Public Draft

Environmental Assessment/Initial Study and Finding of No Significant Impact/Mitigated Negative Declaration

Arroyo Canal Fish Screen and Sack Dam Fish Passage Project

SAN JOAQUIN RIVER RESTORATION PROGRAM

June 2012

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MID-PACIFIC REGION
SACRAMENTO, CALIFORNIA

DRAFT FINDING OF NO SIGNIFICANT IMPACT

ARROYO CANAL FISH SCREEN AND SACK DAM FISH PASSAGE PROJECT

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Proposed Action

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) in cooperation with the Henry Miller Reclamation District #2131 (HMRD), proposes to replace Sack Dam and install a new fish screen structure in Arroyo Canal to accommodate fish passage in the San Joaquin River, in accordance with the Stipulation of Settlement (Settlement) in *NRDC, et al., v. Kirk Rodgers, et al*. Federal authorization for implementing the Settlement is provided in the San Joaquin River Restoration Settlement Act (Public Law 111-11).

The Proposed Action includes the following key components:

- Construct a new Sack Dam to accommodate fish passage and improve operational control under the scheduled Restoration Flow regime.
- Demolish the existing Sack Dam structure, and recontour the resulting disturbed channel. Provide stabilization improvements to the east side of the San Joaquin River channel between the east abutment of Sack Dam and the adjacent levee.
- Construct a new 700-cubic-foot-per-second positive barrier fish screen structure within the Arroyo Canal in a single vee configuration with profile bar screens. The fish screen would be designed to meet the criteria and/or recommendations of the guidelines issued by California Department of Fish and Game (DFG) and National Marine Fisheries Service (NMFS).
- Construct a new trash-rack structure at the head of the Arroyo Canal, upstream of the new fish screen structure, with an automated raking mechanism.
- Construct a new transport channel/fish ladder, beginning at the downstream end of the vee screen and terminating at the west abutment of Sack Dam. The transport channel/fish ladder would convey downstream migrating fish and accommodate upstream migrating fish past Sack Dam.
- Construct a defined work bench area adjacent to the west abutment of Sack Dam to facilitate operation and maintenance access to the dam and the Arroyo Canal approach channel.
- Construct a new control building to accommodate mechanical, electrical, and instrumentation and control equipment related to Proposed Action improvements.
- Construct a new equipment storage building to accommodate maintenance equipment related to Proposed Action improvements.
- Replace an existing bridge across the Poso Canal (located immediately north of the Arroyo Canal) to accommodate project operation and maintenance equipment access needs.
- Construct a new bridge across the Poso Canal to facilitate site access from Valeria Avenue during inclement weather conditions. This bridge would also be designed to accommodate project operation and maintenance equipment.

Reclamation posted the draft Environmental Assessment/Finding of No Significant Impact for public review and comment on Reclamation's web site and through a press release that was distributed June XX, 2012. The public review period began June XX, 2012, and will end July XX, 2012.

Findings

In accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended, and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act of 1969 (40 Code of Federal Regulations Parts 1500-1508), the Mid-Pacific Region of Reclamation finds that the Proposed Action is not a major federal action that would significantly affect the quality of the human environment. Therefore, an Environmental Impact Statement is not required for implementing the Proposed Action. This Finding of No Significant Impact is supported by the attached Environmental Assessment/Initial Study, *Arroyo Canal Fish Screen and Sack Dam Fish Passage Project*.

The following factors support this determination, including the implementation of several environmental commitments that are identified below and would be incorporated into the Proposed Action:

1. The Proposed Action would not result in adverse impacts on aesthetics. Construction of the Proposed Action would potentially create short-term and temporary changes in views within the project area. Heavy equipment and machinery is a common visual element in the landscape due to intensive surrounding agricultural operations, and the existence of equipment for construction is not anticipated to significantly affect aesthetics. Aesthetic impacts associated with vegetation removal would be temporary, and a restoration plan would be developed and implemented to revegetate disturbed areas through the implementation of environmental commitment VEG-1, which would help to reduce or eliminate aesthetic impacts. Periodic inspection and maintenance of the fish screen and dam would be similar to existing maintenance activities and would not change the aesthetic characteristics of the area. Equipment storage areas and work areas may be lit for safety purposes and security. Additionally, as described in environmental commitment AES-1, lights would be installed at the lowest allowable height and wattage, and would be screened or directed downward from residences. Therefore, the Proposed Action would have no effect on scenic resources, nor would it create any substantial source of light or glare.

