets to align with the volume of the projected water shortage. Consistent with the WSCP outdoor discretionary uses are targeted first, which results in reductions to the evapotranspiration (ET) Factor. Beginning with a level 3 shortage and increased level of water supply shortage, reductions to the indoor per capita use also would need to be implemented. Beginning with a

level 4 shortage, reductions in available water supplies would require that the District also implement reductions to indoor uses for commercial, industrial and institutional customers (CII).

1.1.2.1. Outdoor Budget Adjustments During Shortage

The fundamental metric used in the District's calculation of efficient outdoor water usage is the evapotranspiration rate of landscape plants. Evapotranspiration is the process by which water is lost to the atmosphere through evaporation and transpiration. Having established the ET rate for each day of the monthly billing cycle based on actual weather conditions, the District applies an adjustment factor. The District's standard ET Factor (ETF) for potable landscapes of 0.75 is based on a typical landscape plant mix and an irrigation system with an assumed efficiency of 80%. Different plants have different watering requirements, called plant factors, which can be quantified compared to a reference crop such as cool-season turf, which requires 100% of ET.

A simplified representation of the general formula used to determine a customer's outdoor water budget is shown below.

Outdoor Budget Served by Potable Connection (ccf) =
*Irrigated Landscape Area (1) * Evapotranspiration (ET) Rate (2) * ET Factor (3) * 36.3 Conversion Factor (4)*

(1) Area measured in acres.
(2) Evapotranspiration rate during each day of the monthly billing cycle based on actual temperature, humidity, and other factors.
(3) ET factor based on plant watering requirements relative to cool-season turf and 20% irrigation system inefficiency.
(4) 36.3 is a factor to convert acre-inches of water to one hundred cubic feet (ccf).

During a water shortage, discretionary uses such as landscape irrigation are the first targeted for reductions. As shown in Table 1, the amount of water budgeted for outdoor use would be reduced to match the level of shortage and available supplies beginning at Level 2. At Level 2, the minimum water budget would only be sufficient to irrigate drought tolerant plants, with an ET Factor of 0.625. At Level 4, the minimum water budget would only be sufficient to support California native plants. At Level 5 or 6, which are severe levels of shortage, no water would be available to allocate to outdoor water budgets.

1.1.2.2. Indoor residential budget adjustments during shortage

IRWD allocates a standard indoor water budget of 50 gallons per capita per day (gpcd) for residential customers, as described in the Cost of Service Study . During a water shortage, the District would need to reduce the indoor water budget down from 50 gpcd beginning at Level 3. The indoor budget would be reduced to 40 gpcd at Level 3, to 32.5 gpcd at Level 4, to 25 gpcd at Level 5 and then to only basic human needs of 20 gpcd at Level 6.

1.1.2.3. Commercial customer water budget adjustments during shortage

Given the diversity of water usage characteristics, the District establishes an individualized water budget for each customer based on an analysis of business water use needs. This may include an on-site assessment. This allows the water budget of each commercial, industrial and institutional customer (CII) to be tailored to their specific needs and requirements.

Although reductions to CII customer outdoor budgets are consistent with section 1.1.2.1 above, IRWD would apply percentage reductions to CII indoor budgets as shown in Table 2 up to the maximum reductions shown in Table 2 because the water budgets are tailored to each CII customer. Indoor reductions would not start until level 4 to reduce impacts to the economy, health, and safety that result from reduced commercial use of water. The maximum percentage reductions to each CII customer's base allocation would be 10% at Level 4, 20% at Level 5 and 30% at Level 6.

These reductions, when combined with the outdoor and residential indoor reductions equitably allocate the potable water supply available to the District at each level of projected shortage, consistent with the District's adopted WSCP.

1.1.2.4. Example Water Budgets During Each Level of Shortage

Table 3 provides the various factors for the indoor and outdoor portions of residential customer water budgets, and shows both the indoor, outdoor, and total CCFs (CCF = one hundred cubic feet = 748 gallons) that would be allocated in a hypothetical Level 3 shortage, with the maximum adjustment applied. Applying the maximum adjustment results in the minimum customer water budget at a Level 3 water shortage. Average monthly ET of 4.1 inches, rather than actual ET for the month being billed, is used solely for example purposes.

Table 3: Example Minimum Residential Water Budgets for Level 3 Water Shortage

Customer Type	Indoor Gal Per Person Per Day	Default People	Days in Bill Cycle	Default Acres Default Acres	ET Factor	Average Monthly ET (inches)	Indoor CCF	Outdoor CCF	Total CCF (after rounding)
Residential Single Family	40	4	30	0.03	0.35	4.1	6.42	1.61	**9**
Residential Condo	40	3	30	0.01	0.35	4.1	4.81	0.52	**6**
Residential Apartment*	40	2	30	0	0.35	4.1	3.21	0.00	**4**
Potable Landscape	40	0	30	1.00	0.35	4.1	0.00	52.09	**53**

*Water budget multiplied by number of units
CCF = One Hundred Cubic Feet = 748 gallons

The water budget indoor and outdoor CCFs are calculated using the formulas described in the Cost of Service Study. To further illustrate, the actual calculation for a residential single family in a Level 3 shortage is shown in Table 4 (note that any differences with Table 3 are due to rounding).

Table 4: Example Calculation of Minimum Single Family Residential Monthly Water Budget at Level 3 Shortage

Example Minimum Monthly Water Budget Calculation for an Average Single Family Residential Customer at Level 3 Shortage		
Line	**Indoor Water Budget Calculation**	
1	Default Persons per Household	4.0
2	Required Gallons per Person per Day	40.0
3	Days in Billing Cycle	30
4	Monthly Indoor Water Budget (gallons)	4,800 (Lines 1 * 2 * 3)
5	Monthly Indoor Water Budget (ccf)	6.42 (Line 4 / 748 Conversion Factor)
	Outdoor Water Budget Calculation	
6	Average Monthly ET Rate During the Billing Cycle Based on Measured Temperature, Humidity and other factors (Inches)	4.1
7	Adjustment for 75% drought tolerant plants and 25% native landscaping and irrigation efficiency of 80%	0.28
8	Adjustment for Irrigation System Efficiency	0.8
9	ET Factor	0.35 (Line 7 / Line 8)
10	Adjusted Average Monthly ET Rate (30 day bill cycle)	1.435 (Line 6 * Line 9)
11	Customer Irrigated Landscape Area (acres)	0.03
12	Required Inches of Water per Acre	0.044 (Line 10 * Line 11)
13	Monthly Outdoor Water Budget (ccf)	1.6 (Line 12 * 36.3 Conversion Factor)
	Total Water Budget	
14	Total Monthly Water Budget Before Rounding (ccf)	8.2 (Line 5 + Line 13)
15	Total Monthly Water Budget Used in Customer Billing (ccf)	9.0

Applying the same methodology, the minimum water budget is calculated for each level of water shortage. The resulting minimum water budget, broken down by tier, is shown for an average single family residential customer for each of the six levels of shortage in Table 5. This same methodology and approach would be used to calculate the water budgets for each tier for each customer type for each level of shortage.

Table 5: Minimum Water Budget Allocations by Tier for Single Family Customer at Each Level of Shortage

Water Shortage Level	Total Water Budget CCF	Low Volume CCF	Base Tier CCF	Inefficient Tier CCF	Wasteful Tier CCF
Percent of Budget	**100%**	**0-40%**	**41-100%**	**101-140%**	**All CCF usage equal or greater than**
None	12	5	7	5	18
1	12	5	7	5	18
2	11	5	6	5	17
3	9	4	5	4	14
4	7	3	4	3	11
5	5	2	3	2	8
6	4	2	2	2	7

1.1.2.5. Water shortage Contingency Rates - FY 2021-22 & FY 2022-23

The WSCP rates were developed using a cost of service methodology consistent with the IRWD updated cost of service rate model. As stated previously, the District uses a "budget-based" rate structure to recover the variable costs of providing potable and recycled water service to customers. Under this approach, a customized monthly budget (i.e. monthly water usage allocation) is developed for each customer. The commodity rates charged by the District in each consumption tier are designed to:

- Reflect and recover the increased cost of meeting consumption demands within each tier.
- Fund demand reduction and reliability programs.
- Mitigate for costs arising from customers' wasteful use that causes urban runoff requiring treatment by the Natural Treatment System (NTS).

The low volume and base tiers are included in the budget allocation while the inefficient and wasteful tiers exceed the budgeted allocation. The tiered rates assume that the lowest cost source of water is used first for each tier. Costs associated with outreach to all customers are allocated to all tiers except the low-volume tier. Costs associated with over-allocation usage, such as targeted outreach and supply reliability programs, are allocated to the inefficient and wasteful

tiers. The District includes the cost of compliance efforts in tiers four and five because the targets will be extremely difficult to meet from existing programs alone.

Changes affecting rates include:

- Reduced expenses associated with water availability and the reduced demand associated with each level of the WSCP;
- An increasing cost for targeted conservation to aid in reaching the targets identified for each level in the WSCP; and
- The addition of a compliance effort to reach the reductions included in the highest levels.

1.1.2.6. Source Water Reductions

The all-in cost of water includes variable and fixed costs. The variable cost per unit do not change as the volume decreases. These costs represent between 70% to over 90% for all groundwater sources. There are fixed costs (labor and associated G&A, repairs and maintenance, etc.) included in the commodity rate. Although these costs are fixed, the fixed cost per unit increases as the volumes decrease. The analysis for low volume and the base tier below reflects the changes at each level starting with the standard rate. The standard rate is the rate in effect when the Board has not elected to implement a change in rates during a declared shortage. These rates are shown in Appendix 4.

The source of supply in Table 6 is based on the FY 2021-22 and 2022-23 Board approved budgets. For each level starting with 0 reflecting no reduction, the reduced source water in levels 1-6 was applied proportionally to all sources based on the percentage of required reduction at each level (except the Baker Treatment Plant (BTP). Baker was excluded primarily because we have multiple partners and would only reduce production as a last resort. The reductions use the same time period, March 2022-June 2023, consistent with the period used in calculating the standard rates (see Appendix 4). The sources for each level are presented below.

Table 6: Source of Supply Reductions Applied to the WSCP Levels

Reduced Source Water (acre feet)	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Dyer Road Well Field	56,000	53,507	48,538	43,565	38,590	33,615	28,642
Deep Aquifer Treatment System	16,000	15,288	13,868	12,447	11,025	9,604	8,183
Other Process Wells	13,420	12,823	11,632	10,439	9,248	8,057	6,864
Baker Treatment Plant (SAC)	14,400	14,400	14,400	14,400	14,400	14,400	14,400
Water Purchases Imported (MWD)	14,368	13,724	12,440	11,154	9,868	8,583	7,297
Total	114,188	109,742	100,878	92,005	83,131	74,259	65,386

1.1.2.7. Increased Conservation Efforts

Over-allocation tiers include three cost elements included in rates:

- Conservation efforts that target reducing the District's overall demands and support reliability programs that include:

  - Interaction between District staff and customers in the over-allocation tiers to provide aid in reducing monthly demands; and
  - Funding programs that aid in reducing water use such as replacing lawns with drought tolerant plants and programs that replace older fixtures with low flow fixtures.
- Funding costs associated with wasteful use that causes urban runoff requiring treatment by the District's NTS sites.
- Water banking programs to meet demands during major supply interruptions that can be used to address shortages addressed in the WSCP.

The cost increases included for each of the WSCP levels are based on the history of increased expenditures incurred when the District was required to meet a mandatory 16% reduction in 2015, increased by the Consumer Price Index. Additional costs for compliance efforts are included at levels 5 and 6 of the WSCP because reaching reductions that exceed 35% will be extremely difficult for an agency such as IRWD, whose customers have already significantly reduced gpcd since the last drought. The conservation and compliance expenses included in the table below are allocated to the over-allocation tiers to aid in reaching the identified WSCP level.

Table 7: Additional Conservation and Compliance Efforts Applied to Over-allocation Tiers by Level

(thousands)

	1	*2*	*3*	*4*	*5*	*6*
Additional Conservation Efforts:						
FY 2021-22	$1,170	$3,022	$3,778	$7,556	$7,556	$7,556
FY 2022-23	1,884	3,768	7,556	7,556	7,556	7,556
Additional Compliance Efforts:						
FY 2021-22	-	-	-	-	1,500	3,000
FY 2022-23	-	-	-	-	2,400	3,000
Total by Level	$3,054	$6,790	$11,334	$15,112	$19,012	$21,112
Over-allocation Increase by Level						
Inefficient	$ 745	$ 1,768	$ 2,986	$ 4,402	$ 5,620	$ 6,406
Wasteful	2,309	5,022	8,348	10,710	13,392	14,706
Total by Level	$ 3,054	$ 6,790	$ 11,334	$ 15,112	$ 19,012	$ 21,112

1.1.2.8. WSCP Rates

The WSCP rates are based on a consistent cost of service methodology with the IRWD updated cost of service rate model. The rates identified by tier and WSCP level take into consideration the reduced demands, the source shift in reduced water (i.e. available ground water versus imported water) and increased conservation and compliance costs required to reach WSCP targets. For each tier, the standard rate is adjusted for changes in reduced volumes and any increases in costs. The resulting rates are summarized in Table 8 below by tier and WSCP Level. This is followed by the individual rate calculations grouped by tier.

Table 8: Summary WSCP Rates

Tiered Rates/CCF	0	1	2	3	4	5	6
Low Volume	$1.53	$1.53	$1.53	$1.53	$1.55	$1.57	$1.60
Base	$2.42	$2.43	$2.46	$2.50	$2.53	$2.57	$2.62
Inefficient	$5.15	$5.45	$5.86	$6.34	$6.91	$7.40	$7.71
Wasteful	$14.64	$15.77	$17.11	$18.74	$19.90	$21.21	$21.86

Low Volume Tier:

The standard rate for the low volume tier is $1.53 per CCF. Over 80% of the costs included in the standard rate are variable and fluctuate with total sales; therefore rates do not change with a proportionate change in costs and reduced sales volumes. Other expenses are not variable with changes in sales (labor and associated benefits, repairs and maintenance, permits, licenses and fees etc.). The increase costs in the WSCP levels are based on spreading these costs to the reduced units. The calculation of rates for the low volume tier is as follows.

Table 9: Low Volume Rates by Level

Rates per CCF	0	1	2	3	4	5	6
Standard Rate	$1.53	$1.53	$1.53	$1.53	$1.53	$1.53	$1.53
Change *	$0.00	$0.00	$0.00	$0.00	$0.02	$0.04	$0.07
WSCP Rate	$1.53	$1.53	$1.53	$1.53	$1.55	$1.57	$1.60
***Factors Influencing Rate Differential:**							
Acre Feet Sales (CCF / 435.6) (A)	38,499	38,499	38,499	37,679	33,176	29,219	24,866
Change in Acre Feet	-	-	-	(820)	(5,323)	(9,280)	(13,633)
Expense:							
Cumulative Fixed Costs in Water Rate (thousands):[1] (B)	$2,180.0	$2,180.0	$2,180.0	$2,180.0	$2,180.0	$2,180.0	$2,180.0
Cost per AF (B / A)	$56.62	$56.62	$56.62	$57.86	$65.71	$74.61	$87.67
Cost per AF /435.6	$0.13	$0.13	$0.13	$0.13	$0.15	$0.17	$0.20
Change per CCF *	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.02**	**$0.04**	**$0.07**

(1) Includes costs associated with water systems that are not directly variable to the use including Labor and associated G&A, repairs and maintenance, etc.

See appendix 4 Table 6 in Section 4.1 for Total Sales in CCF.

Base Tier:

The standard rate for the base tier is $2.43 per CCF. The same assumptions apply to the base rate. Variable rates do not change with a proportionate change in costs and reduced sales volumes. Other expenses are not variable with changes in sales volumes. The increase costs in the WSCP levels are based on spreading these costs to the reduced units. The calculation of rates for the base tier is as follows:

Table 10: Base Rates by Level

Base WSCP Rates	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Standard Rate	$2.42	$2.42	$2.42	$2.42	$2.42	$2.42	$2.42
Change *	$0.00	$0.01	$0.04	$0.08	$0.11	$0.15	$0.20
WSCP Rate	$2.42	$2.43	$2.46	$2.50	$2.53	$2.57	$2.62
*** Factors Influencing Rate Differential**							
Acre Feet Sales (CCF / 435.6) (A)	56,870	53,014	46,726	38,519	34,170	30,355	26,298
Change in Acre Feet	-	(3,856)	(10,144)	(18,351)	(22,700)	(26,515)	(30,572)
Expense:							
Cumulative Fixed Costs in Water Rate (thousands): (1) (B)	$4,197.0	$4,197.0	$4,197.0	$4,197.0	$4,197.0	$4,197.0	$4,197.0
Cost per AF (B / A)	$73.80	$79.17	$89.82	$108.96	$122.83	$138.27	$159.59
Cost per CCF/ 435.6	$0.17	$0.18	$0.21	$0.25	$0.28	$0.32	$0.37
Change per CCF *	**$0.00**	**$0.01**	**$0.04**	**$0.08**	**$0.11**	**$0.15**	**$0.20**

(1) Includes costs associated with water systems that are not directly variable to the use including Labor and associated G&A,repairs and maintenance, etc.

See Appendix 4, Table 6 in Section 4.1 for sales in CCF.

Inefficient Tier:

The standard rate for the Inefficient tier is $5.15. The over-allocation tiers use imported water and there is no assumed change in the acre feet usage. The assumption is that although some will reduce over-allocation usage, others might move into the tier. The changes in rates to the inefficient tier is based on the increased costs identified above to meet the WSCP targets. The costs increase is spread to the per unit cost to establish each of the WSCP rates by level. The calculation of rates for the inefficient tier is as follows:

Table 11: Inefficient Rates by Level

Inefficient WSCP Rates	0	1	2	3	4	5	6
Standard Rate	$5.15	$5.15	$5.15	$5.15	$5.15	$5.15	$5.15
Change *	$0.00	$0.30	$0.71	$1.19	$1.76	$2.25	$2.56
WSCP Rate	$5.15	$5.45	$5.86	$6.34	$6.91	$7.40	$7.71
*** Factors Influencing Rate Differential**							
Acre Feet Sales (CCF / 435.6) (A)	5,741	5,741	5,741	5,741	5,741	5,741	5,741
Expense:							
Conservation (thousands)	$2,644.5	$2,644.5	$2,644.5	$2,644.5	$2,644.5	$2,644.5	$2,644.5
Increase for Conservation	$0.0	$745.1	$1,767.8	$2,986.1	$4,402.4	$5,620.5	$6,406.4
Total Conservation (B)	$2,644.5	$3,389.6	$4,412.3	$5,630.6	$7,046.9	$8,265.0	$9,050.9
Cost per AF (B / A)	$460.64	$590.43	$768.56	$980.78	$1,227.48	$1,439.65	$1,576.55
Cost per CCF (AF/435.6)	$1.06	$1.36	$1.76	$2.25	$2.82	$3.30	$3.62
Change *	**$0.00**	**$0.30**	**$0.71**	**$1.19**	**$1.76**	**$2.25**	**$2.56**

See Appendix 4, Table 6 in Section 4.1 for sales in CCF.

See Table 7 in Section 1.1.2.7 for the Increase in Conservation.

Wasteful Tier:

The standard rate for the wasteful tier is $14.64. Similar to the inefficient tier, the change to the wasteful tier is based on the increased costs identified above to meet the WSCP targets. The increase is spread to the per unit cost to establish each of the WSCP rates by level. The wasteful tier rate is calculated as follows.

Table 12: Wasteful Rates by Level

Wasteful WSCP Rates	0	1	2	3	4	5	6
Standard Rate	$14.64	$14.64	$14.64	$14.64	$14.64	$14.64	$14.64
Change *	$0.00	$1.13	$2.47	$4.10	$5.26	$6.57	$7.22
WSCP Rate	$14.64	$15.77	$17.11	$18.74	$19.90	$21.21	$21.86
*** Factors Influencing Rate Differential**							
Acre Feet Sales (CCF / 435.6) (A)	4,677	4,677	4,677	4,677	4,677	4,677	4,677
Expense:							
Conservation (thousands)	$8,910.5	$8,910.5	$8,910.5	$8,910.5	$8,910.5	$8,910.5	$8,910.5
Increase for Conservation	$0.0	$2,309.2	$5,022.4	$8,347.9	$10,709.6	$13,391.5	$14,705.6
Total Conservation (B)	$8,910.5	$11,219.7	$13,932.9	$17,258.4	$19,620.1	$22,302.0	$23,616.1
Cost per AF (B / A)	$1,905.17	$2,398.91	$2,979.03	$3,690.05	$4,195.01	$4,768.45	$5,049.41
Cost per CCF (AF/435.6)	$4.37	$5.51	$6.84	$8.47	$9.63	$10.95	$11.59
Change	**$0.00**	**$1.13**	**$2.47**	**$4.10**	**$5.26**	**$6.57**	**$7.22**

See Appendix 4, Table 6 in Section 4.1 for sales in CCF.

See Table 7 in Section 1.1.2.7 for the Increase in Conservation.

The change in commodity rates have no impact on the monthly fixed service water or sewer charges. If the Board of Directors elect to implement any of these WSCP rates, the proposed commodity rates are expected to provide cost of service equity for the budgeted operating

variable costs and additional costs incurred as a direct result of a water shortage declaration at the associated stage level. Implementation of WSCP rates would require additional Board action.

Potential Additional Regulatory Cost to Provide Water Service

This appendix calculates a surcharge on water sales volumes to pay costs that may be imposed on IRWD by the State Water Resources Control Board (the "State Board") in response to any violations of emergency drought regulations restricting water use by IRWD and its customers.

State Board Drought Regulatory Penalties

The State Board cites Water Code section 1058.5 to adopt emergency regulations to prevent the waste, unreasonable use, or unreasonable method of use of water or to promote water conservation. In past droughts, the State Board has adopted such regulations to reduce existing levels of water use by retail public water suppliers, including IRWD. The State Board cites Water Code section 1831(d) to issue a cease and desist order to local agencies, such as IRWD, in response to a violation or threatened violation of a regulation adopted under Section 1058.5. A local agency that fails to comply with a cease and desist order issued by the State Board may be liable in an amount not exceeding ten thousand dollars ($10,000) for each day in which the violation occurs, if the violation occurs in a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years. The State is now in such a critically dry year.

Although IRWD has a robust water conservation program with extensive customer outreach, if the State Board were to adopt an emergency regulation requiring reduced water usage, and IRWD customers were to fail to sufficiently reduce their usage to bring total IRWD customer water use into compliance, the State Board could seek to hold IRWD liable for failing to comply with a cease and desist order. Any monetary liability imposed upon IRWD would be an additional cost of providing water service.

Calculation of the Surcharge

IRWD's potential financial exposure over a 12-month period is $3,600,000 (12 months times 30 days per month times $10,000 per day).

The excess water consumption that IRWD expects would be prohibited by the State Board is that consumption by IRWD customers that exceeds their water usage budgets, including water usage budgets that are lowered pursuant to IRWD's adopted water shortage contingency plan (WSCP). The total over-use of water in the inefficient and wasteful tiers of IRWD's proposed rate structure for FY 2022-23 is calculated to be 2,286,825 ccf (hundred cubic feet), as shown in the table below.

