

# Revised and Corrected Addendum No. 5 – Addressing Federal Nexus Kern Fan Groundwater Storage Project

November 9, 2020<sup>1</sup>

## *Water Infrastructure Improvements for the Nation (WIIN) Act:*

Section 4007(a)(2)(B) defines a State-led storage project to be one which “provides a benefit in meeting any obligation under Federal law (including regulations).”

Section 4007(c)(2)(B)(i) Participation by the Secretary of the Interior in a State-led storage project shall not occur unless the State or local sponsor determines, and the Secretary of the Interior concurs, that the State-led storage project is technically and financially feasible and provides a Federal benefit in accordance with the reclamation laws;

Section 4007(c)(2)(C) the Secretary of the Interior determines that, in return for the Federal cost-share investment in the State-led storage project, at least a proportional share of the project benefits are Federal benefits, including water supplies dedicated to specific purposes such as environmental enhancement and wildlife refuges.

## Background and Project Need

The Kern Fan Groundwater Storage Project (Project) includes the development of a regional water bank in Kern County. The proposed Project would recharge, store excess water supplies during wet years from the State Water Project (SWP) and Central Valley Project (CVP) and other supplies as available and would recover and deliver water to provide water supplies for environmental, agricultural and urban uses.

The Project Sponsors, Rosedale-Rio Bravo Water Storage District (RRBWSD) and Irvine Ranch Water District (IRWD), have formed the Groundwater Banking Joint Powers Authority (Authority) which will implement, operate and maintain the Project. The Project’s updated Feasibility Report, dated April 13, 2020, identifies issues, needs and opportunities, which provide the purpose and objectives for the Project. The Project will have multiple purposes and will provide benefits in accordance with Federal laws and will help alleviate problems and provide opportunities to meet Federal obligations. The Authority would operate the Project for the purposes of improving habitat conditions for federally threatened species in the San Joaquin/Sacramento Delta, providing incidental wetlands, improving water supply reliability including during drought periods and emergencies, improving groundwater levels in the Kern basin, providing a firm water supply for the preservation of permanent agricultural crops and providing additional Federal benefits as described in this Addendum No. 5 to the Project Feasibility Study.

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<sup>1</sup> Modifications made November 9, 2020 include correcting the discount rate from 2.875% to 2.75%, and correcting the annual benefits for Agricultural Benefit Impacts from \$3.2 M to \$0.95 M.

## Additional Federal Benefits from the Project

This Addendum No. 5 serves to incorporate and detail additional Federal benefits from the Project, which further addresses the federal nexus of the Project. Project operations have been modified to provide Incremental Level 4 water supplies to the Kern National Wildlife Refuge as an additional Federal benefit from the Project. This is a new demonstrated water supply and the economic benefits associated with the Level 4 water have been quantified. Other additional Federal benefits created by the Project include Recreation and Flood Control, which have been described and included in this Addendum on a qualitative basis.

## Project Costs and Updated Benefits

Estimated updated Project costs were submitted to Reclamation as part of the Project Sponsors' response to the Design, Engineering and Construction Review in July 2020. The estimated Project benefits have been updated in this Addendum No. 5 to include the new calculated benefits associated with providing additional Level 4 Refuge water supplies. Updated tables from the Project Feasibility Report reflecting the newly calculated economic benefits from the Project and Project cost assignments to beneficiaries are included in Appendix "A". This updated information revises Tables 4-13/ES-2, 5-4, 5-6, and 5-7/ES-3 in the Project Feasibility Report as shown below. In Tables 5-6 and 5-7, the percentages for the ecosystem benefits have been calculated to account for public benefits that are expected to be paid for by the State of California under the Water Storage Investment Program (WSIP). This distinguishes cost share responsibilities between the State of California and others. State funding for the Project secured through the WSIP will not increase the Federal cost share and there is no overlap or double counting of benefits or associated funding. The table below shows the expected funding under WSIP by benefit:

CWC Funding Ecosystem Benefit – Salmon	\$15,991,111
CWC Funding Ecosystem Benefit – Incidental Wetlands	\$29,921,451
CWC Funding Emergency Response – Extended Drought	\$ 8,260,258
CWC Funding Emergency Response – Delta Failure	\$13,364,496
Total	\$67,537,315

The annual capital costs for the Project are \$12.26 million and the updated annual economic benefits of the Project are \$15.70 million yielding a benefit cost ratio of 1.28. The total Project construction cost is \$246 million. 25% of the construction cost is \$61.5 million, and approximately **\$61.3 million** in non-reimbursable federal benefits are eligible for WIIN Act funding. Therefore, the revised request for Section 4007 WIIN Act funds is **\$61.3 million**.

This Addendum No. 5 supplements the Project's Feasibility Report and existing documentation on the Project.

Table 4-13 (and ES-2) Annual Economic Benefits and Cost of Alternative Alignment (Million \$) (Updated 11/9/20)

	Existing Water Bank Participation	Kern Fan Project - KWB Alignment	Kern Fan Project - BV Alignment	Kern Fan Project - ESC Alignment
Annual Water Supply Benefits - M&I	\$2.09	\$2.09	\$2.09	\$2.09
Annual Water Supply Benefits - Agriculture	\$3.22	\$3.22	\$3.22	\$3.22
Annual Water Supply Benefits - Groundwater	\$0.37	\$0.37	\$0.37	\$0.37
Annual Ecosystem Benefits - Salmon Recovery	NA	\$1.38	\$1.38	\$1.38
Annual Ecosystem Benefits - Incidental Wetland Habitat	NA	\$5.18	\$5.18	\$5.18
Annual Water Supply Benefits - Refuge Water Level 4	NA	\$0.28	\$0.28	\$0.28
Annual Emergency Response Benefits - Extended Drought	\$0.72	\$0.72	\$0.72	\$0.72
Annual Emergency Response Benefits - Delta Failure	\$1.51	\$1.51	\$1.51	\$1.51
Annual Agricultural Impact Benefits	NA	\$0.95	\$0.95	\$0.95
<b>Total Annual Benefits</b>	<b>\$7.91</b>	<b>\$15.70</b>	<b>\$15.70</b>	<b>\$15.70</b>
Total Construction Cost	\$340.91	\$224.00	\$246.00	\$236.00
Total Interest During Construction	\$0.00	\$32.20	33.83	\$33.93
Total Capital Cost	\$340.91	\$256.20	\$279.83	\$269.93
<b>Annual Costs</b>	<b>\$20.33</b>	<b>\$11.35</b>	<b>\$12.26</b>	<b>\$12.10</b>
Net Annual Benefits or Costs	-\$12.42	\$4.35	\$3.44	\$3.60
<b>Benefit-Cost Ratio</b>	<b>0.39</b>	<b>1.38</b>	<b>1.28</b>	<b>1.30</b>

Table 5-4 Construction Cost Allocated to Each Kern Fan Project Purpose and Benefit (Million \$) (Updated 11/9/20)