2. The Proposed Action would not result in an adverse impact on air quality. No applicable air quality plan or air quality standard would be violated. The Proposed Action would also not create, exacerbate, or change existing objectionable odors that would affect a substantial number of people. Construction emissions would be below San Joaquin Valley Air Pollution Control District emissions thresholds and are not expected to cause new violations to National Ambient Air Quality Standards (NAAQS), California

Air Quality Standards (CAAQS), or contribute substantially to an existing or projected air quality violation. Long-term operation of the facilities proposed would require minimal trips and use of equipment. Therefore, operation emissions are expected to be minimal and below San Joaquin Valley Air Pollution Control District thresholds, would not result in a violation of NAAQS or CAAQS, and would not contribute substantially to an existing or projected air quality violation.

3. The Proposed Action would result in a beneficial impact on a variety of fish species by allowing uninhibited passage upstream and downstream of Sack Dam. Temporary construction actions would not result in adverse impacts on fish species. Sedimentation and turbidity from project construction would be temporary and limited to a small portion of the river during installation and removal of a temporary cofferdam. Implementation of environmental commitments such as those indentified in FSH-5, GEO-1, HM/PH-2, and WR-2, which include the development and implementation of a stormwater pollution and prevention plan, would minimize potential sediment impacts. Pile driving associated with the Proposed Action would occur within dewatered areas within the cofferdam; and therefore, noise levels are anticipated to be below accepted thresholds for fish species. Temporary and short-term impacts on aquatic and riparian habitat would be short-term in nature; and a revegetation plan, specified as the environmental commitment presented in VEG-1, would reduce and offset potential impacts on aquatic and riparian habitat. No hazardous material impacts on fish species would occur due to the implementation of HM/PM-2, which would include the implementation of a stormwater pollution and prevention plan to address potential spill response. The implementation of measures to reduce or avoid turbidity, noise, and vegetation impacts would also result in no adverse impacts on fish related to potential predation from construction or operational activities. Overall, the completion and operation of the project would be beneficial in the long term in serving to provide passage for salmon and other native fish to upstream areas of the San Joaquin River.

4. The Proposed Action would not result in an adverse impact on terrestrial and avian special-status species within the project area. No significant adverse impacts on special-status species are anticipated given the implementation of environmental commitments TER-1 through TER-6. These measures include avoidance and minimization measures that would help to avoid adverse effects on these species. Additionally, the Proposed Action has been developed in such a way that would minimize potential impacts on these species.

5. The Proposed Action would not result in a significant impact on vegetation and wetland resources. Up to 2.4 acres of *Populus fremontii* and *Salix gooddingii* woodland alliances, which are identified as rare natural communities on DFG's (2010) List of California Terrestrial Natural Communities could be removed during construction of the Proposed Action. However, this impact would be lessened given the potential for natural regeneration and the implementation of environmental commitment VEG-1.

Additionally, potential impacts related to nonnative invasive plant species would be avoided by the implementation of environmental commitments VEG-1 and VEG-3, which include a restoration plan for disturbed portions of the San Joaquin River floodplain. Details of the restoration plan, such as seed mix composition, planting areas, and planting densities, would be developed and implemented. Additionally, up to 1.4 acres of jurisdictional waters and wetlands would be permanently removed from the placement of concrete, fill, and metal materials within the ordinary high water mark of the San Joaquin River and Arroyo Canal. Impacts and restoration, including the implementation of VEG-2, would be addressed through the Section 404 and Section 401permit acquisition process to avoid adverse impacts on wetland resources.

6. The Proposed Action is a federal undertaking triggering the need for compliance with Section 106 of the National Historic Preservation Act. A records search, cultural resources survey, and Tribal consultation resulted in the identification of architectural resources that are being evaluated for their eligibility for listing in the National Register of Historic Places or the California Register of Historic Places. Regardless of their eligibility, the Proposed Action would have no adverse impact on the conveyance system and associated structures because the bridge replacement, and the installation of the fish screen cofferdam and the fish ladder/transport channel would not modify these facilities to the extent that they would no longer continue to function as they have since their original construction – as structures that convey and distribute water. The Proposed Action would require demolition of a storage building that does not appear eligible for listing in the National Register of Historic Places. Environmental commitment CUL-4 would require completion of the Section 106 process prior to the implementation of the ground-disturbing actions that have the potential to have an impact on historical and/or archaeological resources. Reclamation shall undertake Section 106 compliance for all areas of disturbance within the project area, and ensure all historic properties are not adversely affected under the National Historic Preservation Act (36 Code of Federal Regulations Part 800).