Tier	FY 2022-23
Total Inefficient (Acre Feet)	2,893
Total Wasteful (Acre Feet)	2,357
Total Over-allocation (Acre Feet)	5,250
Total Over-allocation (ccf = AF X 435.6)	2,286,825
State Penalties (12 X 30 X $10,000)	$3,600,000
Allocated Cost per CCF (State Penalties / Total Over-allocation)	**$1.57**

Allocating the $3,600,000 cost across 2,286,825 ccf of excess water consumption equates to $1.57 per ccf. To fund IRWD's potential costs of monetary liability to the State Board, IRWD would be authorized to levy a surcharge on the volume of water used up to $1.57 per ccf in the inefficient and wasteful tiers. This is included in the Proposition 218 Notices.

1. Executive Summary

This is an update to the 2021 Cost of Service (COS) Study to support Irvine Ranch Water District's (District) water and sewer service rates for Fiscal Years (FY) 2023-24 and FY 2024-25. The 2021 COS Study described the costs to provide such service for FY 2021-22 and FY 2022-23 and described the method for allocating the costs to customers through rates.

The appendix attachments listed in Section 3, below, are a supplement to support the development of rates for FY 2023-24 through FY 2024-25. The methodology in the 2021 COS Study remains the same, however its tables are updated with detailed costs from the FY 2023-24 and FY 2024-25 proposed operating expense budgets. These appendix tables use the same reference numbering scheme as those in the original 2021 COS Study. To evaluate the rates proposed for FY 2023-24 through FY 2024-25, review the 2021 COS Study together with the updated tables and narrative explanations in Appendices 10 through 17.

2. Background

The proposed Fiscal Year (FY) 2023-24 Operating Budget for IRWD is $220.7 million, representing an increase of $32.9 million, or 17.5%, compared to the Operating Budget for FY 2022-23. The proposed FY 2024-25 Operating Budget for IRWD is $234.5 million, representing an increase of $13.8 million, or 6.3%, compared to the proposed Operating Budget for FY 2023-24.

Staff and Raftelis updated IRWD's 2020 rate model based on Raftelis' findings and Committee recommendations. The same methodology was used to develop cost-of-service-based rates for FY 2023-24 and FY 2024-25.

The 2021 COS Study includes the following:

- Raftelis COS Study for FY 2020-21;
- Exhibit A – Tech Memo re: Legal Basis for Fire Water in Service Charge;
- Exhibit B – Tech Memo re: Determination of Costs of Fire Water;
- Appendices 1- 8 to support rates for years after 2021;
    - Appendix 1: Appendices to 2021 COS Study
    - Appendix 2: Rate Development for FY 2021-22
    - Appendix 3: Rate Development for FY 2022-23
    - Appendix 4: Rate Development for 16-month Period from February 2022 to June 2023
    - Appendix 5: Costs for Public Fire Water for FY 2021-22
    - Appendix 6: Costs for Public Fire Water for FY 2022-23
    - Appendix 7: Rate Development for Water Shortage Contingency Plan
    - Appendix 8: Rate Development for Surcharge

3. Appendices to the 2021 COS Study

The cost-allocation method described in the 2021 COS Study is applied to FY 2023-23 and FY 2023-24 costs to develop proposed rates for the next two fiscal years. The following new appendices show the calculation of the new rates proposed for FY 2023-24 and FY 2024-25.

Appendix 9: List of Updated Appendices to 2021 COS Study for FY 2023-24 and 2024-25

Appendix 10: Rate Development for FY 2023-24

Appendix 11: Rate Development for FY 2024-25

Appendix 12: Costs for Public Fire Water for FY 2023-24

Appendix 13: Costs for Public Fire Water for FY 2024-25

Appendix 14: Rate Development for Water Shortage Contingency Plan for FY 2023-24

Appendix 15: Rate Development for Water Shortage Contingency Plan for FY 2024-25

Appendix 16: Rate Development for Surcharge for FY 2023-24 and FY 2024-25

Appendix 17: Tech Memo re: Pumping Surcharge

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2023-24 and FY 2024-25.

Appendix 10 provides support for the development of rates to cover proposed operating costs for FY 2023-24. Appendix 11 provides support for the development of rates to cover proposed operating costs for FY 2024-25.

The tables are updated with the detailed costs from the FY 2023-24 operating budget. The methodology from the 2021 Cost of Service (COS) Study remains the same and the tables included in this appendix use the same reference numbering scheme as those in the 2021 COS Study. Section 8 has been added to address rates for untreated water.

4. Potable Water Cost of Service FY 2023-24

See section 4 of the COS Study for a complete discussion on the District's potable water cost of service.

The FY 2023-24 water revenue requirement was determined to be $112,783,874 (see sum of tables 13 and 14 below). Of this amount, $71,142,596 (63.4%) is associated with variable costs that are incurred to acquire, treat, and deliver water supplies. These costs vary with the amount of water used by customers and are recovered through commodity rates. Note that the variable cost revenue requirement includes $15,494,061 in costs for universal conservation, targeted conservation, water banking operations, and the District's natural treatment system used to control runoff from customers who use water in the inefficient and wasteful tiers. Table 13 provides detail of the FY 2023-24 variable revenue requirement.

4.3. FY 2023-24 POTABLE WATER REVENUE REQUIREMENT

Table 13: FY 2023-24 Potable Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Dyer Road Wellfield	$23,829,318
Baker Treatment Facilities	14,512,071
Imported Water Purchases	10,412,312
Deep Aquifer Treatment System	8,014,481
Irvine Desalter Domestic	5,820,182
Wells 21 & 22 Desalter Treatment Plant	3,006,878
Orange Park Acres	1,552,363
Total Potable Water Supply Costs	**$67,147,605**
Revenue Requirement Offsets to Water Supply Costs	
Baker Partners	5,956,070
Sinking Fund	1,700,000
Water Banking Operations	2,093,000
MWDOC PTP/IDP Credits	1,750,000
Total Revenue Requirement Offsets	**11,499,070**
Net Revenue Requirement for Water Supply Costs	**$55,648,535**
Conservation and Supply Reliability	
Universal Conservation	1,651,174
Targeted Conservation	7,472,813
Natural Treatment System	4,714,794
Water Banking	1,655,280
Total Conservation and Supply Reliability Costs	**15,494,061**
Net Potable Variable Cost Revenue Requirement	**$71,142,596**
Untreated Water Supplies	
Untreated Imported Water Purchases	154,000
Untreated Water System Maintenance	326,999
Native Water	1,296,280
Total Untreated Water Supply Costs	**$1,777,279**
Revenue Requirement Offsets to Untreated Water Supply Costs	
Transferred to Recycled	1,186,946
Total Revenue Requirement Offsets	**$1,186,946**
Net Untreated Water Variable Cost Revenue Requirement	**$590,333**

Fixed costs do not vary with the volume of water by customers. The fixed cost portion of the total FY 2023-24 revenue requirement was $41,050,945 (36.6%) as shown in Table 14. Of these fixed costs, $9,456,120 were associated with expenditures for replacement and enhancement capital costs that do not increase the capacity of

the water utility system to serve new customer demand growth. Table 14 provides a detail of the FY 2023-24 fixed revenue requirement.

Table 14: FY 2023-24 Potable Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Amount
Fixed Operating Costs	
System Maintenance and Monitoring	28,751,893
Customer Service	5,799,665
Fleet	1,499,777
General Plant	829,790
Building Maintenance	1,876,804
Total Fixed Operating Costs	**$ 38,757,930**
Replacement and Enhancement Capital Costs	
Replacement	7,221,120
Enhancement	2,235,000
Total Capital Costs	**$ 9,456,120**
Fixed Cost Revenue Requirement	**$ 48,214,050**
Revenue Requirement Offsets	
Firelines	3,831,488
Pumping Surcharge	1,530,817
Miscellaneous/Other	1,171,156
Low Volume Benefit	629,644
Total Revenue Requirement Offsets	**$ 7,163,105**
Net Fixed Cost Revenue Requirement from Rates	**$ 41,050,945**
Total Water Revenue Requirement	**$ 112,783,874**

4.3.1 VARIABLE COST RECOVERY – COMMODITY RATES

The District recovers water supply costs through commodity rates with the lowest cost water supplies being recovered in the low volume and base consumption tiers and the highest cost water supplies being recovered in the inefficient and wasteful tiers. The District's method for recovering variable costs is compliant with Proposition 218 because of the direct linkage between the revenue recovered in each tier to the costs incurred to provide service to customers with demand in each consumption tier.

The District also recovers the cost of water conservation and water supply reliability programs through its commodity rates with targeted costs being allocated to customers with consumption in the inefficient and wasteful tiers. This approach is reasonable because customers who exceed their monthly water budget allocation impose higher costs on the District. Thus, the commodity rates charged in these two upper tiers are designed to not only recover the cost of more expensive water supplies, but also the additional costs of:

- Targeted conservation programs designed to reduce excessive use.
- Water banking operational costs to enhance water supply reliability.
- Rebates for long-term improvements in customer water use efficiency.

- Urban runoff source control programs referred to as the natural treatment system (NTS) treat runoff from customers who use water in the inefficient and wasteful tiers.

In FY 2023-24, the District's projected total water demand of 53,481 acre feet was based on historical averages by tier, adjusted for customer account growth and other relevant factors. This reflects a 0.4% increase over the 53,294 acre feet of water demand projected in FY 2022-23. Table 15 details the FY 2023-24 unit cost of water supplies ($/CCF) from each supply source as determined using cost and demand data provided by the District.

Table 15: Unit Cost of FY 2023-24 Water Supplies

Metric	Dyer Road Wellfield	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Totals
Net Cost (1)	$21,848,494	$7,076,726	$8,556,001	$4,067,083	$2,305,638	$10,412,312	$1,382,280	$55,648,535
Demand in Acre Feet (net)	26,233	7,344	6,912	3,940	1,576	6,144	1,332	53,481
CCF (2)	11,427,095	3,199,046	3,010,867	1,716,264	686,506	2,676,326	580,219	23,296,324
Unit Cost per ccf (1) divided by (2)	$1.91	$2.21	$2.84	$2.37	$3.36	$3.89	$2.38	

(1) From Table 14
(2) Acre feet is multiplied by 435.6 to convert to CCF

The District allocates the water supply in the order of cost for each source. The higher cost water supplies are appropriately allocated to the inefficient and wasteful tiers. Fluctuations in sales between the tiers impact the cost per unit as sales are spread over lesser or greater units. In FY 2023-24, the sales in the Inefficient tier were flat with the prior year; however, sales in the Wasteful tier increased by approximately 200 AF. The result is that the rate increase in the Inefficient tier is higher than the Wasteful tier from the prior year. Table 16 details this allocation for FY 2023-24 using cost and demand data provided by the District.

Table 16: Allocation of Potable Water Supplies to Consumption Tiers for Unit Costs

Metric	Dyer Road Wellfield (1)	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Total Acre Feet	Unit Cost by Tier ($ /ccf) (2)
Unit Cost	$1.91	$2.21	$2.84	$2.37	$3.36	$3.89	$2.38		
T1: Low Volume	20,134	-	-	-	-	-	-	20,134	$1.91
T2: Base	6,099	7,344	6,912	1,332	1,576	752	3,940	27,955	$2.44
T3: Inefficient	-	-	-	-	-	2,885	-	2,885	$3.89
T4: Wasteful	-	-	-	-	-	2,507	-	2,507	$3.89

(1) 20,134 acre feet are used to meet projected low volume demand estimated based on historic demand as adjusted for customer account growth and other relevant factors. The remainder (6,099 acre feet) is allocated to partially meet the base demand.
(2) The Unit Cost by Tier is the blended cost of the sources.

Having determined the unit cost of water supplies by consumption tier as shown in Table 16 above, the District then allocates the cost of conservation programs and supply reliability programs to the water budget tiers as described below:

Universal Conservation: Universal conservation costs are incurred to encourage customers to use water as efficiently as possible. Universal program costs are added to the commodity rate in the base, inefficient, and wasteful tiers. This cost is not included in the low volume rate since customers who remain in this usage tier do not need assistance to efficiently use water.

Targeted Conservation: Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage exceeds their water budgets. Therefore, these costs are added to the commodity rates of customers in the inefficient and wasteful tiers. Based on a historical estimate of customers who have been provided assistance in these programs, approximately 77% of the customers are in the wasteful tier with the remainder of customers being in the inefficient tier. Therefore, 77% of the targeted conservation costs are allocated to the wasteful tier with the remaining 23% of the costs being allocated to the inefficient tier.

NTS Costs: These natural treatment system costs are incurred by the District to deal with urban water runoff produced by customers whose usage exceeds their water budgets. These costs are added to the commodity rates of customers in the inefficient and wasteful tiers because their excessive water usage creates urban water runoff. The allocation is based on an estimate of the historic mix of urban runoff created by customers in the inefficient and wasteful tiers primarily from hosing down hardscape and excess irrigation running off the landscape into the storm drains. The District estimates 82% of NTS costs are created by customers in the wasteful tier because wasteful outdoor demand flows to NTS sites. The remaining 18% of urban runoff costs results from inefficient customers overwatering drought tolerant landscape. The allocated costs provide the components and the anticipated sales result in the established rates.

Water Banking: Water banking costs are incurred to support the reliability of the District's water supplies. These costs are added to the commodity rates of customers in the wasteful tier because their excessive water usage creates the need for enhanced reliability of costly imported water supplies as previously discussed.

Table 17 shows the outcome of derivation of the unit costs for the District's conservation and supply reliability programs.

Table 17: FY 2023-24 Conservation and Supply Reliability Unit Costs ($/CCF)

Program	FY 2023-24 Revenue Requirement (1) (A)	FY 2023-24 Units of Demand (ccf) (2) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2023-24 Adjusted CCF B x C = (D)	Unit Cost Included in FY 2023-24 Commodity Rates A/B = (E)
Universal Conservation	$1,651,174	14,525,993	100%	14,525,993	$0.11
Water Banking					
Wasteful tier	$1,655,280	1,092,122	90%	982,910	$1.68
Targeted Conservation					
Inefficient tier (75%)	$1,712,520	1,256,667	90%	1,131,000	$1.51
Wasteful tier (25%)	$5,760,293	1,092,122	90%	982,910	$5.86
Natural Treatment System					
Inefficient tier (15%)	$835,533	1,256,667	90%	1,131,000	$0.74
Wasteful tier (85%)	$3,879,261	1,092,122	90%	982,910	$3.95

(1) From Table 14
(2) Units of Demand are based on the cumulative projected units of sale for the tiers. Universal Conservation includes the base, inefficient, and wasteful tiers.

Table 18 shows the FY 2023-24 potable water commodity rates.

Table 18: FY 2023-24 Potable Water Commodity Rates ($/CCF)

Consumption Tier	Unit Cost of Water Supplies (1)	Unit Cost of Universal Conservation (2)	Unit Cost of Water Banking (2)	Unit Cost of Targeted Conservation (2)	Unit Cost of Natural Treatment System (2)	Rate Stabilization	FY 2023-24 Commodity Rates	FY 2023-24 CCF	FY 2023-24 Revenue
T1: Low Volume	$1.91					($0.16)	$1.75	8,770,330	$15,348,078
T2: Base	$2.44	$0.11				($0.03)	$2.52	12,177,204	30,686,554
T3: Inefficient	$3.89	$0.11		$1.51	$0.74		$6.25	1,256,667	7,854,170
T4: Wasteful	$3.89	$0.11	$1.68	$5.86	$3.95		$15.49	1,092,122	16,916,972
Totals								**23,296,324**	**$ 70,805,774**

(1) From Table 16
(2) From Table 17. Water used in the low volume tier is efficient and universal conservation efforts are not necessary.

The Rate Stabilization Fund is used to moderate the financial impact for significant cost increases on user rates in a single year. It provides a current benefit to our customers by smoothing out the rate increase and avoiding a one-time rate spike. Rate stabilization was utilized to pay for a portion of the increase. Rate Stabilization is a component of the District's Replacement Fund, which is money set aside for funding long- term capital replacements of existing infrastructure and paid by customers through user rates and other non-operating revenue sources.

4.3.2. VARIABLE COST RECOVERY - AGRICULTURAL RATES

Allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. DRWF provides 49% of the source of supply at a cost of $1.91/CCF and imported water provides 12% at a cost of $3.89/CCF. The remaining 39% is the blended cost of the other sources at $2.54/CCF (Table 15). This results in a blended variable cost of $2.39/CCF. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $22,840. The fixed cost applied to the agricultural commodity rate adds $1.10 to the per CCF cost based on the estimated 20,843 CCF. Table 19 shows the calculation of FY 2023-24 agricultural rates.

Table 19: FY 2023-24 Agricultural Water Commodity Rates ($/CCF)

System	FY 2023-24 Revenue Rquirement	FY 2023-24 Projected Demand (CCF)	Variable Cost (CCF) (1)	Fixed Cost Component (CCF) (2)	FY 2023-24 Commodity Rates (1)+(2)
Potable Water	$72,627	20,843	$2.39	$1.10	$3.48

4.3.3. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGES

The District recovers fixed operating costs and replacement and enhancement capital costs through monthly meter service charges. On the District potable water system, the baseline meter size serving customers is 5/8". Thus, the first step in developing the monthly meter service charge is to estimate the total number of 5/8" meter equivalent connections (MEUs) on the potable water system in order to establish the unit cost for a 5/8" equivalent meter. Table 20 shows a summary of this calculation using the District's fixed costs and meter count data.

Table 20: FY 2023-24 Monthly Unit Cost of Serving a 5/8" Equivalent Meter

System	5/8" MEU (A)	Operating Costs (B)	Capital Costs (C)	Total Fixed Cost Revenue Requirement (1) B+C = (D)	Operating Costs per 5/8" MEU B/A = (E)	Capital Costs per 5/8" MEU C/A = (F)	Rate Stabilization (3) (G)	Total Unit Cost per 5/8" MEU(2) E+F+G = (H)
Potable Water	266,504	$30,820,676	$9,224,423	$40,045,099	$9.64	$2.88	($0.65)	$11.85

(1) From Table 14
(2) Values prior to rounding
(3) Use of the Replacement Fund as explained below table 18.

Having established the monthly fixed charge unit cost as being $11.85 per 5/8" meter equivalents, the final step in the process is to develop a schedule of monthly meter service charges for each meter size on the system. The cost per unit is rounded to the nearest $0.05. Table 21 presents this calculation.

Table 21: FY 2023-24 Monthly Meter Service Charges

Meter Size and Technology *	Meter Flow Rate Equivalency Ratio	Number of Accounts	FY 2023-24 Rates (After Rounding)	FY 2023-24 Total MEUs	FY 2023-24 Revenue
5/8" Disc	1.0	66,169	$11.85	794,028	$9,409,232
3/4" Disc	1.5	11,659	$17.80	209,862	2,486,865
1" Disc	2.5	31,183	$29.65	935,490	11,085,557
1 1/2" Disc	6.0	4,127	$71.10	297,144	3,521,156
1 1/2" Single Jet	5.0	1	$59.25	60	711
2" Disc	8.0	5,424	$94.80	520,704	6,170,342
2" Single Jet	8.0	2	$94.80	192	2,275
2" Turbo	12.5	706	$148.15	105,900	1,254,915
3" Turbo	32.5	407	$385.15	158,730	1,880,951
4" Turbo	62.5	198	$740.65	148,500	1,759,725
4" Turbo Omni F-2	62.5	1	$740.65	750	8,888
6" Turbo	125.0	35	$1,481.25	52,500	622,125
6" Turbo Omni F-2	100.0	4	$1,185.00	4,800	56,880
8" Mag Meter	248.7	0	$2,947.10	0	0
8" Turbo	175.0	10	$2,073.75	21,000	248,850
8" Turbo Omni F-2	175.0	1	$2,073.75	2,100	24,885
10" Turbo	350.0	4	$4,147.50	16,800	199,080
Totals				**3,268,560**	**$ 38,732,436**

* Identified maxed capacity (GPM) updated for some meters based on data from meter manufacturers.

Customers who remain in the Low Volume tier for most of the year will have a larger percentage of their bill made up of the fixed service charge even though the reduced system demand can extend the life of system assets. The District provides a fixed service charge rate reduction based on the reduced impact on District assets. This concept provides a "lease-back" conservation credit to those whose use remains in the Low Volume tier via a fixed service charge reduction. With the "lease-back" approach, an agency recognizes that a low volume user is not fully using their budgeted capacity, and therefore, it is reasonable to provide a lease-back credit to users who are underutilizing that flow and effectively "leasing it back" to the system for other users. This prevents the District from having to upsize infrastructure as quickly as capacity is exhausted. The monthly service charge is reduced for customers that remain in the Low Volume tier for at least nine months of the prior calendar year resulting in a $2.00 credit per month, which is itemized on each bill. Nine months is deemed reasonable to account for a customer that may

occasionally leave the Low Volume tier due to a leak, etc. The nexus is based on removing 75% (nine months) of the capital fixed service charge contribution which is approximately $2.00 per month.

4.3.4. MONTHLY PRIVATE FIRELINE CHARGES

Private firelines provide water to sprinkler systems for fire suppression within private improvements such as buildings and other structures. The District, like many utilities, provides private fireline service to its customers.

Table 22 shows the calculation of the FY 2023-24 private fireline rates. For a complete discussion of the calculation method for these rates, please see sections 4.3.4 in the 2021 COS Study.

Table 22: Proposed FY 2023-24 Private Fireline Charges

Private Fireline Size	Number of Lines	Potential Demand Based on Pipe Diameter (1)	Customer Related Costs (2)	Private Fire O&M Peaking Costs (3)	Capital Cost Component (4)	FY 2023-24 Rates	FY 2023-24 Revenue
1"	42	1.00	$7.02	$0.20	$0.25	$7.45	$3,755
2"	1,045	6.19	$7.02	$1.21	$1.52	$9.75	$122,265.00
3"	31	17.98	$7.02	$3.52	$4.41	$14.95	$5,561.40
4"	1,057	38.32	$7.02	$7.49	$9.41	$23.90	$303,147.60
6"	1,195	111.31	$7.02	$21.76	$27.33	$56.10	$804,474.00
8"	1,077	237.21	$7.02	$46.37	$58.24	$111.65	$1,442,964.60
10"	130	426.58	$7.02	$83.39	$104.73	$195.15	$304,434.00
11"	1	548.10	$7.02	$107.14	$134.57	$248.75	$2,985.00
12"	5	689.04	$7.02	$134.69	$169.17	$310.90	$18,654.00
Total	**4,583**						**$ 3,008,240**
						Fire Flow Testing and Hydrant Revenue	$ 823,248
						Total Fireline Revenue	$3,831,488

(1) Potential demand based on the Hazen-Williams Equation which estimates flow based on factors such as pipe diameter, friction, and the velocity of flow.
(2) $10,494,491 customer related operating costs/124,604 bills/12 months = $7.02.
(3) $1,162,349 peaking costs/ 495,508 private fire demand units/ 12 months = $0.20. For pipe diameters > 1", $0.20 is increased by the potential demand based on pipe diameter (Hazen-Williams).
(4) $2.50 capital cost for a 1" meter equivalent X $2.88 capital cost per MEU x 3.4% allocation to private firelines = $0.25. For pipe diameters > 1", $0.25 is increased by potential pipe diameter (Hazen-Williams).