	Water Supply Benefits Refuge Level 4	Ecosystem Benefit Salmon	Ecosystem Benefit Incidental Wetlands	Emergency Response Benefit Extended Drought	Emergency Response Benefit Delta Failure	Agricultural Benefits Crop Substitution	Water Supply Benefits Agriculture	Water Supply Benefits M&I	Groundwater Benefits	Total
<b>Item</b>										
<b>Annual costs to be allocated</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$12.2</b>
Total construction costs	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$246.0
Total IDC	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$33.8
<b>Average Annual Benefits</b>	<b>\$0.3</b>	<b>\$1.4</b>	<b>\$5.2</b>	<b>\$0.7</b>	<b>\$1.5</b>	<b>\$1.0</b>	<b>\$3.2</b>	<b>\$2.1</b>	<b>\$0.4</b>	<b>\$15.7</b>
<b>Justifiable Expenditure<sup>1</sup></b>	<b>\$0.3</b>	<b>\$1.4</b>	<b>\$5.2</b>	<b>\$0.7</b>	<b>\$1.5</b>	<b>\$1.0</b>	<b>\$3.2</b>	<b>\$2.1</b>	<b>\$0.4</b>	<b>\$15.7</b>
Specific Costs <sup>2</sup>	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Construction Costs	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
IDC	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Average Annual OM&R	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Remaining Justifiable Expenditure <sup>3</sup>	\$0.3	\$1.4	\$5.2	\$0.7	\$1.5	\$1.0	\$3.2	\$2.1	\$0.4	\$15.7
Percent Distribution <sup>4</sup>	2%	9%	33%	5%	10%	6%	21%	13%	2%	100%
<b>Remaining Joint Costs (annual)</b>	<b>\$0.2</b>	<b>\$1.1</b>	<b>\$4.1</b>	<b>\$0.6</b>	<b>\$1.2</b>	<b>\$0.8</b>	<b>\$2.6</b>	<b>\$1.7</b>	<b>\$0.3</b>	<b>\$12.5</b>
Construction Costs	\$4.4	\$21.6	\$81.1	\$11.3	\$23.6	\$14.9	\$50.5	\$32.8	\$5.8	\$246.0
IDC	\$0.6	\$3.1	\$11.7	\$1.6	\$3.4	\$2.1	\$7.3	\$4.7	\$0.8	\$35.4
Average Annual OM&R	\$0.0	\$0.2	\$0.6	\$0.1	\$0.2	\$0.1	\$0.4	\$0.2	\$0.0	\$1.9
<b>Total Allocation (annual)</b>	<b>\$0.2</b>	<b>\$1.1</b>	<b>\$4.1</b>	<b>\$0.6</b>	<b>\$1.2</b>	<b>\$0.8</b>	<b>\$2.6</b>	<b>\$1.7</b>	<b>\$0.3</b>	<b>\$12.5</b>
Construction Costs	\$4.4	\$21.6	\$81.1	\$11.3	\$23.6	\$14.9	\$50.5	\$32.8	\$5.8	\$246.0
IDC	\$0.6	\$3.1	\$11.7	\$1.6	\$3.4	\$2.1	\$7.3	\$4.7	\$0.8	\$35.4
Average Annual OM&R	\$0.0	\$0.2	\$0.6	\$0.1	\$0.2	\$0.1	\$0.4	\$0.2	\$0.0	\$1.9

<sup>1</sup> The cost allocation is based on benefits being equivalent to single purpose alternative costs and that benefits are used as the justifiable expenditure.

<sup>2</sup> Specific costs have not been identified for this preliminary cost allocation.

<sup>3</sup> Remaining justifiable expenditure is justifiable expenditure less specific costs. See note 2, specific costs are assumed to be zero for this initial cost allocation.

<sup>4</sup> Percent distribution is based on proportion of benefits for each project purpose.

Table 5-6 Percentages for Assigning Federal and Non-Federal Costs (Updated 10/9/2020)

Cost Type	Cost Category	Water Supply Benefits Refuge Level 4	Ecosystem Benefit Salmon	Ecosystem Benefit Incidental Wetlands	Emergency Response-Extended Drought	Emergency Response-Delta Failure	Agricultural Direct Benefits Crop Substitution	Water Supply Benefits Agriculture	Water Supply Benefits M&I	Groundwater Benefits
<b>Construction</b>	Federal Non-Reimbursable Costs	100%	26%	63%	0%	0%	0%	0%	0%	0%
	Non-Federal Costs	0%	74%	37%	100%	100%	100%	100%	100%	100%
<b>Interest During Construction</b>	Federal Non-Reimbursable Costs	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Non-Federal Costs	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>OM&amp;R</b>	Federal Non-Reimbursable Costs	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Non-Federal Costs	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Refuge Water Put &amp; Take Costs</b>	Federal Reimbursable Costs	100%	0%	0%	0%	0%	0%	0%	0%	0%
	Non-Federal Costs	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table 5-7 (also Table ES 3) Kern Fan Project Costs Assigned to Beneficiaries (Million \$) (Updated 11/9/2020)