7. The Proposed Action would not disproportionately burden minority groups, low-income populations, or Native American Tribes. Potential impacts on minority and low-income populations resulting from implementation of the Proposed Action have been reviewed, and no population, including minority or low-income populations, would bear a disproportionate environmental or human-health effect as a result of the Proposed Action.

8. The Proposed Action would not result in an adverse impact on soils and geologic resources. The Proposed Action would involve substantial earth moving and in-water work to completely remove the existing Sack Dam, regrade approximately 100 feet of river channel between the existing and new dams, and construct the new Sack Dam and associated facilities. Construction of the Proposed Action would also entail the permanent placement of fill material including the new dam, access road and embankment on the east

floodplain, work bench between the new Sack Dam and Poso Canal, and streambank revetments along 25 feet to 100 feet upstream and downstream of the new Sack Dam. The placement of fill material and installation of infrastructure would not affect the quality or functioning of this federally and State-jurisdictional water with the implementation of WR-1. Additionally, best management practices and environmental commitment GEO-1, which have been incorporated into the Proposed Action, would prevent potential adverse soil loss impacts during construction of the Proposed Action.

9. The Proposed Action would not result in a demand for new housing or cause adverse growth-inducing effects. Construction would result in a temporary demand for workers and related support services, but demand for construction labor is expected to be met by the local labor pool.

10. The Proposed Action would not result in adverse impacts on global climate change. The Proposed Action would generate short-term greenhouse gas emissions, which are primarily the result of diesel-powered construction equipment and heavy-duty haul trucks. These emissions are considered short term, because they cease once construction is complete. The estimated emissions range from 396 to 574 metric tons of carbon dioxide equivalent per year and are well below the threshold of 25,000 metric tons of carbon dioxide equivalent per year from construction activities. Also, project operations and maintenance emissions that are primarily the result of electricity usage would result in the generation of very low greenhouse gas emissions. Therefore, the Proposed Action would not create an adverse effect on global climate change.

11. The Proposed Action would not significantly affect known hazards and hazardous material sites, public health, or result in the creation of hazardous materials. Accidental spills of hazardous materials and waste have the potential to occur during construction during routine transportation and use of these materials. Implementation of environmental commitments HM/PH-1 through HM/PH-4 would ensure no adverse impacts associated with hazardous materials. Implementation of environmental commitments HM/PH-5 and HM/PH-6 would ensure no adverse impacts on public health.

12. The Proposed Action would not result in an adverse impact on any Indian Trust Assets as it is outside of the range of Tribal lands held in trust. The nearest Indian Trust Asset is Table Mountain Rancheria, which is approximately 63 miles east of the project area.

13. The Proposed Action would not result in an adverse impact on land use or agricultural resources. The Proposed Action would temporarily result in an impact on approximately 3.4 acres of prime farmland in Fresno County, which accounts for less than 1 percent of the total prime farmland in the county. Additionally, Reclamation and HMRD are working with willing landowners. Once the project has been constructed, all affected farmlands would be restored to their original use; therefore, there would be no adverse impacts on land use as a result of the Proposed Action.

14. The Proposed Action would not result in adverse noise-related impacts. Noise impacts associated with project construction would be short term and would occur only during daylight hours. Fresno County maintains noise standard exemptions for construction noise. Additionally, once constructed, the Proposed Action would not create a substantial permanent increase in ambient noise levels.

15. The Proposed Action would not result in an adverse impact on paleontological resources. It is not expected that in-river construction would encounter paleontological resources, because disturbance would largely be limited to recently deposited sediments. The borrow materials would be expected to be previously disturbed or imported materials. Recent sediments along the river channel have a low potential to contain paleontological resources. Though there is a low potential for paleontological resources to occur, environmental commitment PAL-1 has been incorporated as part of the Proposed Action to ensure no adverse impacts occur to paleontological resources.