4.3.5. PUBLIC FIRE WATER SERVICE COSTS

There are two cost components associated with public fire water service: direct costs and indirect costs. The budgeted costs for FY 2023-24 are:

Direct costs	$ 693,000
Indirect costs	$3,058,000
Total Public Fire Water Service Costs	$3,751,000

Direct costs are associated primarily with maintenance of the fire hydrants. These include inspections, painting, and flushing of the hydrants. Flushing is an important maintenance activity that verifies the proper operation of the hydrant to ensure adequate water flow will be available when the need to extinguish a structure fire arises. Flushing also removes the sediment that naturally accumulates in the hydrant.

Indirect costs are the District's costs for design and sizing of the infrastructure to support the "fire flow" (volume and pressure of water) prescribed to meet peak firefighting water demand. The District's water system is designed

to provide capacity to handle two defined hypothetical fires. Capacity is measured in terms of maximum hourly and maximum daily water flow. See Appendix 5 for a more detailed discussion on these costs.

5. Sewer Cost of Service FY 2023-24

See section 5 of the COS Study for a complete discussion on the District's sewer cost of service.

As is the case with its potable water, the District separates the components of its annual sewer revenue requirement from rates into three specific types of costs: variable operating costs, fixed operating costs, and replacement and enhancement costs. However, as described in Section 5.1.1 in the COS Study, the rate structure used to recover these costs differs from that of potable water service.

5.1. FY 2023-24 SEWER REVENUE REQUIREMENT

The FY 2023-24 sewer revenue requirement was determined to be $68,398,123 (see tables 23 and 24 below). Of this amount, $23,991,547 (35.1%) is associated with variable costs that are incurred to treat sewage for discharge. These costs vary with the amount of water used by customers that returns to the District's sewage treatment facilities and are recovered through IRWD's commodity rates. The District separates operational expenses between sewage treatment and recycled water production with tertiary treatment and similar processes included in the cost for recycled water. Table 23 shows the FY 2023-24 sewer variable cost revenue requirement.

Table 23: FY 2023-24 Sewer Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Variable Operating Costs	
Sewage Treatment	$10,138,449
Biosolids Treatment	9,922,855
OC San Treatment and Disposal	4,270,435
Gross Variable Cost Revenue Requirement	**$ 24,331,738**
Revenue Requirement Offsets	
Direct Billing Revenue and FOG	$340,191
Total Revenue Requirement Offsets	**$ 340,191**
Net Variable Revenue Requirement from Rates	**$ 23,991,547**

Fixed costs do not vary with the volume of water used by customers and returned to the District's sewage treatment facilities. The fixed cost portion of the total FY 2023-24 revenue requirement was $44,406,576 (64.9%). Table 24 provides a detail of the FY 2023-24 sewer fixed cost revenue requirement.

Table 24: FY 2023-24 Sewer Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Sewage System Monitoring and Fixed Costs	$10,770,747
Biosolids Fixed Operating Costs	5,228,213
OC San Sewage Fixed Costs	860
Customer Service	$2,899,833
Fleet	988,490
General Plant	927,014
Building Maintenance	$938,402
Total Fixed Operating Costs	**$ 21,753,559**
Replacement and Enhancement Capital Costs	
Replacement	$21,748,686
Enhancement	1,534,000
Total Capital Costs	**$ 23,282,686**
Gross Fixed Cost Revenue Requirement	**$ 45,036,245**
Revenue Offsets	
Direct Billing Revenue and FOG	$629,669
Total Revenue Offsets	**$ 629,669**
Net Fixed Revenue Requirement from Rates	**$ 44,406,576**

5.1.1. SEWER COST RECOVERY (RATE DESIGN)

The District uses the average of the three lowest water meter readings during the twelve month period ending December 31 to adjust for monthly anomalies in a ratepayer's water use and seasonal variations. The consumption block breakpoints (table 26) are based on a review of historical data for average usage during cooler months because of the limited demand for landscape during winter months. The analysis identified the average usage for all multi-family units was 5 CCF which aligns with the first block. The second block includes average usage below 10 CCF as single family residential customers averaged 10 CCF during the same low usage months. The third block, which includes all commercial, industrial, and institutional (CII) customers, exceeds 10 CCF (The average usage for CII customers exceeds 10 CCF). Non-residential/CII customers with billed water consumption of more than 10 CCF per month pay an additional commodity rate ($/CCF). The Orange County Sanitation District's (OC San) Cost of Service Study (December 2017) identified a flow factor, a percentage of metered water usage returning to the sewer system, of 90% for single family homes and non-residential customers (CII). Therefore, the District applies the additional charge on 90% of the billed water consumption for CII customers, consistent with the OC San study. See Table 25 in the COS Study to view the FY 2020-21 Sewer Rate Structure and Rates.

This rate structure is compliant with Proposition 218 because it provides a mechanism for recovering rate revenue from customers in a manner that is proportionate to the costs incurred by the District to provide service. It includes a fixed component for all three blocks that does not change. A variable component is included that is based on the historic average of estimated sewage flow by customers within each block.

Step 1: Determine the number of sewer customer accounts with usage in each consumption block as shown in Table 26.

Table 26: FY 2023-24 Sewer Customer Accounts by Consumption Block

Customer Class	Block 1	Block 2	Block 3	Total
Single Family Residence	42,254	28,402	32,215	102,871
Multi Family Residence	45,873	7,350	4,011	57,234
Residence Sewer Only	872	283	0	1,155
Commercial			4,920	4,920
Industrial			789	789
Public Authority			3	3
Total	**88,999**	**36,035**	**41,938**	**166,972**

Step 2: Estimate sewer volumes contributed by customer class as shown in Table 27.

Table 27: FY 2023-24 Contributed Sewage Volumes

Line No.	Metric	All Residential (Potable)	All Commercial, Industrial, Public Authority (Potable)	All Construction (Potable)
1	Number of Accounts	161,260	5,712	-
2	Projected Indoor Water Usage (ccf)	13,467,290	4,873,793	116,069
3	Return to Sewer Factor	80%	90%	2%
4	Annual Discharge (ccf) (Line 2*Line 3)	10,773,832	4,386,414	2,321
5	Annual Discharge (MG)	8,064	3,283	2

Step 3: Determine the fixed and variable unit cost of service as shown in Table 28.

Table 28: FY 2023-24 Sewer Unit Cost of Service

Metric	Fixed Costs	Variable Costs	Total
Operating Revenue Requirement	$21,753,559	$24,331,738	$46,085,297
Capital Revenue Requirement	23,282,686		23,282,686
Revenue Offset			
Direct Billing Revenue and FOG	629,669	340,191	969,860
Revenue Requirement (Table 23 and 24)	**$ 44,406,576**	**$ 23,991,547**	**$ 68,398,123**
Discharge (Table 27)		15,162,568	
		ccf of sewer flow	
Unit Cost		$1.58	
		per ccf	

Step 4: Determine the average and total discharges in each fixed tier as shown in Table 29.

Table 29: FY 2023-24 Sewer Discharges by Fixed Consumption Block

Sewer Fixed Charge Tiers	Average Monthly Discarges (ccf) (A)	Number of Accounts (B)	Annual Avg Discharges (ccf) A x B x 12= (C)
Block 1: Average Water Usage < 5 ccf per month	3.2	88,999	3,417,562
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	36,035	3,026,940
Block 3: Average Water Usage > 10 ccf per month	10.0	41,938	5,032,560
Total		**166,972**	**11,477,062**

Step 5: Determine the allocation of fixed and variable sewer costs as shown in Table 30.

Table 30: FY 2023-24 Allocation of Sewer Fixed and Variable Costs

Fixed Allocation	Discharge	Allocation	Cost Allocation	Unit Costs
Operating Costs Allocated to Fixed Charge (from Table 29)	11,477,062	76%	16,235,789	$8.1 per account
Capital Allocated to Fixed Charge		100%	22,957,162	$11.46 per account
Total Fixed Charge per Customer				$19.56 per account (1)
Operating Costs Allocated to Discharge >10 ccf	3,685,506	24%	5,213,625	$1.41 per ccf
Capital Allocated to Discharge >10 ccf				
Total (from Table 27)	15,162,568	100%	44,406,576	
Variable Allocation	Discharge	Cost Allocation	Rate	
Discharge Block Rate – Allocated to Block Rates	**15,162,568**	**23,991,547**	**$1.58**	**per ccf**

Step 6: Calculate the sewer rates based on the allocation of fixed and variable costs shown in Table 30 above. Table 31 shows this outcome.

Table 31: FY 2023-24 Proposed Sewer Rates

Sewer Fixed Charge Tiers	Avg Monthly CCF' Discharged	Variable Cost (1)	Fixed Cost (2)	Rate Stabilization Fund (3)	FY 2023-24 Monthly Rates (4)	FY 2023-24 Accounts (12 Months)	FY 2023-24 Revenue
Block 1: Average Water Usage < 5 ccf per month	3.2	$5.06	$19.56	(1.50)	$23.10	1,067,988	$24,670,523
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	$11.08	$19.56	(1.87)	$28.78	432,420	12,446,660
Block 3: Average Water Usage > 10 ccf per month	10.0	$15.82	$19.56	(2.16)	$33.24	503,256	16,730,528
Totals						**2,003,664**	**$53,847,711**
Variable Rates per ccf		**Discharge**	**Variable Rate (3)**	**Fixed Charge (3)**	**Proposed Rate per CCF**	**FY 2023-24 Discharge CCF**	**FY 2023-24 Revenue**
Discharge >10 ccf		3,685,506	$1.58	$1.41	$3.00	3,685,506	$11,056,518

(1) $1.58 From Table 29 * average monthly CCF discharged
(2) Total fixed charge per customer from Table 30
(3) Use of the Replacement Fund as explained below table 18.
(4) Variable cost plus fixed cost rounded to nearest $0.05

6. RECYCLED WATER COST OF SERVICE

See section 6 of the COS Study for a complete discussion on the District's recycled water cost of service.

The method used by the District to develop recycled water rates is similar to that for potable water service (see Section 2 of this report) with one significant difference. The District does not calculate unique monthly meter service charges for recycled water. Instead, the monthly service charges for recycled water are set to the same as those charged for the potable water monthly meter service charge (see Table 21 in section 4.3.3). The District takes this approach due to an imbalance between variable and fixed costs in the overall recycled water revenue requirement. This reallocation of fixed costs to variable revenue recovery through commodity rates is discussed in Section 6.1. below.

6.1.2. FY 2023-24 RECYCLED WATER REVENUE REQUIREMENT

The District's recycled water revenue requirement from rates is $39,181,175. Prior to any adjustments, the composition of this revenue requirement is variable costs of $21,734,964 (51.3%) and fixed costs of $17,446,210 (48.7%). The District established the monthly fixed charge unit cost as being $11.85 per 5/8" meter equivalents in the potable water service process (see Table 21 in section 4.3.3). Due to the high percentage of fixed costs identified in the recycled water revenue requirement, the District reallocates a portion of fixed costs not recovered by monthly meter service charges ($9,860,650) into the variable cost revenue requirement. These costs are included in the recycled system and recycled water revenue provides the funding consistent with Proposition 218 requirements. This strategy provides a fair and equitable application of these costs without deterring usage.

Tables 34 and 35 detail the FY 2023-24 variable and fixed recycled water revenue requirement before and after this reallocation.

Table 34: FY 2023-24 Recycled Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Untreated Water Purchases	$5,539,690
Recycled Water Treatment	10,610,901
El Toro Groundwater	3,903,318
Total Cost of Water Supplies	**$ 20,053,909**
Conservation and Supply Reliability	
Universal Conservation	116,388
Targeted Conservation	311,367
Natural Treatment System	1,253,300
Total Cost of Water Supplies	**1,681,055**
Total Variable Cost Revenue Requirement Before Adjustment	**$ 21,734,964**
Adjustment to Reflect Reallocated Fixed Costs	$9,860,650
Total Variable Cost Revenue Requirement After Adjustment	**$ 31,595,614**

Table 35: FY 2023-24 Recycled Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
System Maintenance and Monitoring	$14,447,824
Customer Service	1,739,900
Fleet	68,172
General Plant	923,940
Building Maintenance	563,041
Total Fixed Operating Costs	**$17,742,876**
Replacement and Enhancement Capital Costs	
Replacement	$941,413
Enhancement	330,000
Total Capital Costs	**1,271,413**
Gross Fixed Cost Revenue Requirement	**19,014,289**
Revenue Requirement Offsets	
Pumping	807,975
Miscellaneous/Other Revenues	760,104
Total Revenue Requirement Offsets	**1,568,079**
Total Fixed Cost Revenue Requirement Before Adjustment	**17,446,210**
Adjustment to Reflect Reallocated Fixed Costs	**($9,860,650)**
Net Fixed Revenue Requirement from Rates After Adjustment	**7,585,560**

6.1.3. VARIABLE COST RECOVERY - COMMODITY RATES

The method used to determine recycled water commodity rates is similar to that used for potable water. In FY 2023-24, the District's projected total recycled water demand was 32,943 acre feet based on historical demand, customer growth factors and other relevant factors. Table 36 provides a detail of the FY 2023-24 unit cost of water supplies ($/CCF) from each supply source using the District's cost and demand data. Note that the net cost shown in each column includes the reallocation of fixed costs of $9,860,650 as discussed above.

Table 36: Unit Cost of FY 2023-24 Recycled Water Supplies

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported (Supplemental)	Total
Net Cost	$15,541,227	$4,889,383	$9,483,950	$29,914,559
Acre Feet	25,640	3,030	4,273	32,943
Unit Cost per ccf (1)	$1.39	$3.70	$5.10	

(1) Acre feet is multiplied by 435.6 to convert to CCF.

The District allocates the lower cost water supplies to the low volume and base consumption tiers with higher cost water supplies being allocated to the inefficient and wasteful tiers. Table 37 details this allocation for FY 2023-24 using cost and demand data provided by the District.

The general formula used to determine the water budget for a landscape customer served by a recycled water connection is discussed in detail in 4.1.5. in the COS Study.

Table 37: Allocation of Recycled Water Supplies to Consumption Tiers for Landscape Customers

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported	Total Acre Feet	Unit Cost per $ /ccf by Tier (1)
Unit Cost (Table 36)	$1.39	$3.70	$5.10		
T1: Low Volume	16,003	-	-	16,003	$1.39
T2: Base	9,637	3,030	1,922	14,590	$2.36
T3: Inefficient	-	-	1,399	1,399	$5.10
T4: Wasteful	-	-	951	951	$5.10
Total	25,640	3,030	4,273	32,943	

(1) The Unit Cost per $/CCF by TIER is the blended cost of the sources.

Having determined the unit cost of recycled water supplies by consumption tier for landscape customers as shown in Table 37 above, the District then allocates the cost of conservation programs, as shown in table 34, to the appropriate water budget tiers.

Universal conservation costs are added to the commodity rate in the inefficient, and wasteful tiers to pay for conservation program costs that help customers in each of these tiers achieve efficient use of recycled water. This cost is not included in the low volume or base rates since customers who remain in these usage tiers do not need assistance to stay within their water budgets.

Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage exceed their water budgets. Costs are allocated to each tier based on expected usage.

Natural treatment system costs are incurred by the District to deal with urban water runoff produced by customers whose usage reaches the wasteful tier. The costs include prevention, control and treatment of the runoff of water from irrigation and other uses and are added to the commodity rates of customers in the wasteful tier. Costs are allocated based on the expected usage in each tier.

Table 38 shows the outcome of derivation of the unit costs for the District's conservation programs.

Table 38: FY 2023-24 Conservation Program Unit Costs ($/CCF)

Program	FY 2023-24 Revenue Requirement (A)(1)	FY 2023-24 Units of Demand (ccf) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2023-24 Adjusted Units of Demand B x C = (D)	Rate Stabilization Adjustment (E)(2)	Unit Cost Included in FY 2023-24 Commodity Rates A/D - E = (F)
Universal Conservation	$116,388	1,023,910	100%	1,023,910		$0.11
Targeted Conservation						
Inefficient tier	$77,842	609,483	90%	548,535	($0.10)	$0.04
Wasteful tier	$233,525	414,427	90%	372,984		$0.63
Natural Treatment System						
Wasteful tier	$1,253,300	414,427	90%	372,984		$3.36

(1) See Table 34

(2) Use of the Replacement Fund as explained below table 18.

Having determined the unit cost of recycled water supplies by consumption tier as shown in Table 37 and the unit cost of conservation program cost in Table 38, the District must then allocate the cost of conservation programs to each consumption tier. Table 39 shows the outcome of this process using the District's cost and demand data.

Table 39: FY 2023-24 Recycled Water Commodity Rates ($/CCF)

Consumption Tier	Unit Cost of Water Supplies (Table 37)	Unit Cost of Universal Conservation (Table 38)	Unit Cost of Targeted Conservation (Table 38)	Unit Cost of Natural Treatment System (Table 38)	FY 2023-24 Commodity Rates	FY 2023-24 CCF	FY 2023-24 Revenue
T1: Low Volume	$1.39				$1.39	6,970,780	$9,689,385
T2: Base	$2.36				$2.36	6,355,281	14,998,462
T3: Inefficient	$5.10	$0.11	$0.04	$0.00	$5.25	609,483	3,199,787
T4: Wasteful	$5.10	$0.11	$0.63	$3.36	$9.20	414,427	3,812,724
Totals						**14,349,971**	**$31,700,358**

6.1.4. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGE

Recycled water fixed charges are the same as potable water fixed charges (see Table 21 in Section 4.3.3).

6.1.5. VARIABLE COST RECOVERY – RECYCLED WATER AGRICULTURAL RATES

As discussed in section 4.3.2, allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used and these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. It is assumed that produced water provides 78% of the source of supply, 9% is the cost of processed water, and imported water provides 13%. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $14,409. A portion of the fixed cost is included in the variable rate component as described in section 6.1.3. An additional fixed cost of $0.01 per CCF is, which is not recovered through the commodity rate, is applied based on an estimated 1,440,909 CCF. Table 40 shows the calculation of FY 2023-24 recycled water agricultural rates.

Table 40: FY 2023-24 Recycled Water Agricultural Water Commodity Rates ($/CCF)

Customer Class	FY 2023-24 Revenue Rquirement	FY 2023-24 Projected Demand (CCF)	Variable Cost (CCF) (1)	Fixed Component Cost (CCF) (2)	FY 2023-24 Commodity Rates (1)+(2)	FY 2023-24 Revenue
Agricultural	$3,011,501	1,440,909	$2.08	$0.01	$2.09	$3,011,501

8. Untreated Water Cost of Service FY 2023-24

Section 8 of the COS Study is updated to describe projected costs to serve untreated water.

8.1. UNTREATED WATER COMMODITY RATE

The FY 2023-24 variable revenue requirement for untreated water was determined to be $154,000. The source of this water comes from the Santiago Aqueduct Commission (SAC), and this is the cost incurred to acquire water supplies (See Table 13). Table 41 shows the calculation of the variable rate for untreated water.

Table 41: FY 2023-24 Untreated Water Commodity Rate ($/CCF)

Consumption Tier	FY 2023-24 Revenue Rquirement	FY 2023-24 SAC Purchases (AF)	Variable Cost (AF)	Variable Cost (CCF) (1)	FY 2023-24 Commodity Rates
Untreated Water	$92,831	101	$919	$2.11	$2.11

(1) Acre feet is multiplied by 435.6 to convert to CCF

8.1.1. UNTREATED WATER AGRICULTURAL COMMODITY RATE

The fixed cost revenue requirement for all untreated water uses was determined to be $479,555 for FY 2023-24. These include capacity, readiness to serve, and meter costs that do not vary based upon the amount of water used. The untreated agricultural rate includes a fixed charge component that is based upon an allocated portion of the untreated water costs for all untreated imported water uses. This includes untreated water supplies used by the Baker Treatment Plant (7,200 AF), the Recycled System (5,591 AF), and water sold directly to customers (101 AF). The total projected demand for these customers is 12,892 AF. Table 42 shows the calculation of the rate included for fixed costs for untreated agricultural customers.

Table 42: FY 2023-24 Untreated Water Agricultural Commodity Rates ($/CCF)

FY 2023-24 Revenue Requirement	FY 2023-24 Projected Demand (AF)	FY 2023-24 Projected Demand (CCF)(1)	Variable Cost (CCF)(2)	Fixed Cost Component (CCF)	FY 2023-24 Commodity Rate
$446,298	5,692	2,479,435	$2.11	$0.18	$2.29

(1) Acre feet is multiplied by 435.6 to convert to CCF
(2) From table 41

Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. As discussed in section 4.3.2, allocated fixed and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. The untreated water agricultural rate is calculated by combining the variable cost shown in Table 41 and the fixed cost component as shown in Table 42.

Table 43: FY 2023-24 Untreated Water Agricultural Commodity Rates ($/CCF)

Consumption Tier	Variable Cost (CCF)	Fixed Cost Component (CCF)	FY 2023-24 Commodity Rates
Untreated Water	$2.11	$0.18	$2.29

9. Setup and Reconnect Fees Cost of Service FY 2023-24

Section 9 of the COS Study is updated to describe projected costs of setup and reconnection fees.

9.1. SETUP AND RECONNECT FEES

New customers pay a setup fee to offset labor, general and administrative (G&A) costs related to establishing a new account with the District. The fee is $25.00 and has not changed since June 2015 since this fee is sufficient to offset new account costs.

When service is discontinued because of delinquency in payment of a water, sewer, or recycled water bill, the service shall not be restored until all delinquent charges, late charges and interest charges, and a trip charge (reconnection fee) have been paid.

The costs for the reconnection fee include labor, G&A, and vehicle costs. Reconnecting after hours is at a higher cost due to labor overtime and minimum guaranteed hours. Estimated costs are shown in Table 44.

Table 44: Reconnection Fee Costs

Estimated Cost	Normal Hours	After Hours Average
Labor and G&A	$62	$186
Vehicle Costs	$14	$14
Estimated Total Cost	$76	$200

In 2019, the California Health and Safety Code § 116914(a) limited reconnection fees for urban water systems for very low-income households to $50 during working hours and $150 at other times and allowed for Consumer Price Index (CPI) adjustments starting in 2021. The District applied the December Los Angeles CPI rates for 2021 (6.6%) and 2022 (4.9%) for the low income reconnection fee rate increases. Fees are rounded to nearest five dollars.

Table 45: FY 2023-24 Reconnection Fees

Reconnection Fees	Normal Hours	After Hours
Standard Fee	$75	$200
Low Income	$55	$165

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2023-24 and FY 2024-25.

Appendix 10 provides support for the development of rates to cover proposed operating costs for FY 2023-24. Appendix 11 provides support for the development of rates to cover proposed operating costs for FY 2024-25.

The tables are updated with the detailed costs from the FY 2024-25 operating budget. The methodology from the 2021 Cost of Service (COS) Study remains the same and the tables included in this appendix use the same reference numbering scheme as those in the 2021 COS Study. Section 8 has been added to address rates for untreated water.

4. Potable Water Cost of Service FY 2024-25

See section 4 of the COS Study for a complete discussion on the District's potable water cost of service.