Cost Type	Cost Category	Water Supply Benefits Refuge Level 4	Ecosystem Benefit Salmon	Ecosystem Benefit Incidental Wetlands	Emergency Response-Extended Drought	Emergency Response-Delta Failure	Agricultural Direct Benefits Crop Substitution	Water Supply Benefits Agriculture	Water Supply Benefits M&I	Groundwater Benefits	Total
Construction	Federal Non-Reimbursable Costs	\$4.42	\$5.66	\$51.22	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$61.30
	Non-Federal Costs	\$0.00	\$15.99	\$29.92	\$11.29	\$23.59	\$14.89	\$50.46	\$32.77	\$5.78	\$184.70
Interest During Construction	Federal Non-Reimbursable Costs	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	Non-Federal Costs	\$0.61	\$2.98	\$11.16	\$1.55	\$3.24	\$2.05	\$6.94	\$4.51	\$0.80	\$33.83
OM&R	Federal Non-Reimbursable Costs	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	Non-Federal Costs	\$0.03	\$0.16	\$0.61	\$0.09	\$0.18	\$0.11	\$0.38	\$0.25	\$0.04	\$1.86
Refuge Water Put and Take Costs	Federal Reimbursable Costs	\$0.04	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.04
	Non-Federal Costs	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

## Federal Benefit: Level 4 Water for National Wildlife Refuge

The Project would provide increased deliveries of Incremental Level 4 water supplies during below normal, dry and critical water years for habitat improvement in the Kern National Wildlife Refuge (Kern Refuge) located in Kern County, California. Through capturing and storing of excess Friant Section 215 water, after other agreements for water have been met, the Project would recover a portion of this water and make it available to the Bureau of Reclamation as an Incremental Level 4 supply to the Kern Refuge.

### Federal Interest

The Federal interest in the Project includes the Central Valley Project Improvement Act (CVPIA), which establishes Federal obligations in providing water supplies to improve Central Valley refuges and wildlife habitat areas. As a result of the CVPIA, the Federal Government is required to provide a reliable water supply to wetland habitats in the established refuges, such as the Kern Refuge. Reclamation delivers water to wildlife refuges in the Central Valley as Level 2 supply (firm supply) and Incremental Level 4 supply (acquired from willing parties). Currently, Incremental Level 4 Refuge demands in Kern Refuge are not fully met during below normal, dry and critical water year types.

### Section 215 Water Supply Availability

The water supply that will be provide the Kern Refuge benefit is defined under Section 215 of the Reclamation Reform Act of 1982, as excess irrigation water to be released due to flood control criteria or un-managed, un-storable flood flows from the Sacramento/San Joaquin Delta (Delta). As a result of these flood flows occurring in short duration, Section 215 authorizes Reclamation to declare the availability of Section 215 water for CVP south-of-Delta contractors and enter into temporary water service contracts for this surplus water for south-of-Delta contractor use.

The project proposes to capture Section 215 water from the Friant system in wet years (subject to acquisition by Reclamation) and store up to 40,000 acre-feet (AF), with 10,000 AF of storage dedicated for the Refuge Account. Twenty-five percent (25%) of captured Section 215 water would be stored in the Recharge Account, up to the available storage capacity of 10,000 AF. As the water in the Refuge Account is recovered for refuge use, storage would be freed up, and additional Section 215 water, as available, would be recharged and stored (using the same methodology) in the Refuge Account.

This stored water would then be dedicated to the Kern Refuge and, on average, the Project would provide up to 360 AF per year, during below normal, dry and critical water years, as Incremental Level 4 water for the Kern Wildlife Refuge. MBK Engineers has modeled the Project utilizing CalSimII to depict the without- project scenario. CalSim II simulates operations of the CVP and the SWP to meet existing environmental and regulatory requirements, contract obligations and other system requirements. The operation of the Project is then simulated in a spreadsheet model that simulates the with-Project scenario. The Baseline scenario is Reclamation's Biological Opinion Model (2019) and includes the Early Long-Term climate change and completion of the Friant-Kern Canal Capacity Correction Project. It was modified to include additional demands for groundwater

recharge within the Friant Division associated with implementation of the Sustainable Groundwater Management Act.