16. The Proposed Action would not result in an adverse impact on public services and utilities. There would be no disruption to existing services, nor would the Proposed Action create a significant impact related to power resources necessary to operate the project features. Additionally, environmental commitments PUB-1 and PUB-2 that have been incorporated into the Proposed Action include measures that would ensure that waste generated from project construction activities would not result in an adverse impact on local landfills.

17. The Proposed Action would not result in an adverse impact on recreation, nor would the Proposed Action cause a substantial increase in the demand for recreational facilities. The Proposed Action could potentially increase fish populations upstream of Sack Dam in the San Joaquin River; however, any increase to recreational fishing would occur in pre-project locations and would not result in the expansion or require the construction of recreational facilities.

18. The Proposed Action would not result in an adverse impact on socioeconomic resources. The Proposed Action is anticipated to provide a temporary beneficial impact on the local economy through the creation of construction-associated jobs. The Proposed Action would not result in an impact on existing population and housing trends, employment and labor force trends, prominent business and industry types, and government and finance conditions within the study area.

19. The Proposed Action would not result in an adverse impact on transportation and traffic. During construction there would be a slight increase in traffic to local roadways, with intermittent increases of up to 30 truck trips per day travelling to and from the construction site; however, the increased levels of traffic would be temporary, lasting only during the construction period. Additionally, the Proposed Action incorporates environmental commitments TRAN-1 and TRAN-2, which would ensure that increases in traffic to and from the construction site would not affect current level of service to local

roadways, nor would the Proposed Action create adverse impacts on local traffic and transportation routes.

20. The Proposed Action would not result in an adverse impact on water resources, nor violate water quality standards or waste discharge requirements; nor would the Proposed Action result in disruptions to water deliveries, including wildlife refuges. Environmental commitments WR-1 through WR-3 would minimize potential adverse impacts on water resources.

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HENRY MILLER RECLAMATION DISTRICT #2131

MITIGATED NEGATIVE DECLARATION

ARROYO CANAL FISH SCREEN AND SACK DAM FISH PASSAGE PROJECT

Lead Agency: Henry Miller Reclamation District #2131

Project Description/Location

The Proposed Project is in Fresno and Madera counties, approximately 7 miles southeast of Dos Palos, California. Sack Dam is on the San Joaquin River in the western region of the San Joaquin Valley, just north of Arroyo Canal. The facilities are owned and operated by Henry Miller Reclamation District # 2131 (HMRD). HMRD is the lead agency under the California Environmental Quality Act (CEQA).

The Proposed Project includes the following key components:

- Construct a new Sack Dam to accommodate fish passage and improve operational control under the scheduled Restoration Flow regime.
- Demolish the existing Sack Dam structure, and recontour the resulting disturbed channel. Provide stabilization improvements to the east side of the San Joaquin River channel between the east abutment of Sack Dam and the adjacent levee.
- Construct a new 700-cubic-foot-per-second positive barrier fish screen structure within the Arroyo Canal in a single vee configuration with profile bar screens. The fish screen would be designed to meet the criteria and/or recommendations of the guidelines issued by California Department of Fish and Game (DFG) and National Marine Fisheries Service (NMFS).
- Construct a new trash-rack structure at the head of the Arroyo Canal, upstream of the new fish screen structure, with an automated raking mechanism.
- Construct a new transport channel/fish ladder, beginning at the downstream end of the vee screen and terminating at the west abutment of Sack Dam. The transport channel/fish ladder would convey downstream migrating fish and accommodate upstream migrating fish past Sack Dam.

- Construct a defined work bench area adjacent to the west abutment of Sack Dam to facilitate operation and maintenance access to the dam and the Arroyo Canal approach channel.
- Construct a new control building to accommodate mechanical, electrical, and instrumentation and control equipment related to Proposed Action improvements.
- Construct a new equipment storage building to accommodate maintenance equipment related to Proposed Action improvements.
- Replace an existing bridge across the Poso Canal (located immediately north of the Arroyo Canal) to accommodate project operation and maintenance equipment access needs.
- Construct a new bridge across the Poso Canal to facilitate site access from Valeria Avenue during inclement weather conditions. This bridge would also be designed to accommodate project operation and maintenance equipment.