The FY 2024-25 water revenue requirement was determined to be $120,320,660 (see sum of tables 13 and 14 below). Of this amount, $76,505,575 (63.6%) is associated with variable costs that are incurred to acquire, treat, and deliver water supplies. These costs vary with the amount of water used by customers and are recovered through commodity rates. Note that the variable cost revenue requirement includes $16,537,403 in costs for universal conservation, targeted conservation, water banking operations, and the District's natural treatment system used to control runoff from customers who use water in the inefficient and wasteful tiers. Table 13 provides detail of the FY 2024-25 variable revenue requirement.

4.3. FY 2024-25 POTABLE WATER REVENUE REQUIREMENT

Table 13: FY 2024-25 Potable Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Dyer Road Wellfield	$25,092,730
Baker Treatment Facilities	15,381,569
Imported Water Purchases	9,681,275
Deep Aquifer Treatment System	8,615,833
Irvine Desalter Domestic	6,072,459
Wells 21 & 22 Desalter Treatment Plant	3,300,605
Orange Park Acres	3,181,343
Total Potable Water Supply Costs	**$ 71,325,815**
Revenue Requirement Offsets to Water Supply Costs	
Baker Partners	6,324,396
Sinking Fund	1,700,000
Water Banking Operations	2,202,000
MWDOC PTP/IDP Credits	1,750,000
Total Revenue Requirement Offsets	**11,976,396**
Net Revenue Requirement for Water Supply Costs	**$ 59,349,419**
Conservation and Supply Reliability	
Universal Conservation	1,633,283
Targeted Conservation	7,754,476
Natural Treatment System	5,011,479
Water Banking	2,138,165
Total Conservation and Supply Reliability Costs	**16,537,403**
Net Potable Variable Cost Revenue Requirement	**$ 75,886,821**
Untreated Water Supplies	
Untreated Imported Water Purchases	163,187
Untreated Water System Maintenance	341,085
Native Water	1,340,760
Total Untreated Water Supply Costs	**$ 1,845,032**
Revenue Requirement Offsets to Untreated Water Supply Costs	
Transferred to Recycled	1,226,278
Total Revenue Requirement Offsets	**$ 1,226,278**
Net Untreated Water Variable Cost Revenue Requirement	**$ 618,754**

Fixed costs do not vary with the volume of water by customers. The fixed cost portion of the total FY 2024-25 revenue requirement was $43,815,085 (36.4%) as shown in Table 14. Of these fixed costs, $10,250,444 were associated with expenditures for replacement and enhancement capital costs that do not increase the capacity of

the water utility system to serve new customer demand growth. Table 14 provides a detail of the FY 2024-25 fixed revenue requirement.

Table 14: FY 2024-25 Potable Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Amount
Fixed Operating Costs	
System Maintenance and Monitoring	30,642,242
Customer Service	6,095,165
Fleet	1,579,495
General Plant	980,279
Building Maintenance	1,984,493
Total Fixed Operating Costs	**$41,281,674**
Replacement and Enhancement Capital Costs	
Replacement	8,015,444
Enhancement	2,235,000
Total Capital Costs	**$10,250,444**
Fixed Cost Revenue Requirement	**$51,532,118**
Revenue Requirement Offsets	
Firelines	4,184,472
Pumping Surcharge	1,695,742
Miscellaneous/Other	1,194,578
Low Volume Benefit	642,241
Total Revenue Requirement Offsets	**7,717,033**
Net Fixed Cost Revenue Requirement from Rates	**$43,815,085**
Total Water Revenue Requirement	**$120,320,660**

4.3.1. VARIABLE COST RECOVERY – COMMODITY RATES

The District recovers water supply costs through commodity rates with the lowest cost water supplies being recovered in the low volume and base consumption tiers and the highest cost water supplies being recovered in the inefficient and wasteful tiers. The District's method for recovering variable costs is compliant with Proposition 218 because of the direct linkage between the revenue recovered in each tier to the costs incurred to provide service to customers with demand in each consumption tier.

The District also recovers the cost of water conservation and water supply reliability programs through its commodity rates with targeted costs being allocated to customers with consumption in the inefficient and wasteful tiers. This approach is reasonable because customers who exceed their monthly water budget allocation impose higher costs on the District. Thus, the commodity rates charged in these two upper tiers are designed to not only recover the cost of more expensive water supplies, but also the additional costs of:

- Targeted conservation programs designed to reduce excessive use.
- Water banking operational costs to enhance water supply reliability.
- Rebates for long-term improvements in customer water use efficiency.

- Urban runoff source control programs referred to as the natural treatment system (NTS) treat runoff from customers who use water in the inefficient and wasteful tiers.

In FY 2024-25, the District's projected total water demand of 54,551 acre feet was based on historical averages by tier, adjusted for customer account growth and other relevant factors. This reflects a 2.0% increase over the 53,481 acre feet of water demand projected in FY 2023-24. Table 15 details the FY 2024-25 unit cost of water supplies ($/CCF) from each supply source as determined using cost and demand data provided by the District.

Table 15: Unit Cost of FY 2024-25 Water Supplies

Metric	Dyer Road Wellfield	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Totals
Net Cost (1)	$23,054,983	$7,726,089	$9,057,173	$4,344,186	$2,627,249	$9,681,275	$2,858,464	$59,349,419
Demand in Acre Feet (net)	26,567	7,432	6,912	3,995	1,598	5,350	2697	54,551
CCF (2)	11,572,585	3,237,379	3,010,867	1,740,222	696,089	2,330,460	1,174,813	23,762,416
Unit Cost per ccf (1) divided by (2)	$1.99	$2.39	$3.01	$2.50	$3.77	$4.15	$2.43	

(1) From Table 14
(2) Acre feet is multiplied by 435.6 to convert to CCF

The District allocates the water supply in the order of cost for each source. The higher cost water supplies are appropriately allocated to the inefficient and wasteful tiers. Table 16 details this allocation for FY 2024-25 using cost and demand data provided by the District.

Table 16: Allocation of Potable Water Supplies to Consumption Tiers for Unit Costs

Metric	Dyer Road Wellfield (1)	Deep Aquifer Treatment System	Baker Treatment Facilities	Irvine Desalter Domestic	Wells 21 & 22 Desalter Treatment Plant	Imported Water Purchases	Orange Park Acres Well 1	Total Acre Feet	Unit Cost by Tier ($ /ccf) (2)
Unit Cost	$1.99	$2.39	$3.01	$2.50	$3.77	$4.15	$2.43		
T1: Low Volume	20,537	-	-	-	-	-	-	20,537	$1.99
T2: Base	6,030	7,432	6,912	3,995	1,448	-	2,697	28,514	$2.54
T3: Inefficient	-	-	-	-	150	2,793	-	2,943	$4.13
T4: Wasteful	-	-	-	-	-	2,557	-	2,557	$4.15

(1) 20,537 acre feet are used to meet projected low volume demand estimated based on historic demand as adjusted for customer account growth and other relevant factors. The remainder (6,030 acre feet) is allocated to partially meet the base demand.
(2) The Unit Cost by Tier is the blended cost of the sources.

Having determined the unit cost of water supplies by consumption tier as shown in Table 16 above, the District then allocates the cost of conservation programs and supply reliability programs to the water budget tiers as described below:

Universal Conservation: Universal conservation costs are incurred to encourage customers to use water as efficiently as possible. Universal program costs are added to the commodity rate in the base, inefficient, and wasteful tiers. This cost is not included in the low volume rate since customers who remain in this usage tier do not need assistance to efficiently use water.

Targeted Conservation: Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage exceeds their water budgets. Therefore, these costs are added to the

commodity rates of customers in the inefficient and wasteful tiers. Based on a historical estimate of customers who have been provided assistance in these programs, approximately 77% of the customers are in the wasteful tier with the remainder of customers being in the inefficient tier. Therefore, 77% of the targeted conservation costs are allocated to the wasteful tier with the remaining 23% of the costs being allocated to the inefficient tier.

NTS Costs: These natural treatment system costs are incurred by the District to deal with urban water runoff produced by customers whose usage exceeds their water budgets. These costs are added to the commodity rates of customers in the inefficient and wasteful tiers because their excessive water usage creates urban water runoff. The allocation is based on an estimate of the historic mix of urban runoff created by customers in the inefficient and wasteful tiers primarily from hosing down hardscape and excess irrigation running off the landscape into the storm drains. The District estimates 82% of NTS costs are created by customers in the wasteful tier because wasteful outdoor demand flows to NTS sites. The remaining 18% of urban runoff costs results from inefficient customers overwatering drought tolerant landscape. The allocated costs provide the components and the anticipated sales result in the established rates.

Water Banking: Water banking costs are incurred to support the reliability of the District's water supplies. These costs are added to the commodity rates of customers in the wasteful tier because their excessive water usage creates the need for enhanced reliability of costly imported water supplies as previously discussed.

Table 17 shows the outcome of derivation of the unit costs for the District's conservation and supply reliability programs.

Table 17: FY 2024-25 Conservation and Supply Reliability Unit Costs ($/CCF)

Program	FY 2024-25 Revenue Requirement (1) (A)	FY 2024-25 Units of Demand (ccf) (2) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2024-25 Adjusted CCF B x C = (D)	Unit Cost Included in FY 2024-25 Commodity Rates A/B = (E)
Universal Conservation	$1,633,283	14,816,616	100%	14,816,616	$0.11
Water Banking					
Wasteful tier	$2,138,165	1,113,972	90%	1,002,575	$2.13
Targeted Conservation					
Inefficient tier (75%)	$1,777,068	1,281,809	90%	1,153,629	$1.54
Wasteful tier (25%)	$5,977,409	1,113,972	90%	1,002,575	$5.96
Natural Treatment System					
Inefficient tier (15%)	$888,110	1,281,809	90%	1,153,629	$0.77
Wasteful tier (85%)	$4,123,368	1,113,972	90%	1,002,575	$4.11

(3) From Table 14
(4) Units of Demand are based on the cumulative projected units of sale for the tiers. Universal Conservation includes the base, inefficient, and wasteful tiers.

Table 18 shows the FY 2024-25 potable water commodity rates.

Table 18: FY 2024-25 Potable Water Commodity Rates ($/CCF)

Consumption Tier	Unit Cost of Water Supplies (1)	Unit Cost of Universal Conservation (2)	Unit Cost of Water Banking (2)	Unit Cost of Targeted Conservation (2)	Unit Cost of Natural Treatment System (2)	FY 2024-25 Commodity Rates	FY 2024-25 CCF	FY 2024-25 Revenue
T1: Low Volume	$1.99					$1.99	8,945,799	$17,802,141
T2: Base	$2.54	$0.11				$2.65	12,420,834	32,915,211
T3: Inefficient	$4.13	$0.11		$1.54	$0.77	$6.55	1,281,809	8,395,852
T4: Wasteful	$4.15	$0.11	$2.13	$5.96	$4.11	$16.46	1,113,972	18,335,985
Totals							**23,762,416**	**$ 77,449,189**

(3) From Table 16
(4) From Table 17. Water used in the low volume tier is efficient and universal conservation efforts are not necessary.

4.3.2. VARIABLE COST RECOVERY - AGRICULTURAL RATES

Allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. DRWF provides 49% of the source of supply at a cost of $1.99/CCF and imported water provides 10% at a cost of $4.15/CCF. The remaining 41% is the blended cost of the other sources at $2.70/CCF (Table 15). This results in a blended variable cost of $2.50/CCF. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $24,139. The fixed cost applied to the agricultural commodity rate adds $1.14 to the per CCF cost based on the estimated 21,260 CCF. Table 19 shows the calculation of FY 2024-25 agricultural rates.

Table 19: FY 2024-25 Agricultural Water Commodity Rates ($/CCF)

System	FY 2024-25 Revenue Rquirement	FY 2024-25 Projected Demand (CCF)	Variable Cost (CCF) (1)	Fixed Cost Component (CCF) (2)	FY 2024-25 Commodity Rates (1)+(2)
Potable Water	$77,238	21,260	$2.50	$1.14	$3.63

4.3.3. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGES

The District recovers fixed operating costs and replacement and enhancement capital costs through monthly meter service charges. On the District potable water system, the baseline meter size serving customers is 5/8". Thus, the first step in developing the monthly meter service charge is to estimate the total number of 5/8" meter equivalent connections (MEUs) on the potable water system in order to establish the unit cost for a 5/8" equivalent meter. Table 20 shows a summary of this calculation using the District's fixed costs and meter count data.

Table 20: FY 2024-25 Monthly Unit Cost of Serving a 5/8" Equivalent Meter

System	5/8" MEU (A)	Operating Costs (B)	Capital Costs (C)	Total Fixed Cost Revenue Requirement (1) B + C = (D)	Operating Costs per 5/8" MEU B/A = (E)	Capital Costs per 5/8" MEU C/A = (F)	Rate Stabilization (G)	Total Unit Cost per 5/8" MEU(2) E+F+G= (H)
Potable Water	269,142	$32,742,614	$9,999,402	$42,742,015	$10.14	$3.10	($0.05)	$13.20

(1) From Table 14
(2) Values prior to rounding

The Rate Stabilization Fund is used to moderate the financial impact for significant cost increases on user rates in a single year. It provides a current benefit to our customers by smoothing out the rate increase and avoiding a one-time rate spike. Rate stabilization was utilized to pay for a portion of the increase. Rate Stabilization is a component of the District's Replacement Fund, which is money set aside for funding long- term capital replacements of existing infrastructure and paid by customers through user rates and other non-operating revenue sources.

Having established the monthly fixed charge unit cost as being $13.20 per 5/8" meter equivalents, the final step in the process is to develop a schedule of monthly meter service charges for each meter size on the system. The cost per unit is rounded to the nearest $0.05. Table 21 presents this calculation.

Table 21: FY 2024-25 Monthly Meter Service Charges

Meter Size and Technology	Meter Flow Rate Equivalency Ratio	Number of Accounts	FY 2024-25 Rates (After Rounding)	FY 2024-25 Total MEUs	FY 2024-25 Revenue
5/8" Disc	1.0	67,492	$13.20	809,904	$10,690,733
3/4" Disc	1.5	11,892	$19.80	214,056	2,825,539
1" Disc	2.5	31,806	$33.00	954,180	12,595,176
1 1/2" Disc	6.0	4,210	$79.20	303,120	4,001,184
1 1/2" Single Jet	5.0	1	$66.00	60	792
2" Disc	8.0	5,532	$105.60	531,072	7,010,150
2" Single Jet	8.0	2	$105.60	192	2,534
2" Turbo	12.5	719	$165.00	107,850	1,423,620
3" Turbo	32.5	414	$429.00	161,460	2,131,272
4" Turbo	62.5	202	$825.00	151,500	1,999,800
4" Turbo Omni F-2	62.5	1	$825.00	750	9,900
6" Turbo	125.0	35	$1,650.00	52,500	693,000
6" Turbo Omni F-2	100.0	4	$1,320.00	4,800	63,360
8" Mag Meter	248.7	0	$3,282.85	0	0
8" Turbo	175.0	10	$2,310.00	21,000	277,200
8" Turbo Omni F-2	175.0	1	$2,310.00	2,100	27,720
10" Turbo	350.0	4	$4,620.00	16,800	221,760
Totals				**3,314,544**	**$ 43,751,981**

Customers who remain in the Low Volume tier for most of the year will have a larger percentage of their bill made up of the fixed service charge even though the reduced system demand can extend the life of system assets. The District provides a fixed service charge rate reduction based on the reduced impact on District assets. This concept provides a "lease-back" conservation credit to those whose use remains in the Low Volume tier via a fixed service charge reduction. With the "lease-back" approach, an agency recognizes that a low volume user is not fully using their budgeted capacity, and therefore, it is reasonable to provide a lease-back credit to users who are underutilizing that flow and effectively "leasing it back" to the system for other users. This prevents the District from having to upsize infrastructure as quickly as capacity is exhausted. The monthly service charge is reduced for customers that remain in the Low Volume tier for at least nine months of the prior calendar year resulting in a $2.00 credit per month, which is itemized on each bill. Nine months is deemed reasonable to account for a customer that may occasionally leave the Low Volume tier due to a leak, etc. The nexus is based on removing 75% (nine months) of the capital fixed service charge contribution which is approximately $2.00 per month.

4.3.4. MONTHLY PRIVATE FIRELINE CHARGES

Private firelines provide water to sprinkler systems for fire suppression within private improvements such as buildings and other structures. The District, like many utilities, provides private fireline service to its customers.

Table 22 shows the calculation of the FY 2024-25 private fireline rates. For a complete discussion of the calculation method for these rates, please see sections 4.3.4 in the 2021 COS Study.

Table 22: Proposed FY 2024-25 Private Fireline Charges

Private Fireline Size	Number of Lines	Potential Demand Based on Pipe Diameter (1)	Customer Related Costs (2)	Private Fire O&M Peaking Costs (3)	Capital Cost Component (4)	FY 2024-25 Rates	FY 2024-25 Revenue
1"	43	1.00	$7.19	$0.20	$0.28	$7.65	$3,947
2"	1,066	6.19	$7.19	$1.23	$1.72	$10.15	$129,838.80
3"	32	17.98	$7.19	$3.58	$5.01	$15.80	$6,067.20
4"	1,078	38.32	$7.19	$7.63	$10.67	$25.50	$329,868.00
6"	1,219	111.31	$7.19	$22.17	$30.99	$60.35	$882,799.80
8"	1,099	237.21	$7.19	$47.25	$66.04	$120.50	$1,589,154.00
10"	133	426.58	$7.19	$84.98	$118.76	$210.95	$336,676.20
11"	1	548.10	$7.19	$109.18	$152.59	$268.95	$3,227.40
12"	5	689.04	$7.19	$137.26	$191.83	$336.30	$20,178.00
Total	**4,676**						**$ 3,301,757**
						Fire Flow Testing and Hydrant Revenue	$ 882,715
						Total Fireline Revenue	$4,184,472

(5) Potential demand based on the Hazen-Williams Equation which estimates flow based on factors such as pipe diameter, friction, and the velocity of flow.
(6) $10,970,888 customer related operating costs/127,096 bills/ 12 months = $7.19.
(7) $1,208,676 peaking costs/ 505,632 private fire demand units/ 12 months = $0.20. For pipe diameters > 1", $0.20 is increased by the potential demand based on pipe diameter (Hazen-Williams).
(8) $2.50 capital cost for a 1" meter equivalent X $3.10 capital cost per MEU x 3.6% allocation to private firelines = $0.28. For pipe diameters > 1", $0.28 is increased by potential pipe diameter (Hazen-Williams).

4.3.5. PUBLIC FIRE WATER SERVICE COSTS

There are two cost components associated with public fire water service: direct costs and indirect costs. The budgeted costs for FY 2024-25 are:

Direct costs	$ 738,000
Indirect costs	$3,122,000
Total Public Fire Water Service Costs	$3,860,000

Direct costs are associated primarily with maintenance of the fire hydrants. These include inspections, painting, and flushing of the hydrants. Flushing is an important maintenance activity that verifies the proper operation of the hydrant to ensure adequate water flow will be available when the need to extinguish a structure fire arises. Flushing also removes the sediment that naturally accumulates in the hydrant.

Indirect costs are the District's costs for design and sizing of the infrastructure to support the "fire flow" (volume and pressure of water) prescribed to meet peak firefighting water demand. The District's water system is designed to provide capacity to handle two defined hypothetical fires. Capacity is measured in terms of maximum hourly and maximum daily water flow. See Appendix 5 for a more detailed discussion on these costs.

5. Sewer Cost of Service FY 2024-25

See section 5 of the COS Study for a complete discussion on the District's sewer cost of service.

As is the case with its potable water, the District separates the components of its annual sewer revenue requirement from rates into three specific types of costs: variable operating costs, fixed operating costs, and replacement and enhancement costs. However, as described in Section 5.1.1 in the COS Study, the rate structure used to recover these costs differs from that of potable water service.

5.1. FY 2024-25 SEWER REVENUE REQUIREMENT

The FY 2024-25 sewer revenue requirement was determined to be $72,790,352 (see tables 23 and 24 below). Of this amount, $25,268,747 (34.7%) is associated with variable costs that are incurred to treat sewage for discharge. These costs vary with the amount of water used by customers that returns to the District's sewage treatment facilities and are recovered through IRWD's commodity rates. The District separates operational expenses between sewage treatment and recycled water production with tertiary treatment and similar processes included in the cost for recycled water. Table 23 shows the FY 2024-25 sewer variable cost revenue requirement.

Table 23: FY 2024-25 Sewer Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Variable Operating Costs	
Sewage Treatment	$10,732,162
Biosolids Treatment	10,611,644
OC San Treatment and Disposal	4,279,000
Gross Variable Cost Revenue Requirement	**$ 25,622,806**
Revenue Requirement Offsets	
Direct Billing Revenue and FOG	$354,059
Total Revenue Requirement Offsets	**$ 354,059**
Net Variable Revenue Requirement from Rates	**$ 25,268,747**

Fixed costs do not vary with the volume of water used by customers and returned to the District's sewage treatment facilities. The fixed cost portion of the total FY 2024-25 revenue requirement was $47,521,605 (65.3%). Table 24 provides a detail of the FY 2024-25 sewer fixed cost revenue requirement.

Table 24: FY 2024-25 Sewer Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
Sewage System Monitoring and Fixed Costs	$11,428,404
Biosolids Fixed Operating Costs	5,413,372
OC San Sewage Fixed Costs	860
Customer Service	$3,047,583
Fleet	1,041,031
General Plant	588,928
Building Maintenance	$992,247
Total Fixed Operating Costs	**$ 22,512,424**
Replacement and Enhancement Capital Costs	
Replacement	$24,141,041
Enhancement	1,534,000
Total Capital Costs	**$ 25,675,041**
Gross Fixed Cost Revenue Requirement	**$ 48,187,465**
Revenue Offsets	
Direct Billing Revenue and FOG	$665,860
Total Revenue Offsets	**$ 665,860**
Net Fixed Revenue Requirement from Rates	**$ 47,521,605**

5.1.1. SEWER COST RECOVERY (RATE DESIGN)

The District uses the average of the three lowest water meter readings during the twelve month period ending December 31 to adjust for monthly anomalies in a ratepayer's water use and seasonal variations. The consumption block breakpoints (table 26) are based on a review of historical data for average usage during cooler months because of the limited demand for landscape during winter months. The analysis identified the average usage for all multi-family units was 5 CCF which aligns with the first block. The second block includes average usage below 10 CCF as single family residential customers averaged 10 CCF during the same low usage months. The third block, which includes all commercial, industrial, and institutional (CII) customers, exceeds 10 CCF (The average usage for CII customers exceeds 10 CCF). Non-residential/CII customers with billed water consumption of more than 10 CCF per month pay an additional commodity rate ($/CCF). The Orange County Sanitation District's (OC San) Cost of Service Study (December 2017) identified a flow factor, a percentage of metered water usage returning to the sewer system, of 90% for single family homes and non-residential customers (CII). Therefore, the District applies the additional charge on 90% of the billed water consumption for CII customers, consistent with the OC San study. See Table 25 in the COS Study to view the FY 2020-21 Sewer Rate Structure and Rates.