Results of the model of the CVP water supplies over an 82-year period, indicate there is an average of 4.1 thousand acre-feet (TAF) per year of Section 215 water available to be diverted, of which 0.5 TAF could be recharged and stored by the Project to supplement Reclamation's Level 4 supplies for the Kern Refuge. Appendix "B" attached includes MBK's modeling spreadsheet and technical memorandum documenting the availability of Section 215 water supplies for the Project.

### Project Operations for Kern Refuge Level 4 Water

The Project would bank excess Section 215 water from the Friant-Kern Canal, when available after all agreements for water have been met. The project would operate to capture excess available Section 215 water from the Friant system in wet years and store up to 40,000 acre-feet (AF). Twenty-five percent (25%) or 10,000 AF of this stored water would then be dedicated to the Kern Refuge.

The Project assumes that the water stored in the Refuge Account would be most beneficial during Below Normal, Dry and Critical Years. Modeling results indicate that the Project would provide an average of 360 AF per year over the 82-year modeling period. Over the 82-years, 27 of those years would be Below Normal, Dry or Critical Years, during which the Project would provide up to 1200 AF of Incremental Level 4 water for the Kern National Wildlife Refuge. Model results estimate that the average annual water available for delivery to the Refuge during Below Normal Years is 510 AF, Dry Years 820 AF and Critical Years 600 AF.

The maximum allowable recovery of water from the Refuge Account would be 1,200 AF in any year. If during a below normal, dry or critical water year, the Refuge Account has additional water stored in the account, that additional water would be carried over for future use by the refuge. Reclamation would be allowed to recover water for use at the refuge in other water year types. However, such use could result in a reduction in supply available in storage in the Refuge Account for use in Below Normal, Dry or Critical Years.

It is proposed that Reclamation would wheel this water through its existing arrangements with the Buena Vista Water Storage District. This would improve water supply reliability for the Kern Refuge to maintain and improve habitat conditions. The remainder of the Section 215 water would be stored in the Project for the benefit of Rosedale and IRWD through exchanges that ensure the water is used in the CVP Place of Use,

Project partner Rosedale-Rio Bravo Water Storage District's service area is within the CVP place of use for banking and direct use of CVP water and Rosedale has historically entered into contracts with Reclamation for Section 215 water. The availability period for the Section 215 water delivery depends on hydrologic conditions and water demands. The supplemental Section 215 water made available to Rosedale is through the Friant-Kern Canal and Rosedale primarily takes delivery through its existing capacity rights and connections to the Cross-Valley Kern River conveyances. Water will be conveyed through the Kern River to an existing turnout, operated by Rosedale, with 125 cfs capacity and diverted to the Project recharge basins.

Section 215 water delivery would be from existing CVP facilities and/or the San Joaquin River and no construction or modification of facilities will be needed for delivery of this water. As a representative for the Authority, Rosedale would enter into an agreement with Reclamation for delivery of this water. Rosedale generally takes delivery of Section 215 water through its conveyance capacity from the Kern River. The Authority would seek an agreement with Reclamation to allow banking of Section 215 water in the Project for later use for the Kern Refuge as Incremental Level 4 water.

WIIN Act funding is intended to provide capital funding for the Project and not to cover operations and maintenance (O&M) costs. As a result of the funding, Reclamation will have access to the Project water banking facilities and storage that will provide increased flexibility to Reclamation in its use of Section 215 water for the Kern NWR. It is understood that Reclamation would provide the Section 215 water for the Refuge account at no cost. Access to the Project water banking facilities and storage would allow Reclamation to reregulate the water for delivery to the Refuge during below normal, dry and critical years. It is typical for participants in water banking projects to pay “put” and “take” costs. Since WIIN funding only funds capital, and does not cover any O&M costs, the Authority assumes that Reclamation will pay the pass-through estimated recharge costs of \$27.02/AF and recovery costs of \$79.32/AF (in 2018 dollars). The estimated average annual recharge and recovery costs is \$38,280.96, with a net present value over 50 years of \$1.06 million. Table 5-7 (also ES-3) as shown above has been updated to show a federal reimbursable cost associated with the recharge and recovery for the Refuge water. The Authority would seek to enter into agreement with Reclamation which provides for the reimbursement to the Project for the associated recharge and recovery costs to make this water available to the Kern Refuge.