This rate structure is compliant with Proposition 218 because it provides a mechanism for recovering rate revenue from customers in a manner that is proportionate to the costs incurred by the District to provide service. It includes a fixed component for all three blocks that does not change. A variable component is included that is based on the historic average of estimated sewage flow by customers within each block.

Step 1: Determine the number of sewer customer accounts with usage in each consumption block as shown in Table 26.

Table 26: FY 2024-25 Sewer Customer Accounts by Consumption Block

Customer Class	Block 1	Block 2	Block 3	Total
Single Family Residence	43,099	28,970	32,859	104,928
Multi Family Residence	46,790	7,497	4,091	58,379
Residence Sewer Only	881	286	0	1,167
Commercial			4,920	4,920
Industrial			789	789
Public Authority			3	3
Total	**90,770**	**36,753**	**42,663**	**170,186**

Step 2: Estimate sewer volumes contributed by customer class as shown in Table 27.

Table 27: FY 2024-25 Contributed Sewage Volumes

Line No.	Metric	All Residential (Potable)	All Commercial, Industrial, Public Authority (Potable)	All Construction (Potable)
1	Number of Accounts	164,474	5,712	-
2	Projected Indoor Water Usage (ccf)	13,621,940	5,058,522	118,391
3	Return to Sewer Factor	80%	90%	2%
4	Annual Discharge (ccf) (Line 2*Line 3)	10,897,552	4,552,670	2,368
5	Annual Discharge (MG)	8,157	3,408	2

Step 3: Determine the fixed and variable unit cost of service as shown in Table 28.

Table 28: FY 2024-25 Sewer Unit Cost of Service

Metric	Fixed Costs	Variable Costs	Total
Operating Revenue Requirement	$22,512,424	$25,622,806	$48,135,230
Capital Revenue Requirement	25,675,041		25,675,041
Revenue Offset			
Direct Billing Revenue and FOG	665,860	354,059	1,019,918
Revenue Requirement (Table 23 and 24)	**$ 47,521,605**	**$ 25,268,747**	**$ 72,790,353**
Units of service (Table 26)		15,452,590	
		ccf of sewer flow	
Unit Cost		$1.64	
		per ccf	

Step 4: Determine the average and total discharges in each fixed tier as shown in Table 29.

Table 29: FY 2024-25 Sewer Discharges by Fixed Consumption Block

Sewer Fixed Charge Tiers	Average Monthly Discarges (ccf) (A)	Number of Accounts (B)	Annual Avg Discharges (ccf) A x B x 12= (C)
Block 1: Average Water Usage < 5 ccf per month	3.2	90,770	3,485,578
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	36,753	3,087,241
Block 3: Average Water Usage > 10 ccf per month	10.0	42,663	5,119,502
Total		**170,186**	**11,692,321**

Step 5: Determine the allocation of fixed and variable sewer costs as shown in Table 30.

Table 30: FY 2024-25 Allocation of Sewer Fixed and Variable Costs

Fixed Allocation	Discharge	Allocation	Cost Allocation	Unit Costs
Operating Costs Allocated to Fixed Charge (from Table 29)	11,692,321	76%	16,798,819	$8.23 per account
Capital Allocated to Fixed Charge		100%	25,320,261	$12.4 per account
Total Fixed Charge per Customer				$20.62 per account (1
Operating Costs Allocated to Discharge >10 ccf	3,760,268	24%	5,402,526	$1.44 per ccf
Capital Allocated to Discharge >10 ccf				
Total (from Table 27)	15,452,590	100%	47,521,605	
Variable Allocation	Discharge	Cost Allocation	Rate	
Discharge Block Rate – Allocated to Block Rates	**15,452,590**	**25,268,747**	**$1.64**	**per ccf**

Step 6: Calculate the sewer rates based on the allocation of fixed and variable costs shown in Table 30 above. Table 31 shows this outcome.

Table 31: FY 2024-25 Proposed Sewer Rates

Sewer Fixed Charge Tiers	Avg Monthly CCF' Discharged	Variable Cost (1)	Fixed Cost (2)	Rate Stabilization Fund (3)	FY 2024-25 Monthly Rates (4)	FY 2024-25 Accounts (12 Months)	FY 2024-25 Revenue
Block 1: Average Water Usage < 5 ccf per month	3.2	$5.23	$20.62	(0.15)	$25.70	1,089,243	$27,993,548
Block 2: Average Water Usage between 5 and 10 ccf per month	7.0	$11.45	$20.62	(0.19)	$31.86	441,034	14,053,100
Block 3: Average Water Usage > 10 ccf per month	10.0	$16.35	$20.62	(0.21)	$36.79	511,950	18,832,342
Totals						**2,042,228**	**$60,878,990**
Variable Rates per ccf		**Discharge**	**Variable Rate (3)**	**Fixed Charge (3)**	**Proposed Rate per CCF**	**FY 2024-25 Discharge CCF**	**FY 2024-25 Revenue**
Discharge >10 ccf		3,760,268	$1.64	$1.44	$3.07	3,760,268	$11,544,024

(1) $1.64 From Table 29 * average monthly CCF discharged
(2) Total fixed charge per customer from Table 30
(3) Use of the Replacement Fund as explained below table 18.
(4) Variable cost plus fixed cost rounded to nearest $0.05

6. RECYCLED WATER COST OF SERVICE

See section 6 of the COS Study for a complete discussion on the District's recycled water cost of service.

The method used by the District to develop recycled water rates is similar to that for potable water service (see Section 2 of this report) with one significant difference. The District does not calculate unique monthly meter service charges for recycled water. Instead, the monthly service charges for recycled water are set to the same as those charged for the potable water monthly meter service charge (see Table 21 in section 4.3.3). The District takes this approach due to an imbalance between variable and fixed costs in the overall recycled water revenue requirement. This reallocation of fixed costs to variable revenue recovery through commodity rates is discussed in Section 6.1. below.

6.1.2. FY 2024-25 RECYCLED WATER REVENUE REQUIREMENT

The District's recycled water revenue requirement from rates is $41,895,129. Prior to any adjustments, the composition of this revenue requirement is variable costs of $23,695,895 (56.6%) and fixed costs of $18,199,234 (43.4%). The District established the monthly fixed charge unit cost as being $13.20 per 5/8" meter equivalents in the potable water service process (see Table 21 in section 4.3.3). Due to the high percentage of fixed costs identified in the recycled water revenue requirement, the District reallocates a portion of fixed costs not recovered by monthly meter service charges ($9,510,108) into the variable cost revenue requirement. These costs are included in the recycled system and recycled water revenue provides the funding consistent with Proposition 218 requirements. This strategy provides a fair and equitable application of these costs without deterring usage.

Tables 34 and 35 detail the FY 2024-25 variable and fixed recycled water revenue requirement before and after this reallocation.

Table 34: FY 2024-25 Recycled Water Variable Cost Revenue Requirement

Revenue Requirement Component	Amount
Water Supplies	
Untreated Water Purchases	$5,830,878
Recycled Water Treatment	11,222,587
El Toro Groundwater	4,872,035
Total Cost of Water Supplies	**$ 21,925,500**
Conservation and Supply Reliability	
Universal Conservation	115,127
Targeted Conservation	323,103
Natural Treatment System	1,332,165
Total Cost of Water Supplies	**1,770,395**
Total Variable Cost Revenue Requirement Before Adjustment	**$ 23,695,895**
Adjustment to Reflect Reallocated Fixed Costs	$9,510,108
Total Variable Cost Revenue Requirement After Adjustment	**$ 33,206,003**

Table 35: FY 2024-25 Recycled Water Fixed Cost Revenue Requirement

Revenue Requirement Component	Total
Fixed Operating Costs	
System Maintenance and Monitoring	$15,413,400
Customer Service	1,828,550
Fleet	71,795
General Plant	586,712
Building Maintenance	595,348
Total Fixed Operating Costs	**$18,495,805**
Replacement and Enhancement Capital Costs	
Replacement	$1,044,969
Enhancement	330,000
Total Capital Costs	**1,374,969**
Gross Fixed Cost Revenue Requirement	**19,870,774**
Revenue Requirement Offsets	
Pumping	896,233
Miscellaneous/Other Revenues	775,306
Total Revenue Requirement Offsets	**1,671,539**
Total Fixed Cost Revenue Requirement Before Adjustment	**18,199,234**
Adjustment to Reflect Reallocated Fixed Costs	**($9,510,108)**
Net Fixed Revenue Requirement from Rates After Adjustment	**8,689,126**

6.1.3. VARIABLE COST RECOVERY - COMMODITY RATES

The method used to determine recycled water commodity rates is similar to that used for potable water. In FY 2024-25, the District's projected total recycled water demand was 33,587 acre feet based on historical demand, customer growth factors and other relevant factors. Table 36 provides a detail of the FY 2024-25 unit cost of water supplies ($/CCF) from each supply source using the District's cost and demand data. Note that the net cost shown in each column includes the reallocation of fixed costs of $9,510,108 as discussed above.

Table 36: Unit Cost of FY 2024-25 Recycled Water Supplies

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported (Supplemental)	Total
Net Cost	$15,977,641	$5,823,045	$9,634,921	$31,435,608
Acre Feet	25,640	3,541	4,406	33,587
Unit Cost per ccf (1)	$1.43	$3.78	$5.02	

(1) Acre feet is multiplied by 435.6 to convert to CCF.

The District allocates the lower cost water supplies to the low volume and base consumption tiers with higher cost water supplies being allocated to the inefficient and wasteful tiers. Table 37 details this allocation for FY 2024-25 using cost and demand data provided by the District.

The general formula used to determine the water budget for a landscape customer served by a recycled water connection is discussed in detail in 4.1.5. in the COS Study.

Table 37: Allocation of Recycled Water Supplies to Consumption Tiers for Landscape Customers

Metric	Produced from Treatment Plant	Processed from El Toro Remediation	Imported	Total Acre Feet	Unit Cost per $ /ccf by Tier (1)
Unit Cost (Table 36)	$1.43	$3.78	$5.02		
T1: Low Volume	16,323	-	-	16,323	$1.43
T2: Base	9,317	3,541	2,008	14,867	$2.47
T3: Inefficient	-	-	1,427	1,427	$5.02
T4: Wasteful	-	-	970	970	$5.02
Total	25,640	3,541	4,406	33,587	

(2) The Unit Cost per $/CCF by TIER is the blended cost of the sources.

Having determined the unit cost of recycled water supplies by consumption tier for landscape customers as shown in Table 37 above, the District then allocates the cost of conservation programs, as shown in table 34, to the appropriate water budget tiers.

Universal conservation costs are added to the commodity rate in the inefficient, and wasteful tiers to pay for conservation program costs that help customers in each of these tiers achieve efficient use of recycled water. This cost is not included in the low volume or base rates since customers who remain in these usage tiers do not need assistance to stay within their water budgets.

Targeted conservation costs reflect programs specifically designed to encourage efficient water practices of customers whose usage exceed their water budgets. Costs are allocated to each tier based on expected usage.

Natural treatment system costs are incurred by the District to deal with urban water runoff produced by customers whose usage reaches the wasteful tier. The costs include prevention, control and treatment of the runoff of water from irrigation and other uses and are added to the commodity rates of customers in the wasteful tier. Costs are allocated based on the expected usage in each tier.

Table 38 shows the outcome of derivation of the unit costs for the District's conservation programs.

Table 38: FY 2024-25 Conservation Program Unit Costs ($/CCF)

Program	FY 2024-25 Revenue Requirement (A)*	FY 2024-25 Units of Demand (ccf) (B)	Demand Adjustment Factor for Price Elasticity (C)	FY 2024-25 Adjusted Units of Demand B x C = (D)	Unit Cost Included in FY 2024-25 Commodity Rates A/D = (E)
Universal Conservation	$115,127	1,044,392	100%	1,044,392	$0.11
Targeted Conservation					
Inefficient tier	$80,776	621,675	90%	559,508	$0.14
Wasteful tier	$242,327	422,717	90%	380,445	$0.64
Natural Treatment System					
Wasteful tier	$1,332,165	422,717	90%	380,445	$3.50

*See Table 34

Having determined the unit cost of recycled water supplies by consumption tier as shown in Table 37 and the unit cost of conservation program cost in Table 38, the District must then allocate the cost of conservation programs to each consumption tier. Table 39 shows the outcome of this process using the District's cost and demand data.

Table 39: FY 2024-25 Recycled Water Commodity Rates ($/CCF)

Consumption Tier	Unit Cost of Water Supplies (Table 37)	Unit Cost of Universal Conservation (Table 38)	Unit Cost of Targeted Conservation (Table 38)	Unit Cost of Natural Treatment System (Table 38)	FY 2024-25 Commodity Rates	FY 2024-25 CCF	FY 2024-25 Revenue
T1: Low Volume	$1.43				$1.43	7,110,226	$10,167,624
T2: Base	$2.47				$2.47	6,475,879	15,995,420
T3: Inefficient	$5.02	$0.11	$0.14		$5.27	621,675	3,276,230
T4: Wasteful	$5.02	$0.11	$0.64	$3.50	$9.27	422,717	3,918,585
Totals						**14,630,497**	**$ 33,357,859**

6.1.4. FIXED COST RECOVERY - MONTHLY METER SERVICE CHARGE

Recycled water fixed charges are the same as potable water fixed charges (see Table 21 in Section 4.3.3).

6.1.5. VARIABLE COST RECOVERY – RECYCLED WATER AGRICULTURAL RATES

As discussed in section 4.3.2, allocated fixed costs and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used and these customers do not have a budget. The variable rate is based on the total available source of supply. The variable rate component is based on the respective proportions of those available sources using the same allocation of available sources used for residential and commercial customers. It is assumed that produced water provides 76% of the source of supply,11% is the cost of processed water, and imported water provides 13%. The fixed component is based on an allocation of fixed expense which includes a component for replacement and enhancement capital to the agricultural customer class of $14,697. A portion of the fixed cost is included in the variable rate component as described in section 6.1.3. An additional fixed cost of $0.01 per CCF is, which is not recovered through the commodity rate, is applied based on an estimated 1,469,734 CCF. Table 40 shows the calculation of FY 2024-25 recycled water agricultural rates.

Table 40: FY 2024-25 Recycled Water Agricultural Water Commodity Rates ($/CCF)

Customer Class	FY 2024-25 Revenue Rquirement	FY 2024-25 Projected Demand (CCF)	Variable Cost (CCF) (1)	Fixed Component Cost (CCF) (2)	FY 2024-25 Commodity Rates (1)+(2)	FY 2024-25 Revenue
Agricultural	$3,174,625	1,469,734	$2.15	$0.01	$2.16	$3,174,625

8. Untreated Water Cost of Service FY 2024-25

Section 8 of the COS Study is updated to describe projected costs to serve untreated water.

8.1. UNTREATED WATER COMMODITY RATE

The FY 2024-25 variable revenue requirement for untreated water was determined to be $163,187. The source of this water comes from the Santiago Aqueduct Commission (SAC), and this is the cost incurred to acquire water supplies (See Table 13). Table 41 shows the calculation of the variable rate for untreated water

Table 41: FY 2024-25 Untreated Water Commodity Rate ($/CCF)

Consumption Tier	FY 2024-25 Revenue Rquirement	FY 2024-25 SAC Purchases (AF)	Variable Cost (AF)	Variable Cost (CCF) [1]	FY 2024-25 Commodity Rates
Untreated Water	$100,053	103	$971	$2.23	$2.23

(1) Acre feet is multiplied by 435.6 to convert to CCF

8.1.1. UNTREATED WATER AGRICULTURAL COMMODITY RATE

The fixed cost revenue requirement for all untreated water uses was determined to be $492,798 for FY 2024-25. These include capacity, readiness to serve, and meter costs that do not vary based upon the amount of water used. The untreated agricultural rate includes a fixed charge component that is based upon an allocated portion of the untreated water costs for all untreated imported water uses. This includes untreated water supplies used by the Baker Treatment Plant (7,200 AF), the Recycled System (5,414 AF), and water sold directly to customers (97 AF). The total projected demand for these customers is 12,711. Table 42 shows the calculation of the rate included for fixed costs for untreated agricultural customers.

Table 42: FY 2024-25 Untreated Water Agricultural Commodity Rates ($/CCF)

FY 2024-25 Revenue Requirement	FY 2024-25 Projected Demand (AF)	FY 2024-25 Projected Demand (CCF)[1]	Variable Cost (CCF)(2)	Fixed Cost Component (CCF)	FY 2024-25 Commodity Rate
$432,106	5,511	2,400,592	$2.23	$0.18	$2.41

(3) Acre feet is multiplied by 435.6 to convert to CCF
(4) From table 41

Due to the variable nature of water demands for seasonal growing (i.e. not permanent crops), these customers do not have a budget. As discussed in section 4.3.2, allocated fixed and variable costs are combined to calculate the agricultural commodity rate, and these customers are charged a single volumetric rate for all water used. The untreated water agricultural rate is calculated by combining the variable cost shown in Table 41 and the fixed cost component as shown in Table 42.

Table 43: FY 2024-25 Untreated Water Agricultural Commodity Rates ($/CCF)

Consumption Tier	Variable Cost (CCF)	Fixed Cost Component (CCF)	FY 2024-25 Commodity Rates
Untreated Water	$2.23	$0.18	$2.41

9. Setup and Reconnect Fees Cost of Service FY 2024-25

Section 9 of the COS Study is updated to describe projected costs of reconnection fees.

9.1. SETUP AND RECONNECT FEES

New customers pay a setup fee to offset labor, general and administrative (G&A) costs related to establishing a new account with the District. The fee is $25.00 and has not changed since June 2015 since this fee is sufficient to offset new account costs.

When service is discontinued because of delinquency in payment of a water, sewer, or recycled water bill, the service shall not be restored until all delinquent charges, late charges and interest charges, and a trip charge (reconnection fee) have been paid.

The costs for the reconnection fee include labor, G&A, and vehicle costs. Reconnecting after hours is at a higher cost due to labor overtime and minimum guaranteed hours. Estimated costs are shown in Table 44.

Table 44: Reconnection Fee Costs

Estimated Cost	Normal Hours	After Hours Average
Labor and G&A	$62	$186
Vehicle Costs	$14	$14
Estimated Total Cost	$76	$200

In 2019, the California Health and Safety Code § 116914(a) limited reconnection fees for urban water systems for very low-income households to $50 during working hours and $150 at other times and allowed for Consumer Price Index (CPI) adjustments starting in 2021. The District applied the December Los Angeles CPI rates for 2021 (6.6%) and 2022 (4.9%) for the low income reconnection fee rate increases. Fees are rounded to nearest five dollars.

Table 45: FY 2023-24 Reconnection Fees

Reconnection Fees	Normal Hours	After Hours
Standard Fee	$75	$200
Low Income	$55	$165

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2023-24 and FY 2024-25.

Appendix 12 provides the support for public fire water costs for FY 2023-24. Appendix 13 provides support for public fire water costs for FY 2024-25. The tables are updated with the details from the FY 2023-24 operating budget. The methodology from the 2021 Cost of Service (COS) Study Appendices 5 and 6 (Appendices) remains the same, and tables included in this appendix use the same alphabetical reference scheme as those in the 2021 COS Study Public Fire Water Costs Technical Memos.

1.1. COST COMPONENTS ASSOCIATED WITH PUBLIC FIRE WATER SERVICE

See Appendices 5 and 6 of the COS Study for a complete discussion on the District's public fire water service cost components and how public fire water service costs are calculated.

The following steps are used to calculate indirect fire water service costs:

a. Identify total system peaking factors allocated to Base, Max Day, and Max Hour demands;
b. Apply functional allocation percentages to the asset categories;
c. Allocate asset values by function;
d. Allocate functions to peaking factors;
e. Determine asset value by peaking factor;
f. Allocate operating costs by their demands on the system;
g. Summarize peaking factor percentages for all operating costs by demand category;
h. Identify operating costs by demand category;
i. Calculate the cost of service by peaking factor;
j. Determine capacity requirements for fire flow and the allocation to public fire water supply capacity; and
k. Compute the public fire water supply cost-of-service.

The result is the cost estimate for the indirect component related to public fire water service. Steps a through f of the fire water costs calculation are the same as calculated in Appendices 5 and 6.

g. Summarize peaking factor percentages for all operating costs by demand category - Peaking factor percentages for operating expenses by demand category are summarized in the table below.

Table G: Summarized Peaking Factor Percentages for all Operating Costs FY 2023-24

Functional Group	Base	Max Day	Max Hour	Customer	Fire	General
Base Supply	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Excess Supply	12.2%	47.0%	40.8%	0.0%	0.0%	0.0%
Conservation and Supply Reliability	8.6%	43.7%	47.6%	0.0%	0.0%	0.0%
Customer Service	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
System Maintenance	96.9%	0.0%	0.0%	0.0%	3.1%	0.0%
General & Administrative	49.1%	31.6%	17.9%	1.4%	0.0%	0.0%
General Plant	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Asset Mangement	55.6%	44.4%	0.0%	0.0%	0.0%	0.0%

h. Identify operating costs by demand category – Amounts are assigned to demand categories shown in Table F. The net costs are explained in further detail in section 4.3 in the COS Study and are shown in Table 13 (variable revenue requirement) and Table 14 (fixed revenue requirement) in Appendix 10.

Table H: Operating and Asset Maintenance Costs by System Demands FY 2023-24

	Cost Group	Demand Category	Cost (Thousands)	Totals
Variable:	Water Supplies	Base Supply	$44,625	
	Water Supplies	Excess Supply	10,412	
	Conservation and Supply Reliability	Water Banking	1,655	
	Conservation and Supply Reliability	Conservation and NTS	13,752	
	Conservation and Supply Reliability	Universal Conservation	1,768	$72,213
Fixed:	Fixed Operating Costs	Customer Service	$5,800	
	Fixed Operating Costs	System Maintenance	20,210	
	Fixed Operating Costs	General & Administrative	10,933	
	Fixed Operating Costs	General Plant	830	
	Fixed Operating Costs	Asset Management	3,377	$41,149
			Net Allocated Costs	$113,362

i. Calculate cost-of-service by peaking factor - The allocated percentages identified in Table G are applied to the operating costs identified in Table H to calculate the cost by peaking factor. General and Administrative (G&A) cost is reallocated based on the total cost of service.

Table I: Calculate Cost-of-Service by Peaking Factor FY 2023-24

Demand Category	Base	Max Day	Max Hour	Customer	Fire	G&A	Total
Base Supply	$44,625	$0	$0	$0	$0	$0	$44,625
Excess Supply	1,274	4,889	4,249	0	0	0	10,412
Conservation and Supply Reliability	1,482	7,511	8,183	0	0	0	17,175
Customer Service	0	0	0	5,800	0	0	5,800
System Maintenance	19,584	0	0	0	626	0	20,210
General & Administrative	0	0	0	0	0	10,933	10,933
General Plant	461	369	0	0	0	0	830
Asset Management	1,658	1,066	605	47	0	0	3,377
Total Allocated Costs	$69,085	$13,835	$13,037	$5,846	$626	$10,933	$113,362

j. Determine capacity requirements for fire flow and the allocation to public fire water supply capacity –

To estimate the costs associated with (and to provide capacity for) public fire water service, the methodology put forth in the AWWA M1 Manual was used.

To determine the capacity requirements for fire flow, the District uses two hypothetical fires with varying fire flow. The first fire requires flows of 2,500 gallons per minute for a minimum of 4 hours, and the second requires 8,000 gallons per minute for a minimum of 8 hours as shown below. These hypothetical fires were chosen based on the professional judgement and experience of Raftelis applied to the District's service area.

Fire flows as a percentage of total capacity is converted to a percentage and used to identify the indirect cost allocated to water supply for public and private fire protection. The water supply demand capacity for public and private fire water service are based on firelines and hydrant capacity.

Water is supplied for private fire service through pipes and appurtenances on private property. These include all water-based fire protection systems, such as fire protection sprinklers and fire hydrants that are not part of, but are connected to, the public water service. Costs are allocated to these systems in a similar fashion and billed separately to the individual customers owning the private fire protection systems.

Max Day capacity is the amount of water needed for the duration of a fire in one day (fire flow gallons per minute multiplied by the duration of fire in minutes).

Max Hour capacity is the amount of water needed if a similar fire lasted an entire day (fire flow gallons per minute multiplied by the number of minutes in a day), less the capacity already allocated to meeting Max Day demand. Capacity amounts in gallons are converted to CCF in the table below. (One CCF = 748.05 gallons.)

Table J: Capacity Requirements for Fire Flow and Public Fire Allocation FY 2023-24

	Fire #1		Fire #2		Total	
Fire Flow Estimate	**Max Day (1)**	**Max Hour (2)**	**Max Day (1)**	**Max Hour (2)**	**Max Day**	**Max Hour**
Duration of Fire (Hours)	4.00		4.00		8.00	
Fire Flow (gpm)	2,500	2,500	8,000	8,000	10,500	10,500
Percent Allocated to Public Fire	74.7%	74.7%	74.7%	74.7%	74.7%	74.7%
Capacity Demanded for Fire (ccf)	802	4,010	2,567	12,833	3,369	16,844
Public Fire Capacity (ccf) (3)	599	2,995	1,917	9,583	2,516	12,578
Private Fire Capacity (ccf) (4)	203	1,016	650	3,250	853	4,266
Total Potable Capacity	77,539	70,509				
Public Fire Allocation (Max Day: 2,516/77,539; Max Hour 12,578/70,509)					**3.2%**	**17.8%**
Private Fire Allocation (Max Day: 853/77,539; Max Hour 4,266/70,509)					1.1%	6.0%

(1) Max Day Capacity demanded for fire = (hours*minutes*gallons)/748.05.
(2) Max Hour Capacity demanded for fire = (hours*minutes*gallons)/748.05 – Max Day Capacity.
(3) Split is based on fireline meter capacity = 707,667 / total system hydrants = 2,794,302.
(4) Total potable capacity is max day and max hour demands for all customer classes.

k. Compute the public fire water service cost –

The Max Day and Max Hour percentages identified in Table J for public fire water service are applied to the total cost-of-service by peaking factor to reallocate expenses included in Max Day and Max Hour fire protection water service costs to customer costs:
Max Day Public Fire Water Service costs: 3.2% * $15,312K = $ 490k
Max Hour Public Fire Water Service costs: 17.8% * $14,428K = $2,568k
Total indirect costs of Public Fire Water Service: $3,058k

Table K: Public Fire Water Service Cost-of-Service FY 2023-24

Cost Allocation (Thousands)	Base	Max Day	Max Hour	Customer	Direct Fire	Private Fire	Total
Total Operating Costs	$76,459	$15,312	$14,428	$6,470	$693	$ -	$113,362
Allocation of Public Fire To Customer				693	(693)		-
Allocation of Indirect Public Fire to Customer		(490)	(2,568)	3,058			-
Allocation to Private Fire		(168)	(866)			1,034	-
Adjusted Cost of Service	**$ 76,459**	**$ 14,654**	**$ 10,994**	**$ 10,221**	**$ -**	**$ 1,034**	**$ 113,362**
Total Cost of Public Fire included in "Customer"				$3,751			

(1) As described above, public fire water is calculated as follows:

Max day - 15,312k * 3.2% = 490k

Max hour – 14,428k * 17.8% = 2,568k

As identified in Table K, there are two cost components associated with public fire water service: direct and indirect. The total cost of public fire water service is $3,751,000 including the direct cost of $693,000 and the indirect cost of $3,058,000.

Total public fire water service costs are allocated to all customers through the fixed meter charge through the IRWD's rate structure. This complies with Proposition 218's cost-of-service and proportionality principles because meter charges are proportional to a given property's water demand, and that water demand is proportional to the property's use and need for fire water service.

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2023-24 and FY 2024-25.

Appendix 12 provides the support for public fire water costs for FY 2023-24. Appendix 13 provides support for public fire water costs for FY 2024-25. The tables are updated with the details from the FY 2023-24 operating budget. The methodology from the 2021 Cost of Service (COS) Study Appendices 5 and 6 (Appendices) remains the same, and tables included in this appendix use the same alphabetical reference scheme as those in the 2021 COS Study Public Fire Water Costs Technical Memos.

1.1. COST COMPONENTS ASSOCIATED WITH PUBLIC FIRE WATER SERVICE

See Appendices 5 and 6 of the COS Study for a complete discussion on the District's public fire water service cost components and how public fire water service costs are calculated.

The following steps are used to calculate indirect fire water service costs:

l. Identify total system peaking factors allocated to Base, Max Day, and Max Hour demands;
m. Apply functional allocation percentages to the asset categories;
n. Allocate asset values by function;
o. Allocate functions to peaking factors;
p. Determine asset value by peaking factor;
q. Allocate operating costs by their demands on the system;
r. Summarize peaking factor percentages for all operating costs by demand category;
s. Identify operating costs by demand category;
t. Calculate the cost of service by peaking factor;
u. Determine capacity requirements for fire flow and the allocation to public fire water supply capacity; and
v. Compute the public fire water supply cost-of-service.

The result is the cost estimate for the indirect component related to public fire water service.
Steps a through f of the fire water costs calculation are the same as calculated in Appendices 5 and 6.

l. Summarize peaking factor percentages for all operating costs by demand category - Peaking factor percentages for operating expenses by demand category are summarized in the table below.

Table G: Summarized Peaking Factor Percentages for all Operating Costs FY 2024-25

Functional Group	Base	Max Day	Max Hour	Customer	Fire	General
Base Supply	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Excess Supply	12.2%	47.0%	40.8%	0.0%	0.0%	0.0%
Conservation and Supply Reliability	8.0%	43.0%	49.0%	0.0%	0.0%	0.0%
Customer Service	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
System Maintenance	96.9%	0.0%	0.0%	0.0%	3.1%	0.0%
General & Administrative	49.1%	31.6%	17.9%	1.4%	0.0%	0.0%
General Plant	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Asset Mangement	55.6%	44.4%	0.0%	0.0%	0.0%	0.0%

m. Identify operating costs by demand category – Amounts are assigned to demand categories shown in Table F. The net costs are explained in further detail in section 4.3 in the COS Study and are shown in Table 13 (variable revenue requirement) and Table 14 (fixed revenue requirement) in Appendix 10.

Table H: Operating and Asset Maintenance Costs by System Demands FY 2024-25

	Cost Group	Demand Category	Cost (Thousands)	Totals
Variable:	Water Supplies	Base Supply	$48,918	
	Water Supplies	Excess Supply	9,681	
	Conservation and Supply Reliability	Water Banking	2,138	
	Conservation and Supply Reliability	Conservation and NTS	14,421	
	Conservation and Supply Reliability	Universal Conservation	1,748	$76,907
Fixed	Fixed Operating Costs	Customer Service	$6,095	
	Fixed Operating Costs	System Maintenance	21,537	
	Fixed Operating Costs	General & Administrative	11,639	
	Fixed Operating Costs	General Plant	980	
	Fixed Operating Costs	Asset Management	3,564	$43,815
			Net Allocated Costs	$120,722

n. Calculate cost-of-service by peaking factor - The allocated percentages identified in Table G are applied to the operating costs identified in Table H to calculate the cost by peaking factor. General and Administrative (G&A) cost is reallocated based on the total cost of service.

Table I: Calculate Cost-of-Service by Peaking Factor FY 2024-25

Demand Category	Base	Max Day	Max Hour	Customer	Fire	G&A	Total
Base Supply	$48,918	$0	$0	$0	$0	$0	$48,918
Excess Supply	1,185	4,546	3,951	0	0	0	9,681
Conservation and Supply Reliability	1,466	7,867	8,975	0	0	0	18,308
Customer Service	0	0	0	6,095	0	0	6,095
System Maintenance	20,870	0	0	0	667	0	21,537
General & Administrative	0	0	0	0	0	11,639	11,639
General Plant	545	436	0	0	0	0	980
Asset Management	1,751	1,126	639	49	0	0	3,564
Total Allocated Costs	$74,733	$13,974	$13,565	$6,144	$667	$11,639	$120,722

o. Determine capacity requirements for fire flow and the allocation to public fire water supply capacity –

To estimate the costs associated with (and to provide capacity for) public fire water service, the methodology put forth in the AWWA M1 Manual was used.
To determine the capacity requirements for fire flow, the District uses two hypothetical fires with varying fire flow. The first fire requires flows of 2,500 gallons per minute for a minimum of 4 hours, and the second requires 8,000 gallons per minute for a minimum of 8 hours as shown below. These hypothetical fires were chosen based on the professional judgement and experience of Raftelis applied to the District's service area.

Fire flows as a percentage of total capacity is converted to a percentage and used to identify the indirect cost allocated to water supply for public and private fire protection. The water supply demand capacity for public and private fire water service are based on firelines and hydrant capacity.

Water is supplied for private fire service through pipes and appurtenances on private property. These include all water-based fire protection systems, such as fire protection sprinklers and fire hydrants that are not part of, but are connected to, the public water service. Costs are allocated to these systems in a similar fashion and billed separately to the individual customers owning the private fire protection systems.

Max Day capacity is the amount of water needed for the duration of a fire in one day (fire flow gallons per minute multiplied by the duration of fire in minutes).

Max Hour capacity is the amount of water needed if a similar fire lasted an entire day (fire flow gallons per minute multiplied by the number of minutes in a day), less the capacity already allocated to meeting Max Day demand. Capacity amounts in gallons are converted to CCF in the table below. (One CCF = 748.05 gallons.)

Table J: Capacity Requirements for Fire Flow and Public Fire Allocation FY 2024-25

	Fire #1		Fire #2		Total	
Fire Flow Estimate	**Max Day** (1)	**Max Hour** (2)	**Max Day** (1)	**Max Hour** (2)	**Max Day**	**Max Hour**
Duration of Fire (Hours)	4.00		4.00		8.00	
Fire Flow (gpm)	2,500	2,500	8,000	8,000	10,500	10,500
Percent Allocated to Public Fire	74.4%	74.4%	74.4%	74.4%	74.4%	74.4%
Capacity Demanded for Fire (ccf)	802	4,010	2,567	12,833	3,369	16,844
Public Fire Capacity (ccf) (3)	597	2,984	1,910	9,549	2,507	12,533
Private Fire Capacity (ccf) (4)	205	1,026	657	3,285	862	4,311
Total Potable Capacity	79,023	71,583				
Public Fire Allocation (Max Day: 2,507/79,023; Max Hour 12,533/71,583)					**3.2%**	**17.5%**
Private Fire Allocation (Max Day: 862/79,023; Max Hour 4,311/71,583)					1.1%	6.0%

(5) Max Day Capacity demanded for fire = (hours*minutes*gallons)/748.05.
(6) Max Hour Capacity demanded for fire = (hours*minutes*gallons)/748.05 – Max Day Capacity.
(7) Split is based on fireline meter capacity=717,790 / total system hydrants =2,804,425.
(8) Total potable capacity is max day and max hour demands for all customer classes.

p. Compute the public fire water service cost –

The Max Day and Max Hour percentages identified in Table J for public fire water service are applied to the total cost-of-service by peaking factor to reallocate expenses included in Max Day and Max Hour fire protection water service costs to customer costs:
Max Day Public Fire Water Service costs: 3.2% * $15,466K = $ 495k
Max Hour Public Fire Water Service costs: 17.8% * $15,012K = $2,627k
Total indirect costs of Public Fire Water Service: $3,122k

Table K: Public Fire Water Service Cost-of-Service
FY 2024-25

Cost Allocation (Thousands)	Base	Max Day	Max Hour	Customer	Direct Fire	Private Fire	Total
Total Operating Costs	$82,711	$15,466	$15,012	$6,800	$738	$ -	$120,727
Allocation of Public Fire To Customer				738	(738)		-
Allocation of Indirect Public Fire to Customer		(495)	(2,627)	3,122			-
Allocation to Private Fire		(170)	(901)			1,071	-
Adjusted Cost of Service	**$ 82,711**	**$ 14,801**	**$ 11,484**	**$ 10,660**	**$ -**	**$ 1,071**	**$ 120,727**
Total Cost of Public Fire included in "Customer"				$3,860			

(2) As described above, public fire water is calculated as follows:
Max day - 15,312k * 3.2% = 495k

Max hour – 14,428k * 17.8% = 2,627k

As identified in Table K, there are two cost components associated with public fire water service: direct and indirect. The total cost of public fire water service is $3,860,000 including the direct cost of $738,000 and the indirect cost of $3,122,000.

Total public fire water service costs are allocated to all customers through the fixed meter charge through the IRWD's rate structure. This complies with Proposition 218's cost-of-service and proportionality principles because meter charges are proportional to a given property's water demand, and that water demand is proportional to the property's use and need for fire water service.

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2023-24 and FY 2024-25.

Appendix 14 provides the support for the development of Water Shortage Contingency Plan (WSCP) rates for FY 2023-24. Appendix 15 provides support for the development of WSCP rates for FY 2024-25. The tables are updated with detailed costs from the FY 2023-24 operating budget. The methodology from the 2021 Cost of Service (COS) Study Water Shortage Contingency Plan Rates Technical Memo (Appendix 7) remains the same, and tables 1, 6, and 7 included in this appendix use the same reference numbering scheme as those in the 2021 COS Study's WSCP Technical Memo.

Water Shortage Contingency Plan Cost of Service FY 2023-24

See Appendix 7 of the COS Study for a complete discussion on the District's Water Shortage Contingency Plan Rates.

Table 1: WSCP Augmentation or Demand Reduction Need Based on Level of Shortage FY 2023-24

Water Shortage Contingency Plan Stage	Range of Shortage Within the Stage	Needed Augmentation or Reduction at maximum point of the Stage
1	0-10%	5,300 AF
2	11-20%	10,700 AF
3	21-30%	16,000 AF
4	31-40%	21,400 AF
5	41-50%	26,700 AF
6	51% +	32,100 AF

1.1.1. WATER SHORTAGE MAXIMUM WATER BUDGET ADJUSTMENTS

IRWD has modeled maximum water budget allocation adjustments as response measures to target a percentage reduction from FY 2023-24 demands for each of the six WSCP shortage levels. The water reduction goal is the maximum shortage for each WSCP level. For example, a Level 1 shortage ranges from 0% to 10%, so the reduction target used is 10%. The proposed maximum water budget adjustments, shown in Table 2 follow the WSCP by first targeting discretionary outdoor potable uses, then indoor uses, and finally commercial, industrial, and institutional (CII) indoor uses as the shortage levels increase in severity. Agricultural and construction usage is considered discretionary and would be reduced based on WSCP stage; however, rates would remain the same.

Table 2: Adjustments to Water Budgets for Each Level of Water Shortage

Water Shortage Contingency Plan level	Target reduction Midpoint of the level	Messaging and outreach	Outdoor potable landscape Includes residential, dedicated irrigation and CII outdoor	ET Factor	Indoor gallons per capita	Commercial, Industrial, and Institutional (CII) percent indoor reduction
None	0	Water efficiency programs and outreach	40% drought-tolerant plants	.75	50	
Level 1 0-10%	10%	Expanded messaging and targeted outreach	40% drought-tolerant plants	.75	50	
Level 2 11-20%	20%	Expanded messaging and targeted outreach	No turf; 100% drought-tolerant plants	.625	50	
Level 3 21-30%	30%	Expanded messaging and targeted outreach	No turf; 25% drought-tolerant plants; 75% native plants; tree health affected	.35	40	
Level 4 31-40%	40%	Expanded messaging and targeted outreach	No turf; 100% native plants only; tree health affected	.25	32.5	10%
Level 5 41-50%	50%	Expanded messaging and targeted outreach	No landscape	0	30	20%
Level 6 51%+	60%	Expanded messaging and targeted outreach	No landscape	0	Basic needs only; 20	30%

1.1.2.6 SOURCE WATER REDUCTIONS

See Section 1.1.2.6 in Appendix 7 of the 2021 COS Study for a complete discussion on source water reductions.

The source of supply in Table 6 is based on the FY 2023-24 Board approved budget. For each level starting with 0 reflecting no reduction, the reduced source water in levels 1-6 was applied proportionally to all sources based on the percentage of required reduction at each level. The sources for each level are presented below.

Table 6: Source of Supply Reductions Applied to the WSCP Levels FY 2023-24

Reduced Source Water (acre feet)	0	1	2	3	4	5	6
Dyer Road Well Field	26,233	24,610	21,875	19,141	16,406	13,672	10,938
Other Process Wells	14,192	12,773	11,354	9,934	8,515	7,096	5,677
Baker Treatment Plant (SAC)	6,912	6,221	5,530	4,838	4,147	3,456	2,765
Water Purchases Imported (MWD)	6,144	4,530	4,026	3,523	3,020	2,517	2,013
Total	53,481	48,133	42,785	37,437	32,089	26,741	21,392

1.1.2.7 INCREASED CONSERVATION EFFORTS

See Section 1.1.2.7 in Appendix 7 for a complete discussion on increased conservation efforts.

The conservation and compliance expenses included in the table below are allocated to the over-allocation tiers to aid in reaching the identified WSCP level.

Table 7: Additional Conservation and Compliance Efforts Applied to Over-allocation Tiers by Level FY 2023-24

(in thousands)						
Additional Costs	1	2	3	4	5	6
Universal/Targeted Costs	$1,852	$3,703	$5,145	$6,431	$6,626	$7,406
Compliance Costs	0	0	0	423	1,410	2,820
Over-allocation Increase by Level	1	2	3	4	5	6
Inefficient	$424	$849	$1,179	$1,571	$1,842	$2,343
Wasteful	1,427	2,854	3,966	5,283	6,194	7,882
Total By Level	$1,852	$3,703	$5,145	$6,854	$8,036	$10,226

1.1.2.8 WSCP RATES

The WSCP rates are based on a consistent cost of service methodology with the IRWD updated cost of service rate model. The rates identified by tier and WSCP level take into consideration the reduced demands, the source shift in reduced water (i.e. available ground water versus imported water) and increased conservation and compliance costs required to reach WSCP targets. For each tier, the standard rate is adjusted for changes in reduced volumes and any increases in costs.

Many of the costs included in the standard rate are variable and fluctuate with total sales. However, with the exception of imported water, many expenses are not variable with changes in sales (labor and associated benefits, repairs and maintenance, permits, licenses and fees etc.). The cost of water component in WSCP rates increase as a result of allocating these costs to the reduced units as water usage is reduced.

The following table shows the cost of water by source by shortage level.

Table 8: Cost of water per CCF by Water Shortage Level
FY 2023-24

Level	0	1	2	3	4	5
Dyer Road Well Field	$1.91	$1.92	$1.92	$1.93	$1.94	$1.95
Orange Park Acres	2.38	2.39	2.41	2.43	2.46	2.49
Wells 21 & 22	3.36	3.49	3.66	3.87	4.16	4.56
Deep Aquifer Treatment	2.21	2.24	2.28	2.33	2.39	2.48
Potable Treatment Plant	2.37	2.42	2.49	2.58	2.69	2.85
Baker Water Treatment Plant	2.84	2.83	2.82	2.80	2.77	2.74
Imported Water	3.89	3.89	3.89	3.89	3.89	3.89

Budgeted costs for programs to educate and incentivize all District customers will be allocated to fewer sales units, which increases the cost per ccf. In addition, costs for extra programs to encourage further water conservation will be necessary and increase with the shortage levels. he following table shows the increases in universal conservation costs by shortage level.

Table 9: District Wide Conservation Cost per CCF
FY 2023-24

Universal Conservation Costs*	0	1	2	3	4	5	6
Budgeted Costs	1,768	1,768	1,768	1,768	1,768	1,768	1,768
Additional Costs	-	975	1,950	2,340	2,925	3,120	3,900
Total Costs	**1,768**	**2,744**	**3,720**	**4,111**	**4,697**	**4,893**	**5,674**
Potable and Recycled Sales (ccf)	15,549,903	13,220,239	11,767,632	10,315,083	8,862,454	6,971,357	5,518,381
Universal Conservation Rates	$0.11	$0.21	$0.32	$0.40	$0.53	$0.70	$1.03
*in thousands							

In levels 1 through 4, inefficient and wasteful usage are assumed to remain the same. In levels 5 and 6, it is assumed that over-allocation usage will decrease due to price elasticity and increased conservation efforts, and budgeted costs will be allocated to fewer units. In addition, costs for customer outreach and targeted programs to encourage further water conservation will be necessary and increase with the shortage levels.

Table 10: Targeted Conservation and Compliance Effort Cost per CCF
FY 2023-24

Targeted Costs*	0	1	2	3	4	5	6
Budget Cost Targeted	7,473	7,473	7,473	7,473	7,473	7,473	7,473
Additional Conservation Costs	-	877	1,753	2,805	3,506	3,506	3,506
Compliance Effort	-	-	-	-	423	1,410	2,820
Total Costs	**7,473**	**8,349**	**9,226**	**10,278**	**11,402**	**12,389**	**13,798**
Cost Allocation*							
Inefficient tier	1,713	1,913	2,114	2,355	2,613	2,839	3,162
Wasteful tier	5,760	6,436	7,112	7,922	8,789	9,550	10,636
Total CCF	**7,473**	**8,349**	**9,226**	**10,278**	**11,402**	**12,389**	**13,798**
*in thousands							
Level	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Target Demand CCF							
Inefficient tier	1,131,000	1,131,000	1,131,000	1,131,000	1,131,000	1,017,900	916,110
Wasteful tier	982,910	982,910	982,910	982,910	982,910	884,426	796,157
Targeted Costs per ccf							
Inefficient tier	$1.51	$1.69	$1.87	$2.08	$2.31	$2.79	$3.45
Wasteful tier	5.86	6.55	7.24	8.06	8.94	10.80	13.36

Water banking and natural treatment system (NTS) costs included in the budget do not change with water shortage levels. See Appendix 10 Table 17 for more information. Standard rates and WSCP rates at all levels include the amounts shown in the table below.

Table 11: Water Banking and Natural Treatment Systems Rate Components
FY 2023-24

All Levels	
Water Banking	
Wasteful tier	$1.68
Natural Treatment System	
Inefficient tier	$0.74
Wasteful tier	3.95

WSCP Rate calculations by tier are shown in the tables below.