#### Economic Benefit of Level 4 Refuge Water

The economic benefits estimated for the Project have been quantified by consultants at M.Cubed. The methodological approach for monetizing the project’s benefits is documented in M.Cubed’s technical memorandum and supporting documentation attached in Appendix “C”. Appendix “C” includes the economic benefits evaluation from the most recent Project Feasibility Report dated April 13, 2020. This information is supplemented by a separate technical memorandum prepared by M. Cubed that describes the methodology for calculating the economic benefit of the additional benefit of the Incremental Level 4 Refuge Water. The calculated economic benefit of providing Incremental Level 4 water supplies to the Kern Refuge in below normal, dry and critical water years is \$6.4 million in 2018 dollars.

Reclamation’s DEC and policy review has determined that the ecosystem and wetland benefits from the Project provide quantifiable non-reimbursable federal benefits that are technically feasible and as such are eligible for funding of approximately \$56.9 million under the WIIN Act. The only federal benefits that were not included in the prior review are the additional benefits to the Kern NWR. Based on allocation of costs proportional to benefits, the Kern NWR would be eligible for approximately \$4.4 million in WIIN Act funding. Since the other federal benefits have already been determined to be eligible for funding by Reclamation, we would not expect those benefits and associated funding eligibility to be reduced.

**Total Project benefits are approximately \$427 million, of which \$367 million are public benefits. Federal non-reimbursable benefits total \$210 million. State funding through the**

**Water Storage Investment Program (WSIP) will contribute approximately \$45.9 million in funding for those benefits, leaving approximately \$61.3 million in federal non-reimbursable benefits that are eligible for funding under the WIIN Act.**

## Federal Benefit: Recreation Wildlife Watching

The United States Fish and Wildlife Service (USFWS) defines wildlife associated recreation as fishing, hunting, and wildlife-watching activities. Wildlife-watching activities include observing, feeding, and photographing wildlife, visiting parks and natural areas for the benefit of wildlife (2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation). In 2016, USFWS found that 86 million U.S. residents participated in wildlife-watching activities, which was an increase when compared to 2011 surveys. As evident by the 2016 survey, there is significant interest in wildlife-watching activities. In addition, Department of Interior priorities and other laws and policies further recognize the need for wildlife associated recreation. For example, the Federal Water Project Recreation Act of 1965, encourages projects that provide opportunities for outdoor recreation and fish and wildlife enhancement.

The Project Sponsors currently manage and maintain existing recharge basins, which support similar intermittent wetland habitat. Other existing recharge areas in Kern County, such as the Kern Water Bank, and National Wildlife Refuges, located within the same watershed, have been shown to provide essential habitat that support the numerous species. The Kern Water Bank spans 20,000 acres of water recharge and recovery infrastructure. Their recharge basins were established and are operated and managed as a habitat matrix of upland and intermittent wetland habitat. Through 2018, over 206 species of birds have been identified on Kern Water Bank lands (Kern Water Bank Authority 2019).

The Kern Fan Groundwater Storage Project (Project) will establish intermittent wetland habitat during recharge events when approximately 1,280 acres of recharge basins are inundated with water that will percolate into the groundwater basins. During these recharge events, the temporary wetland habitat established will support waterfowl, shorebirds, raptors and other migratory birds along the Pacific Flyaway. The wildlife attracted to the temporary wetland habitat established by the Project will generate a recreational wildlife watching benefits. These benefits were not quantified as part of the Feasibility Study. However, they are described here as a qualitative benefit of the Project.

### References

Rosenberger, R. 2016. Recreation Use Values Database- Summary. Available at: <http://recvaluation.forestry.oregonstate.edu/database>

U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

U.S. Fish and Wildlife Service, 2005. Kern and Pixley National Wildlife Refuges, Comprehensive Conservation Plan, February 2005.