Table 12: WSCP Rate Calculations by Tier
FY 2023-24

Level	0	1	2	3	4	5	6
Low Volume tier							
Cost of Water	$1.91	$1.92	$1.92	$1.93	$1.94	$1.95	$1.98
Rate Stabilization	($0.16)	($0.16)	($0.16)	($0.16)	($0.16)	($0.16)	($0.16)
Low Volume tier Rate	$1.75	$1.76	$1.76	$1.77	$1.78	$1.79	$1.82
Base tier							
Cost of Water	$2.41	$2.38	$2.37	$2.39	$2.42	$2.54	$2.61
Universal Conservation	0.11	$0.21	$0.32	$0.40	$0.53	$0.70	$1.03
Base tier Rate	$2.52	$2.59	$2.69	$2.79	$2.95	$3.24	$3.64
Inefficient tier							
Cost of Water	$3.89	$3.77	$3.75	$3.59	$3.34	$3.27	$3.27
Universal Conservation	0.11	0.21	0.32	0.40	0.53	0.70	1.03
Targeted Conservation	1.51	1.69	1.87	2.08	2.31	2.79	3.45
Natural Treatment System	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Inefficient tier Rate	$6.25	$6.41	$6.68	$6.81	$6.92	$7.50	$8.49
Wasteful tier							
Cost of Water	$3.89	$3.89	$3.89	$3.89	$3.99	$4.12	$4.28
Universal Conservation	0.11	0.21	0.32	0.40	0.53	0.70	1.03
Targeted Conservation	5.86	6.55	7.24	8.06	8.94	10.80	13.36
Water Banking and NTS	$5.63	$5.63	$5.63	$5.63	$5.63	$5.63	$5.63
Wasteful tier Rate	$15.49	$16.28	$17.07	$17.98	$19.09	$21.25	$24.30

The rates are summarized in Table 13 below by tier and WSCP Level.

Table 13: Summary WSCP Rates
FY 2023-24

Level	0	1	2	3	4	5	6
Shortage	0%	10%	20%	30%	40%	50%	60%
Low Volume	$1.75	$1.76	$1.76	$1.77	$1.78	$1.79	$1.82
Base	$2.52	$2.59	$2.69	$2.79	$2.95	$3.24	$3.64
Inefficient	$6.25	$6.41	$6.68	$6.81	$6.92	$7.50	$8.49
Wasteful	$15.49	$16.28	$17.07	$17.98	$19.09	$21.25	$24.30

The change in commodity rates has no impact on the monthly fixed service water or sewer charges. If the Board of Directors elect to implement any of these WSCP rates, the proposed commodity rates are expected to provide cost of service equity for the budgeted operating variable costs and additional costs incurred as a direct result of a water shortage declaration at the associated stage level. Implementation of WSCP rates would require additional Board action.

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2023-24 and FY 2024-25.

Appendix 14 provides the support for the development of Water Shortage Contingency Plan (WSCP) rates for FY 2023-24. Appendix 15 provides support for the development of WSCP for FY 2024-25. The tables are updated with the details from the FY 2024-25 operating budget. The methodology and assumptions from the 2021 Cost of Service (COS) Study Water Shortage Contingency Plan Rates Technical Memo (Appendix 7) remain the same and tables 1, 6, and 7 included in this appendix use the same numbering scheme as those in the 2021 COS Study WSCP Technical Memo.

Water Shortage Contingency Plan Cost of Service FY 2024-25

See Appendix 7 of the COS Study for a complete discussion on the District's Water Shortage Contingency Plan Rates.

Table 1: WSCP Augmentation or Demand Reduction Need Based on Level of Shortage FY 2024-25

Water Shortage Contingency Plan Stage	Range of Shortage Within the Stage	Needed Augmentation or Reduction at maximum point of the Stage
1	0-10%	5,500 AF
2	11-20%	10,900 AF
3	21-30%	16,400 AF
4	31-40%	21,800 AF
5	41-50%	27,300 AF
6	51% +	32,700 AF

1.1.1. WATER SHORTAGE MAXIMUM WATER BUDGET ADJUSTMENTS

IRWD has modeled maximum water budget allocation adjustments as response measures to target a percentage reduction from FY 2024-25 demands for each of the six WSCP shortage levels. The water reduction goal is the maximum shortage for each WSCP level. For example, a Level 1 shortage ranges from 0% to 10%, so the reduction target used is 10%. The proposed maximum water budget adjustments, shown in Table 2 follow the WSCP by first targeting discretionary outdoor potable uses, then indoor uses, and finally commercial, industrial, and institutional (CII) indoor uses as the shortage levels increase in severity. Agricultural and construction usage is considered discretionary and would be reduced based on WSCP stage; however, rates would remain the same.

Table 2: Adjustments to Water Budgets for Each Level of Water Shortage

Water Shortage Contingency Plan level	Target reduction Midpoint of the level	Messaging and outreach	Outdoor potable landscape Includes residential, dedicated irrigation and CII outdoor	ET Factor	Indoor gallons per capita	Commercial, Industrial, and Institutional (CII) percent indoor reduction
None	0	Water efficiency programs and outreach	40% drought-tolerant plants	.75	50	
Level 1 0-10%	10%	Expanded messaging and targeted outreach	40% drought-tolerant plants	.75	50	
Level 2 11-20%	20%	Expanded messaging and targeted outreach	No turf; 100% drought-tolerant plants	.625	50	
Level 3 21-30%	30%	Expanded messaging and targeted outreach	No turf; 25% drought-tolerant plants; 75% native plants; tree health affected	.35	40	
Level 4 31-40%	40%	Expanded messaging and targeted outreach	No turf; 100% native plants only; tree health affected	.25	32.5	10%
Level 5 41-50%	50%	Expanded messaging and targeted outreach	No landscape	0	30	20%
Level 6 51%+	60%	Expanded messaging and targeted outreach	No landscape	0	Basic needs only; 20	30%

1.1.2.6 SOURCE WATER REDUCTIONS

See Section 1.1.2.6 in Appendix 7 of the 2021 COS Study for a complete discussion on source water reductions.

The source of supply in Table 6 is based on the FY 2024-25 Board approved budget. For each level starting with 0 reflecting no reduction, the reduced source water in levels 1-6 was applied

proportionally to all sources based on the percentage of required reduction at each level. The sources for each level are presented below.

Table 6: Source of Supply Reductions Applied to the WSCP Levels FY 2024-25

Reduced Source Water (acre feet)	0	1	2	3	4	5	6
Dyer Road Well Field	26,567	24,643	21,854	19,065	16,276	13,486	10,697
Other Process Wells	15,722	14,274	12,827	11,379	9,932	8,484	7,036
Baker Treatment Plant (SAC)	6,912	6,207	5,502	4,797	4,092	3,387	2,682
Water Purchases Imported (MWD)	5,350	3,972	3,458	2,945	2,432	1,918	1,405
Total	54,551	49,096	43,641	38,186	32,731	27,276	21,820

1.1.2.7 INCREASED CONSERVATION EFFORTS

See Section 1.1.2.7 in Appendix 7 for a complete discussion on increased conservation efforts.

The conservation and compliance expenses included in the table below are allocated to the over-allocation tiers to aid in reaching the identified WSCP level.

Table 7: Additional Conservation and Compliance Efforts Applied to Over-allocation Tiers by Level FY 2024-25

(in thousands)						
Additional Costs	1	2	3	4	5	6
Universal/Targeted Costs	$1,906	$3,812	$5,300	$6,625	$6,825	$7,625
Compliance Costs	0	0	0	438	1,459	2,918
Over-allocation Increase by Level	1	2	3	4	5	6
Inefficient	$437	$874	$1,215	$1,618	$1,898	$2,416
Wasteful	1,469	2,939	4,085	5,444	6,385	8,127
Total By Level	$1,906	$3,812	$5,300	$7,062	$8,284	$10,543

1.1.2.8 WSCP RATES

The WSCP rates are based on a consistent cost of service methodology with the IRWD updated cost of service rate model. The rates identified by tier and WSCP level take into consideration the reduced demands, the source shift in reduced water (i.e. available ground water versus imported water) and increased conservation and compliance costs required to reach WSCP targets. For each tier, the standard rate is adjusted for changes in reduced volumes and any increases in costs.

Many of the costs included in the standard rate are variable and fluctuate with total sales. However, with the exception of imported water, many expenses are not variable with changes in sales (labor and associated benefits, repairs and maintenance, permits, licenses and fees etc.). The cost of water component in WSCP rates increase as a result of allocating these costs to the reduced units as water usage is reduced.

The following table shows the cost of water by source by shortage level.

Table 8: Cost of water per CCF by Water Shortage Level
FY 2024-25

Cost per CCF	0	1	2	3	4	5	6
DRWF	$1.99	$1.99	$2.00	$2.00	$2.01	$2.02	$2.03
OPA	2.43	2.43	2.44	2.44	2.44	2.44	2.44
Wells 21 & 22	3.77	3.85	3.95	4.08	4.25	4.50	4.86
DATS	2.39	2.42	2.47	2.53	2.60	2.71	2.88
PTP	2.50	2.55	2.61	2.69	2.80	2.95	3.18
Baker WTP	3.01	3.00	2.98	2.96	2.94	2.90	2.84
Import	4.15	4.15	4.15	4.15	4.15	4.15	4.15

Budgeted costs for programs to educate and incentivize all District customers will be allocated to fewer sales units, which increases the cost per ccf. In addition, costs for extra programs to encourage further water conservation will be necessary and increase with the shortage levels. he following table shows the increases in universal conservation costs by shortage level.

Table 9: District Wide Conservation Cost per CCF
FY 2024-25

Universal Conservation Costs*	0	1	2	3	4	5	6
Budgeted Costs	1,748	1,748	1,748	1,748	1,748	1,748	1,748
Additional Costs	-	1,000	2,000	2,400	3,000	3,200	4,000
Total Costs	**1,748**	**2,749**	**3,750**	**4,151**	**4,752**	**4,953**	**5,754**
Potable and Recycled Sales (ccf)	15,861,009	13,484,665	12,003,009	10,521,444	9,039,782	7,110,831	5,628,968
Universal Conservation Rates	$0.11	$0.20	$0.31	$0.39	$0.53	$0.70	$1.02
*in thousands							

In levels 1 through 4, inefficient and wasteful usage are assumed to remain the same. In levels 5 and 6, it is assumed that over-allocation usage will decrease due to price elasticity and increased conservation efforts, and budgeted costs will be allocated to fewer units. In addition, costs for customer outreach and targeted programs to encourage further water conservation will be necessary and increase with the shortage levels.

Table 10: Targeted Conservation and Compliance Effort Cost per CCF
FY 2024-25

Targeted Costs*	0	1	2	3	4	5	6
Budget Cost Targeted	7,754	7,754	7,754	7,754	7,754	7,754	7,754
Additional Conservation Costs	-	906	1,812	2,900	3,625	3,625	3,625
Compliance Effort	-	-	-	-	438	1,459	2,918
Total Costs	**7,754**	**8,661**	**9,567**	**10,654**	**11,817**	**12,838**	**14,297**
Cost Allocation*							
Inefficient tier	1,777	1,985	2,192	2,442	2,708	2,942	3,277
Wasteful tier	5,977	6,676	7,374	8,213	9,109	9,896	11,021
Total CCF	**7,754**	**8,661**	**9,567**	**10,654**	**11,817**	**12,838**	**14,297**
*in thousands							
Level	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Target Demand CCF							
Inefficient tier	1,153,629	1,153,629	1,153,629	1,153,629	1,153,629	1,038,266	934,439
Wasteful tier	1,002,575	1,002,575	1,002,575	1,002,572	1,002,479	902,227	812,086
Targeted Costs per ccf							
Inefficient tier	$1.54	$1.72	$1.90	$2.12	$2.35	$2.83	$3.51
Wasteful tier	5.96	6.66	7.36	8.19	9.09	10.97	13.57

Water banking and natural treatment system (NTS) costs included in the budget do not change with water shortage levels. See Appendix 10 Table 17 for more information. Standard rates and WSCP rates at all levels include the amounts shown in the table below.

Table 11: Water Banking and Natural Treatment Systems Rate Components
FY 2024-25

All Levels	
Water Banking	
Wasteful tier	$2.13
Natural Treatment System	
Inefficient tier	$0.77
Wasteful tier	4.11

WSCP Rate calculations by tier are shown in the tables below.

Table 12: WSCP Rate Calculations by Tier
FY 2024-25

Level	0	1	2	3	4	5	6
Low Volume tier							
Cost of Water	$1.99	$1.99	$2.00	$2.00	$2.01	$2.02	$2.05
Low Volume tier Rate	$1.99	$1.99	$2.00	$2.00	$2.01	$2.02	$2.05
Base tier							
Cost of Water	$2.54	$2.52	$2.53	$2.55	$2.58	$2.71	$2.77
Universal Conservation	0.11	$0.20	$0.31	$0.39	$0.53	$0.70	$1.02
Base tier Rate	$2.65	$2.72	$2.84	$2.94	$3.11	$3.41	$3.79
Inefficient tier							
Cost of Water	$4.13	$3.97	$3.76	$3.54	$3.28	$3.13	$3.08
Universal Conservation	0.11	0.20	0.31	0.39	$0.53	0.70	1.02
Targeted Conservation	1.54	1.72	1.90	2.12	2.35	2.83	3.51
Natural Treatment System	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Inefficient tier Rate	$6.55	$6.66	$6.74	$6.82	$6.93	$7.43	$8.38
Wasteful tier							
Cost of Water	$4.15	$4.15	$4.15	$4.15	$4.19	$4.27	$4.35
Universal Conservation	0.11	0.20	0.31	0.39	0.53	0.70	1.02
Targeted Conservation	5.96	6.66	7.36	8.19	9.09	10.97	13.57
Water Banking and NTS	$6.24	$6.24	$6.24	$6.24	$6.24	$6.24	$6.24
Wasteful tier Rate	$16.46	$17.25	$18.06	$18.97	$20.05	$22.18	$25.18

The rates are summarized in Table 13 below by tier and WSCP Level.

Table 13: Summary WSCP Rates
FY 2024-25

Level	0	1	2	3	4	5	6
Shortage	0%	10%	20%	30%	40%	50%	60%
Low Volume	$1.99	$1.99	$2.00	$2.00	$2.01	$2.02	$2.05
Base	$2.65	$2.72	$2.84	$2.94	$3.11	$3.41	$3.79
Inefficient	$6.55	$6.66	$6.74	$6.82	$6.93	$7.43	$8.38
Wasteful	$16.46	$17.25	$18.06	$18.97	$20.05	$22.18	$25.18

The change in commodity rates has no impact on the monthly fixed service water or sewer charges. If the Board of Directors elect to implement any of these WSCP rates, the proposed commodity rates are expected to provide cost of service equity for the budgeted operating variable costs and additional costs incurred as a direct result of a water shortage declaration at the associated stage level. Implementation of WSCP rates would require additional Board action.

Potential Additional Regulatory Cost to Provide Water Service

This appendix calculates a surcharge on water sales volumes to pay costs that may be imposed on IRWD by the State Water Resources Control Board (the "State Board") in response to any violations of emergency drought regulations restricting water use by IRWD and its customers.

State Board Drought Regulatory Penalties

The State Board cites Water Code section 1058.5 to adopt emergency regulations to prevent the waste, unreasonable use, or unreasonable method of use of water or to promote water conservation. In past droughts, the State Board has adopted such regulations to reduce existing levels of water use by retail public water suppliers, including IRWD. The State Board cites Water Code section 1831(d) to issue a cease and desist order to local agencies, such as IRWD, in response to a violation or threatened violation of a regulation adopted under Section 1058.5. A local agency that fails to comply with a cease and desist order issued by the State Board may be liable in an amount not exceeding ten thousand dollars ($10,000) for each day in which the violation occurs, if the violation occurs in a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years. The State recently experienced such critically dry years, including in 2021 and 2022.

Although IRWD has a robust water conservation program with extensive customer outreach, if the State Board were to adopt an emergency regulation requiring reduced water usage, and IRWD customers were to fail to sufficiently reduce their usage to bring total IRWD customer water use into compliance, the State Board could seek to hold IRWD liable for failing to comply with a cease and desist order. Any monetary liability imposed upon IRWD would be an additional cost of providing water service.

Calculation of the Surcharge

IRWD's potential financial exposure over a 24-month period is $7,300,000 (2 years times 365 days per year times $10,000 per day).

The excess water consumption that IRWD expects would be prohibited by the State Board is the amount used by IRWD customers in the Wasteful tier, including when water usage budgets are lowered pursuant to IRWD's adopted water shortage contingency plan (WSCP). The total use of water in the wasteful tiers of IRWD's proposed rate structure for FY 2023-24 and FY 2024-25 is calculated to be 2,206,095 ccf (hundred cubic feet).

Allocating the $7,300,000 cost across 2,206,095 ccf of Wasteful Tier water consumption equates to $3.31 per ccf. To fund IRWD's potential costs of monetary liability to the State Board, IRWD would be authorized to levy a surcharge of up to $3.31 per ccf on the volume of water used in the Wasteful tiers. This is included in the Proposition 218 Notices.

The table below shows the calculation of excess water consumption, state penalties, and

Table 1: State Water Resources Control Board Penalty Surcharge FY 2023-24 and FY 2024-25

FY 2023-24 Wasteful Tier Usage (Acre Feet)	2,507
FY 2024-25 Wasteful Tier Usage (Acre Feet)	2,557
Total Excess Water Consumption (Acre Feet)	5,064
Total Excess Water Consumption (ccf = AF X 435.6)	2,206,095
State Penalties (2 X 365X $10,000)	$7,300,000
Allocated Cost per CCF (State Penalties / Total Wasteful Tier Usage)	**$3.31**

Technical Memorandum
Determination of Costs for Proposed Pumping Surcharges For Irvine Ranch Water District

Executive Summary

This appendix is part of the Cost of Service update for Fiscal Year (FY) 2023-24 and FY 2024-25. The purpose of the memo is to identify and allocate pumping surcharge costs for District customers in locations that cause the District to incur additional pumping costs to supply their water. Pumping surcharges are based on the actual prevailing energy costs and vary depending upon the cost to pump water to the area served. Details as to how these costs are calculated and allocated to pumping surcharge areas are described in this memo. IRWD's rate structure, including pumping surcharge costs, complies with Proposition 218's cost-of-service and proportionality principles.

The District uses a detailed methodology, developed by consultants at Navigant and refined in a 2023 update by HDR Engineering, Inc. (HDR), to calculate and allocate pumping surcharge costs to pumping surcharge areas. The approach uses embedded energy calculations to determine areas of the District where customers live which require additional energy to pump the water to their service addresses. The additional costs are added to a customer's bill in the form of a pumping surcharge based on the amount of water they use each month.

The approach to calculating pumping surcharges that was developed by Navigant Consulting used hydraulic model and customer billing data to determine water demands throughout the District. From those customer usage demands, Navigant estimated water flows associated with the areas of the District that incur additional energy costs. The estimated water flow data and energy data from Southern California Edison (SCE) was used to compute energy and cost intensities (CI) in order to calculate additional pumping costs throughout the District.

HDR refined the approach in a 2023 update by using the latest available hydraulic models and Supervisory Control and Data Acquisition (SCADA) water flow information from IRWD's pump stations and facilities. Use of the actual flow information from SCADA is more accurate than the flow estimates derived from the customer demand data used in the Navigant approach. Energy and cost intensities (CI) are calculated based on SCE data and SCADA data for conveying water to various hydraulic pressure zones (pressure zones). A pressure zone is an area with similar pressure, elevation and hydraulic requirements. Pressure zones with similar energy and cost intensities are aggregated into pumping surcharge areas. The same methodology is applied to the potable and recycled (non-potable) water distribution systems.

Pumping surcharges are determined based on the additional energy costs required to deliver water to certain locations within the District's service area, beyond the energy costs covered within the IRWD "base" commodity rate, as described in the Cost of Service update. The steps to calculate the pumping surcharges consider water flow volumes, energy, and costs associated

with delivering water from the supply sources to customers. The analysis does not consider the costs of water supply, water treatment, or sewage collection processes. The analysis conducted only considers costs directly paid by IRWD for delivery of water service. The pumping surcharge analysis excludes costs associated with water obtained from wholesale agencies as well as facility costs included in the commodity rate. The following steps are used to calculate pumping surcharge costs and assign costs to pumping surcharge areas:

1. Data Pre-Processing of Flow, Energy, and Cost Data: Provides an overview of the data used to compute the cost intensities, including review of changes from previous analyses.
2. Flow Tracing: Determines the distribution pumps that serve each pressure zone in IRWD's service area, with detailed list of all assets (pump stations) utilized.
3. Energy and Cost Intensity Calculations by Pressure Zone: Computes energy and cost intensities for pump stations and calculates the results for cost intensities by pressure zone.
4. Aggregate Proposed Surcharge areas and Set Rates: Reviews grouping of pressure zones with similar CIs into proposed pumping surcharge areas and their associated pumping surcharge rates.

Summary of Pumping Surcharge Analysis and Proposed Pumping Surcharge Rates

Table 1 shows the proposed pumping surcharge areas and proposed pumping surcharge rates for FY 2023-24 for the potable system. HDR's professional expertise and staff's review of aggregate groupings produced four proposed potable pumping surcharge areas. As shown in Table 1, 85% of customers are assigned to the base area and would incur no pumping surcharge. Fifteen percent of customers are assigned to one of the four pumping surcharge areas for the potable system. Pumping surcharge rates range from $0.38 to $1.72 per hundred cubic feet (ccf) depending on the Pumping Surcharge Area. Expected revenues are $1.51 million.

Table 1. Recommended FY 2023-2024 Potable Pumping Surcharge Rates

Summary of Proposed Pumping Surcharge Areas and Rates - Potable				
Proposed Pumping Surcharge		**Percentage Contribution to Revenue**		
Pumping Surcharge Area	**Pumping Surcharge Rate $ per ccf***	**% Customers**	**% Flow**	**Modeled Revenue**
Base	$0.00	85%	89%	$0
1	$0.38	9%	7%	$577,790
2	$0.67	2%	1%	$125,947
3	$0.90	2%	2%	$497,333
4	$1.72	2%	1%	$312,892
	Total	**100%**	**100%**	**$1,513,963**
**Weighted Cost Intensity (CI) Method*				

Table 2 shows the recommended pumping surcharge areas and proposed rates for FY 2023-24 for the recycled system. HDR's analysis recommended three pumping surcharge areas in addition to a base area. Customers are distributed with 74% assigned to the base area and 26 % assigned to

one of the three Pumping Surcharge Areas. Proposed pumping surcharge rates range from $0.23 to $0.53 per CCF, depending on the Pumping Surcharge Area. Expected revenues are $885,716.

Table 2 Recommended FY 2023-2024 Recycled Pumping Surcharge Rates

Summary of Proposed Pumping Surcharge Areas and Proposed Rates - Recycled				
Proposed Pumping Surcharge		**Percentage Contribution to Revenue**		
Pumping Surcharge Area	**Pumping Surcharge Rate $ per ccf***	**% Customers**	**% Flow**	**Modeled Revenue**
Base	$0.00	74%	79%	$0
1	$0.23	12%	11%	$344,027
2	$0.37	12%	7%	$346,811
3	$0.53	2%	3%	$194,878
Total		**100%**	**100%**	**$885,716**
**Manually Adjusted from Weighted Cost Intensity (CI)Method*				

Potable System: Pumping Surcharge Areas and Rates

Potable System Pumping Surcharge Areas

HDR calculated the cost intensity (CI) for each District potable pressure zone using the steps and methodology described above. Based on HDR's professional judgment and experience, pressure zones with similar adjusted CIs were grouped into a total of five proposed areas for the potable system; a Base area, which does not incur any pumping surcharge, and four proposed pumping surcharge areas: 1, 2, 3 and 4. The resulting CIs for each potable pressure zone and proposed groupings and pumping surcharge areas for the potable system are shown in Table 3.

Table 3: Proposed Pumping Surcharge Area by Potable System Pressure Zone

Potable Pressure Zones	Flow (ccf/year)	Cost Intensity ($/CCF)	Proposed Pumping Surcharge Areas	Percent of Customers
Zone 1 - Central Irvine	66,792	-	Base	85%
Zone 4 - Lake Forest	390,130	-	Base	
Zone 5 - Lake Forest	1,320,259	-	Base	
Zone 3 - TRK / QHL	1,251,245	-	Base	
Zone 4 - EIR / PTS	1,938,074	-	Base	
Zone 2 - Newport Coast	4,691,089	-	Base	
Zone 4 - Newport Coast	4,691,089	-	Base	
Zone 3 - NWD / EIR / PTS	2,344,022	-	Base	
Zone 2 - Northwood	2,326,332	-	Base	
Zone 4 - Turtle Rock	90,631	-	Base	
Zone 5 - SNC / ORH	1,126,331	-	Base	
Zone 8 - East Orange	151,155	-	Base	
N/A (planned future)	151,155	-	Base	
Zone 4 - Quail Hill	57,279	-	Base	
Zone 6 - Foothill Ranch	1,131,931	$0.36	1	9%
Zone 6A - Foothill Ranch	385,958	$0.45	1	
Zone 4 - Shady Canyon	23,043	$0.63	2	2%
Zone 6 - Portola Springs	113,545	$0.72	2	
Zone 9 - Santiago Canyon	52,431	$0.57	2	
Zone 8 - Portola Hills	244,451	$0.85	3	2%
Zone 9 - Portola Hills	205,809	$0.97	3	
Zone 10B - Santiago Canyon	54,250	$0.82	3	
Zone 10A - Santiago Canyon	28,231	$0.85	3	
Zone 10 - Santiago Canyon	21,345	$1.07	3	
Zone 4 - Hidden Canyon	60,291	$1.41	4	2%
Zone 6 - Newport Coast	41,896	$1.70	4	
Zone 7 - Newport Coast	72,150	$1.95	4	
Zone 10C - Santiago Canyon	314	$1.84	4	
Zone 11 - Santiago Canyon	7,641	$1.97	4	

Eighty-five percent of customers are within the Base area and would not incur a pumping surcharge. Nine percent of customers fall within Pumping Surcharge Area 1. Two percent of customers fall within each of Pumping Surcharge Areas 2, 3 and 4.

The current pumping surcharges for the potable system only uses a Base area and three Pumping Surcharge Areas. HDR's updated pumping surcharge analysis recommended the use of a Base area and four Pumping Surcharge Areas due to the large jump in CIs between Zone 10 - Santiago Canyon and Zone 4 - Hidden Canyon, from $1.07 to $1.41. Without a fourth pumping surcharge

area, Pumping Surcharge Area 3 would span a range of adjusted CIs from $0.85 in Zone 10 A Santiago Canyon to a CI of $1.97 in Zone 11 Santiago Canyon. In that case, pressure zones with significantly lower CI would be assigned the same pumping surcharge rate as pressure zones with much higher CIs. This would subsidize those in the higher-pressure zones or apply increased pumping surcharges to pressure zones with lower CIs. Grouping pressure zones further into a fourth pumping surcharge area better accounts for the high variability in CI across the District's service area for potable water supplies. Previously Newport Coast Zones 6 and 7 were assigned to lower pumping surcharge areas due to a lack of sufficient data at the pump stations and flow tracing that was not as accurate or granular as the methods used in the 2023 analysis.

The Hidden Canyon Zone is a special case due to being served by a single pump station for a limited number of customers (approximately 250). While Hidden Canyon could be placed within the higher Pumping Surcharge Area 4 due to its high CI resulting from the single pump station, it was placed in Pumping Surcharge Area 3 due to the limited effect on overall revenue and other surcharge area costs, after sensitivity checks. This change occurred to allow a "step-up" adjustment. In the future, depending on service area changes and the effect on other customer pumping surcharges, Hidden Canyon may move to a higher pumping surcharge area for potable water service.

Potable System: Recommended FY 2023-24 Pumping Surcharge Rates and Revenues

HDR weighted the flows and CIs for the pressure zones in each of the proposed groupings to develop an aggregate proposed pumping surcharge rate per ccf for each of the proposed Pumping Surcharge Areas. For example, in proposed Pumping Surcharge Area 1, the annual flow in Pressure Zone 6 is 1,131,931 ccf. The annual flow in Pressure Zone 6A is 385,958 ccf. The combined flow for the two pressure zones assigned to Pumping Surcharge Area 1 is 1,517,889 ccf. Zone 6 comprises 75% of the total flow. Zone 6A comprises 25% of the total flow. If weighted, the CI's based on those percentages of flow in each pressure zone produce a blended CI, which is the basis for the proposed pumping surcharge rate of $0.38/ccf for Pumping Surcharge Area 1 (Equation 1):

Equation 1:

$$(\$0.36 \times 0.75) + (\$0.45 \times 0.25) = \$0.38 \text{ per ccf}$$

This same flow and CI weighting methodology was applied to each of pumping surcharge area groupings, resulting in a proposed pumping surcharge rate for each of the four proposed Pumping Surcharge Areas, shown below in Table 4.

Table 4. Recommended FY 2023-2024 Potable Pumping Surcharge Rates

Summary of Proposed Pumping Surcharge Areas and Rates - Potable				
Proposed Pumping Surcharge		**Percentage Contribution to Revenue**		
Pumping Surcharge Area	**Pumping Surcharge Rate per CCF***	**% Customers**	**% Flow**	**Modeled Revenue**
Base	$0.00	85%	89%	$ 0
1	$0.38	9%	7%	$577,790
2	$0.67	2%	1%	$125,947
3	$0.90	2%	2%	$497,333
4	$1.72	2%	1%	$312,892
Total		**100%**	**100%**	**$1,513,963**
**Weighted Cost Intensity (CI) Method*				

Approximately 85% of IRWD customers are assigned to the Base Area and as proposed would incur no pumping surcharge cost. Seven percent of customers are in Pumping Surcharge Area 1 and would be charged a proposed rate of $0.38 per ccf, with the two percent of customers in proposed Pumping Surcharge Area 4 charged the highest surcharge rate of $1.72 per ccf. Expected revenue is computed by multiplying the pumping surcharge rate by the combined flow volume from each pressure zone within each surcharge area. Modeled revenue for the potable system, calculated by multiplying the total annual flow within the Pumping Surcharge Area by the proposed Pumping Surcharge rate, is expected to total approximately $1.51 million.

Potable System Pumping Surcharge Rate Comparison

Table 5 shows expected average monthly changes for customers who will remain in an equivalent Pumping Surcharge Area to their existing assignment. Compared to current surcharge rates, customers in Pumping Surcharge Areas 1 to 3 would be charged an increase between $0.05 to $0.21 per ccf. An average change in the pumping surcharge monthly bill amount was calculated by multiplying the change in pumping surcharge rate (proposed pumping surcharge rate minus current pumping surcharge rate) by the flow and dividing by the number of customers. The actual change in a customer's monthly bill amount depends on the water usage of each customer. Customer monthly bills in Pumping Surcharge Area 1 on average would increase by $0.41, while customer monthly bills in in Pumping Surcharge Area 3 on average would increase by $1.23 per month.

Table 5. Comparison of Proposed Surcharge Rates to Current Rates, Potable System

Pumping Surcharge Area	Current Surcharge Rate per ccf	Proposed Surcharge Rate per ccf	Change in Surcharge Rate per ccf	Average Monthly Change in Surcharge Bill Amount
Base	$-	$-	$-	$-
1	$0.33	$0.38	+$0.05	$0.41
2	$0.46	$0.67	+$0.21	$1.09
3	$0.79	$0.90	+$0.11	$1.23
4	*Not applicable. Pumping Surcharge Area 4 newly proposed for highest CI ranges at $1.72 per CCF beginning in FY 2023-24.*			

Potable System Pumping Surcharge Area Assignment Map

The map shown in Figure 2 below indicates the proposed potable system pumping surcharge area assignments:

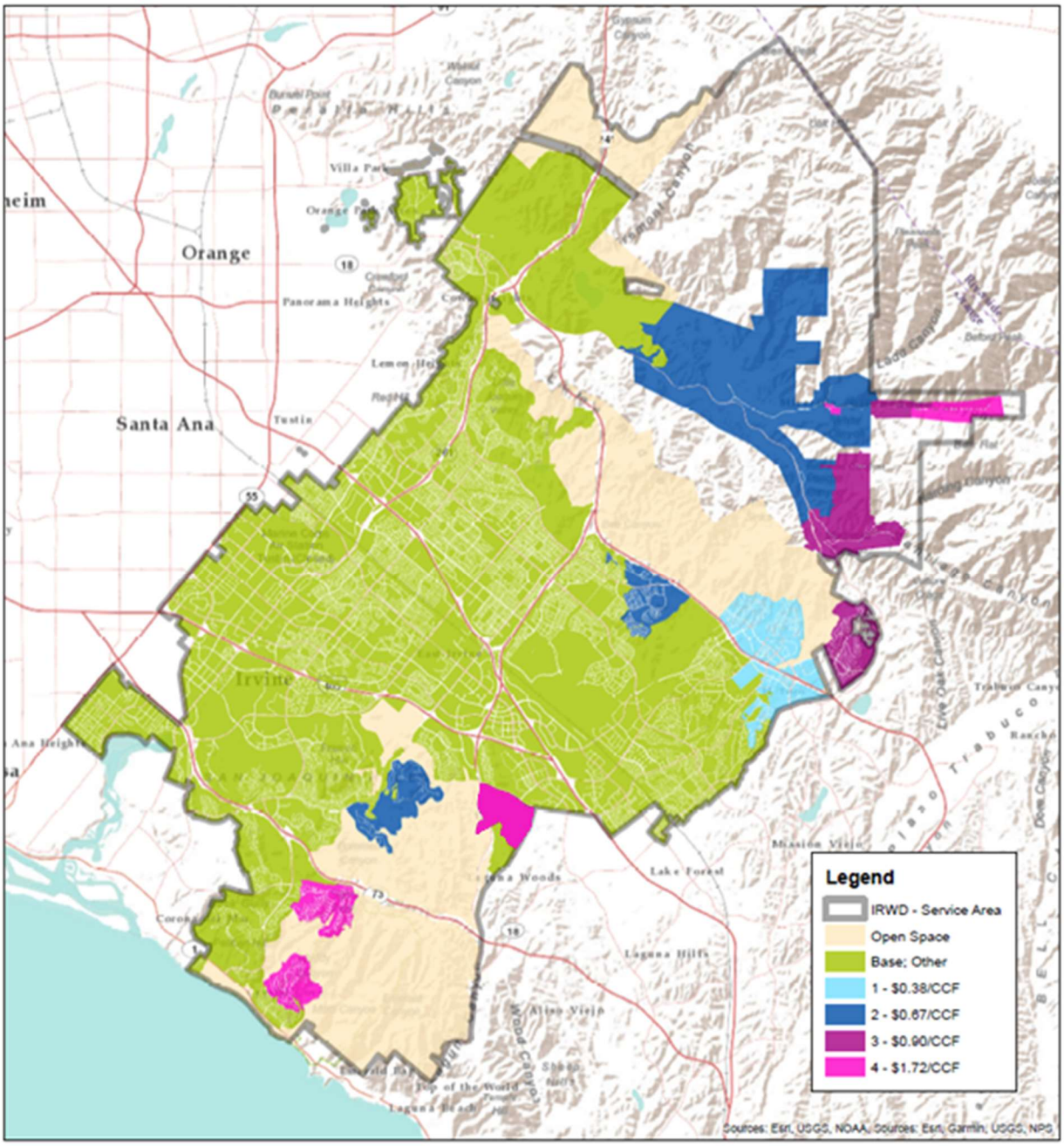

Figure 2. Proposed Potable Pumping Surcharge Areas

Recycled (Non-Potable System): Pumping Surcharge Areas and Rates

Recycled System Pumping Surcharge Areas

Similar to the process used for the potable system, HDR calculated the CIs for each of the District's recycled system pressure zones using the steps and methodology described above. Similar to the potable water system, pressure zones, such as Zone H NPC and Coastal Zone G, which are further from the water supply generally have higher CIs. Pressure zones close to the supply generally have lower CIs, such as Lake Forest A (No 1/2), Laguna Zone B, and Northwood Zone B.

HDR calculated the weighted flows and additional costs for each of the recycled system pressure zones. The resulting CIs for each non-potable pressure zone are shown in Table 6. Based on HDR's professional judgment and experience, pressure zones with similar adjusted CIs were grouped into a total of four proposed areas, a Base area, and three proposed Pumping Surcharge Areas: 1, 2, and 3. Seventy-four percent of customers are within the Base area and would not incur a pumping surcharge. Two percent of customers fall within Pumping Surcharge Area 1, twelve percent of customers are in Pumping Surcharge Areas 2, and twelve percent are within Pumping Surcharge Area 3.

Table 6: Recycled System Pressure Zone Cost Intensities, Groupings and Proposed Pumping Surcharge Areas

Recycled (Non-potable) Pressure Zones	Flow (ccf/year)	CI ($/ccf)	Surcharge Area	Percent of Customers
Zone A North and South	-	-	Base	74%
Lake Forest A (No 1/2)	1,282,761	-	Base	
Laguna Zone B	6,110,252	-	Base	
Northwood Zone B	1,521,560	-	Base	
Lake Forest B (East/West)	605,954	-	Base	
Oso Reservoir	106,949	-	Base	
TRK_B_t_000	105,918	-	Base	
Northern Zone C	500,116	-	Base	
Portola Springs Zone D	367,693	$0.22	1	2%
Coastal Zone D + Zone D TRG	1,495,769	$0.37	2	12%
Coastal Zone G	900,306	$0.48	3	12%
Zone H NPC	37,022	$0.48	3	

Table 6 shows the proposed surcharge areas for the IRWD recycled (non-potable) system. Zone A North and South through Northern Zone C are assigned to the Base Area with no proposed pumping surcharge rate, after sensitivity checks and to be consistent with the methodology applied in the potable system ("80-20" distribution method).

HDR considered all alternatives of statistical groupings, weighted CI ranges, and Base Area configurations to develop the recommended pumping surcharge areas for the recycled system. HDR used professional experience and judgment to adjust the recycled pumping surcharges to account for various Base Areas while considering the recycled pressure zone CI calculations, comparison to 2015 results, and sensitivity checks for impacts on overall rates and charges. The values of the CIs for the recycled system pressure zones naturally group into three Pumping Surcharge Areas, and are similar to the current pumping surcharge areas.

Recycled System: Recommended FY 2023-24 Pumping Surcharge Rates and Revenues

HDR weighted the flows and CIs for the pressure zones in each of the proposed groupings to develop an aggregate proposed pumping surcharge rate per ccf for each of the proposed Pumping Surcharge Areas in the recycled system. For example, Pumping Surcharge Area 3 includes the Coastal Zone G pressure zone and the Zone H NPC pressure zone. From Table 7, the annual flow in Coastal Zone G pressure zone is 900,306 ccf, and the annual flow in the Zone H NPC is 37,022 ccf. The combined flow for the two recycled pressure zones assigned to Pumping Surcharge Area 3 is 937,328 ccf. Coastal Zone G comprises approximately 96% of the total flow in Pumping Surcharge Area 3, and Zone H NPC comprises approximately 4% of the total flow in Pumping Surcharge Area 3. If we weight the CIs based on the percentages of flow in each of the pressure zones in a proposed Pumping Surcharge Area, we can calculate a blended CI. The blended CI is the basis for the proposed pumping surcharge rate, which is $0.48/ccf (rounded to nearest cent) for Pumping Surcharge Area 3 (Equation 2):

Equation 2:

$$(\$0.486 \times 0.96) + (\$0.48 \times 0.44) = \$0.48 \text{ per CCF}$$

This same flow and CI weighting methodology is applied to each of the recycled system pumping surcharge area groupings, resulting in a proposed pumping surcharge rate for each of the three proposed Pumping Surcharge Areas, shown below in Table 7.

Table 7 Recommended FY 2023-2024 Recycled Pumping Surcharge Rates

Summary of Proposed Pumping Surcharge Areas and Proposed Rates - Recycled				
Proposed Pumping Surcharge		**Percentage Contribution to Revenue**		
Pumping Surcharge Area	**Pumping Surcharge Rate $ per CCF***	**% Customers**	**% Flow**	**Modeled Revenue**
Base	$0.00	74%	79%	$0
1	$0.22	2%	3%	$81,665
2	$0.37	12%	11%	$552,421
3	$0.48	12%	7%	$449,310
Total		**100%**	**100%**	**$1,083,395**
**Manually Adjusted from Weighted Cost Intensity (CI)Method*				

Approximately 74% of customers are assigned to the Base Area and would incur no surcharge rate, as proposed. Two percent would be charged a rate of $0.22 per ccf. Twelve percent would be charged a rate of $0.37 per ccf, with twelve percent being charged the highest surcharge rate of $0.48 per ccf. Expected revenue is computed by multiplying the surcharge rate by the flow volume within each surcharge area, which is expected to total $1,083,395 in the analysis period.

Recycled System Pumping Surcharge Rate Comparison

Compared to current surcharge rates, customers in Pumping Surcharge Areas 1 – 3 would be charged an increase between $0.01 and $0.12 per ccf. By multiplying the change in pumping surcharge rate (proposed surcharge rate minus current surcharge rate) by the flow and dividing by the number of customers, an average change in surcharge monthly bill amount was calculated. The actual change in a customer's monthly bill amount depends on the water usage of each customer. Customer monthly bills in Pumping Surcharge Area 1 on average would increase by $18.77, while customer monthly bills in in Pumping Surcharge Area 3 on average would increase by $1.02 per month. Table 8 shows expected average monthly changes for customers who will remain in an equivalent Pumping Surcharge Area compared to their existing Pumping Surcharge Area assignment.

Table 8. Comparison of Proposed Surcharge Rates to Current Rates, Recycled (Non-Potable) Water System

Surcharge area	Current Surcharge Rate	Proposed Surcharge Rate	Change in Surcharge Rate	Average Monthly Change in Bill Amount
Base	$-	$-	$-	$-
1	$0.14	$0.22	+$0.08	$18.77
2	$0.25	$0.37	+$0.12	$20.86
3	$0.47	$0.48	+$0.01	$1.02

Table 8 shows a comparison of current recycled water pumping surcharge rates to the proposed rates. Recycled water rates are expected to increase by $0.01 to $0.12 per ccf. Average monthly pumping surcharge bill amounts are expected to increase between $1.02 to $20.86 depending on the customer Pumping Surcharge Area assignment.

Recycled System Pumping Surcharge Area Assignment Map

The map shown in Figure 3 below indicates the proposed pumping surcharge area assignments:

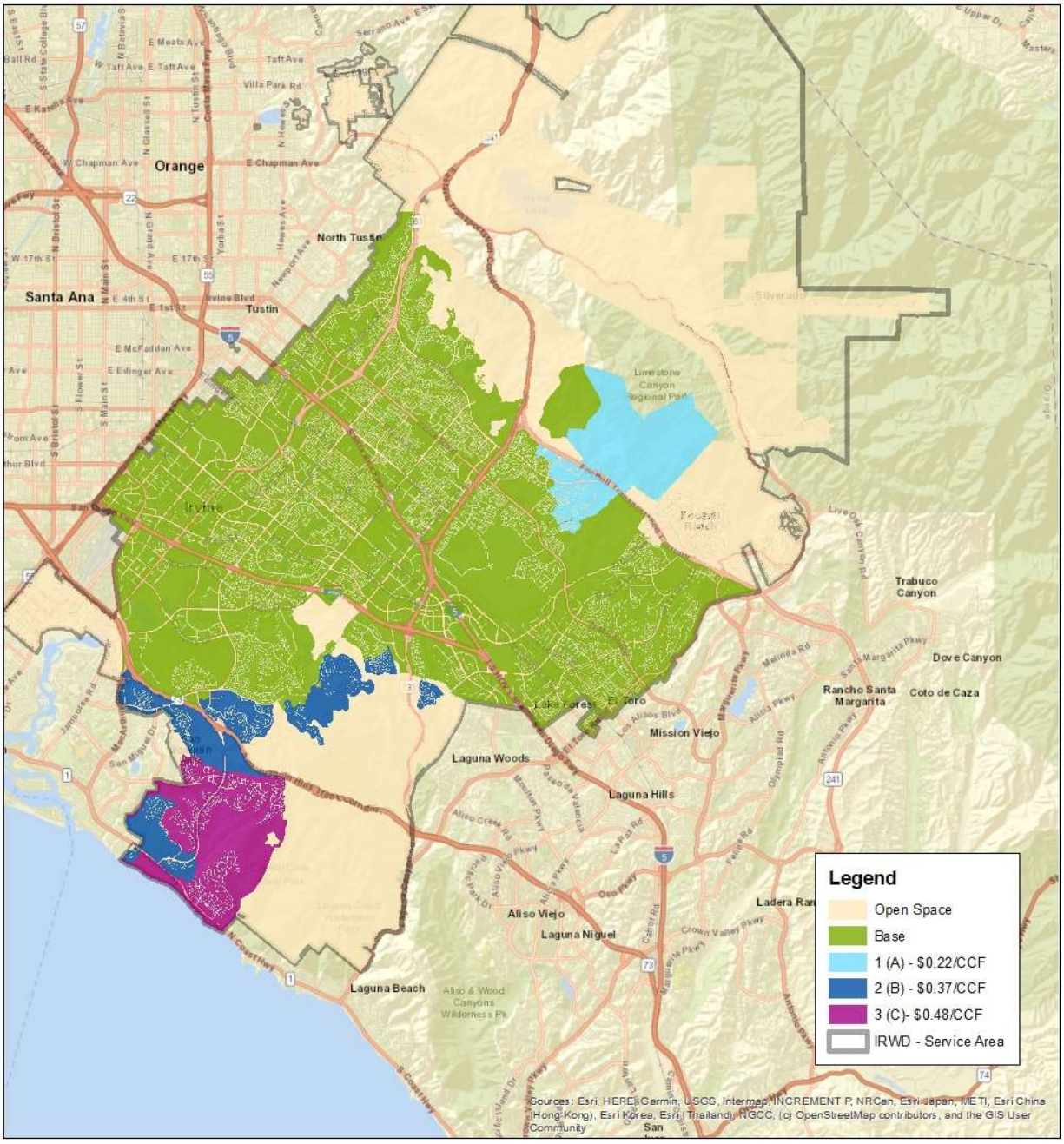

Figure 3. Proposed Recycled (Non-Potable) Pumping Surcharge Areas