## Federal Benefit: Flood Control

The Kern Fan Groundwater Storage Project (Project) has some potential to reduce flood risk on federally insured crops, although these benefits are largely dependent on large flooding events with long recurrence intervals. In the case of a large flood event, the Project could potentially divert sufficient flood flows to avoid damage to federal insured crops downstream on the Kern River. These benefits were not quantified as part of the Feasibility Study. However, they are described here as a qualitative benefit of the Project.

### Federally Insured Crops

Through FEMA’s National Flood Insurance Program (NFIP) and the United States Department of Agriculture (USDA), federal insurance is made available for crops in the case of emergency and natural disasters. Losing large yields of crops to unexpected circumstances can be devastating to farmers and consumers, resulting in high benefits for ensuring it is covered financially. Depending on the insurance purchased by landowners, coverage and indemnity (compensation payment) values vary. Kern County crops are currently insured federally for a combined indemnity of \$7,860,273 for 2020.

### Kern River Flood Peak Flows and Frequency

The Project would divert Kern River floodwaters along the Cross-Valley Canal or Gooselake Channel. Based on the latest preliminary FEMA Flood Insurance Survey (FIS) for Kern County, peak discharges on the Kern River at different reoccurrence intervals would be as follows:

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Kern River	At Kernville gaging stations	1,009.0	13,400	*	44,000	69,000	186,000
Kern River	At Stockdale Highway	2,407.0	2,800	*	7,000	10,200	28,700
Kern River	At McClung Weir	*	2,800	*	7,000	9,600	28,100

\*Not calculated for this Flood Risk Project

Historically, during major flood events and times of high flow, the Kern River floodwaters would flow south to the Kern and Buena Vista Lakes, then north to Tulare Lake, and when high enough overflow into the San Joaquin River. In 1977, the Army Corps of Engineers constructed an Intertie from the Kern River to the California Aqueduct to divert floodwaters into the California Aqueduct to prevent downstream flooding of farmland (water flows through Bakersfield and terminates at the Intertie). The Intertie was constructed to prevent wet year high flows from flooding agricultural fields in Buena Vista Lake and Tulare Lake areas and has a capacity to divert 3,500 cubic feet per second (cfs) of Kern River flow. Prior to reaching the Intertie, the Kern River Watermaster makes the flood flows available to any interest in Kern County who makes an order to divert that water. Since construction of the Intertie, approximately 430,000 AF of Kern River flood water has

bypassed the Intertie along the Kern River Flood Channel, flooding farmland in the Tulare Lake Basin.

Even with the construction of the Intertie facility, the Project offers roughly 1,200 acres of basin area to divert water away during flood conditions thereby reducing damages to downstream farmlands. Infiltration rates in the basins are initially expected to be 0.7 ft/day (between 0-30 days). Potentially, the Project could divert up to 400 cfs of water that can be diverted from Kern River flood flows during a major flooding event, or about 800 acre-feet (AF) per day. Data on the typical duration of Kern River floods was not available at the time of the study calculations. At the known peak flow rates for major floods, the Project areas would be expected to reach capacity between 0-5 days.

#### Potential Flood Control from Kern Fan Project

In summary, the Project does offer some flood control protections in the form of reducing peak cfs flow on the Kern River during large flooding events downstream of the Project. Expected benefits include reduced flood damage on crops bordering the Kern River (e.g. potatoes, carrots, lettuce, and alfalfa) and the potential for fewer affected crops overall in the broader floodplain as well as the Buena Vista and Tulare Lake beds downstream – depending on the event and peak flow distribution. Although exceedingly rare, in the case of a 100-500 year flood event with upwards of 10,000 cfs in peak flow (before the Project site), the additional diversion capacity offered by the Project has the potential to reduce damage to federally insured crops in contribution with other diversions and efforts in the area. These benefits were not quantified as part of the Feasibility Study and are described here as a qualitative benefit of the Project.