Proposed Finding

A joint Initial Study (IS)/Environmental Assessment (EA) has been prepared to assess the Proposed Project's impacts and benefits on the physical environment, and the significance of those impacts. The Proposed Project would not have any significant impacts on the environment once mitigation measures identified below are implemented. As such, preparation of an Environmental Impact Report is not required. This finding is based on the attached EA/IS, *Arroyo Canal Fish Screen and Sack Dam Fish Passage Project*. The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) is the lead agency for the EA under the National Environmental Policy Act (NEPA).

The Proposed Project would substantially improve fish passage both upstream and downstream of Sack Dam as well as greatly lessen the potential for fish entrainment through the installation of a fish screen at the Arroyo Canal diversion.

Mitigation Measures

The following mitigation measures would be implemented as part of the Proposed Project to avoid or minimize potential environmental impacts. These measures were included as part of the Proposed Project and are described as mitigation measures under CEQA as well as "environmental commitments" under NEPA in the EA/IS. These would be implemented as part of the project and its associated mitigation and monitoring plan. Implementation of these measures would reduce the potential environmental impacts of the Proposed Project to less-than-significant levels.

Aesthetics

- **AES-1 –** Lights would be installed at the lowest allowable height and wattage, screened and directed downwards and away from residences to the highest degree possible; and the amount of nighttime lights used would be minimized to the extent possible.

Air Quality

- **AQ-1** – The Proposed Action is subject to San Joaquin Valley Air Pollution Control District (SJVAPCD) Rule 9510 for compliance with the emission reduction requirements set forth in this rule. Compliance with SJVAPCD's Rule 9510 would result in a minimum 20 percent reduction in nitrogen oxide emissions from heavy-duty diesel equipment, compared to statewide average emissions. Implementing the SJVAPCD Rule 9510 would also reduce emissions of reactive organic gas and particulate matter less than 10 micrometers in aerodynamic diameter exhaust from heavy-duty diesel equipment by 5 percent and 45 percent, respectively. All or part of the reductions may be based on the selection of onsite equipment and fuels. The remainder would result from offsite reductions achieved by paying fees that would be applied to other SJVAPCD programs that reduce the same pollutants, but at other sources. The actual amount of emissions subject to offsite emission reduction fee will be determined based on the procedures and fee rates in Rule 9510, when detailed construction equipment and onsite mitigation measure information becomes available.

- **AQ-2** – The Proposed Action would be implemented so as to comply with required fugitive dust control measures listed in SJVAPCD Regulation VIII: *Fugitive Dust PM_{10} 4 Prohibitions*, to minimize the fugitive dust emissions from construction activities.

- **AQ-3** – The demolition of asbestos-containing materials is subject to the limitations of the National Emissions Standards for Hazardous Air Pollutants regulations and would require an asbestos inspection. The SJVAPCD's Compliance Division would be consulted before demolition begins; however, no asbestos removal is anticipated for the project.

Biological Resources – Fish Species

- **FSH-1** – A qualified biologist who possesses valid authorization from DFG and/or U.S. Fish and Wildlife Service (USFWS) for species handling would conduct preconstruction and construction monitoring activities throughout project implementation, inclusive of all construction phases, and as needed during all facets of the project construction. The biological monitor would also conduct worker awareness training as necessary prior to and during project construction.

- **FSH-2** – Riparian vegetation removed or damaged would be replaced or allowed an opportunity for natural recruitment, coordinated with USFWS,

NMFS, or DFG, as appropriate, within the immediate area of the disturbance to maintain habitat quality. Additionally, work within areas of riparian habitats would comply with the following measures as identified in Table 2-7 of the *Draft Program Environmental Impact Statement/Environmental Impact Report for the San Joaquin River Restoration Program* (SJRRP Draft PEIS/R [Reclamation and California Department of Water Resources 2011]) (RHSNC-1):

- Biological surveys would be conducted to identify, map, and quantify riparian and other sensitive habitats in potential construction areas.
- If effects occur on riparian habitat, emergent wetland, or other sensitive natural communities, as associated with streams, the State lead agency would comply with Section 1602 of the California Fish and Game Code.

- **FSH-3** – Prior to implementation of the project, HMRD/Reclamation would conduct an education program for all site workers relative to protected species that may be encountered within the project area, and required practices for their avoidance and protection, as included in Conservation Measure CVS-1 in Table 2-7 of the SJRRP Draft PEIS/R.
- **FSH-4** – Stockpiling of materials, including portable equipment, and vehicles and supplies, including chemicals, would be restricted to the designated construction staging areas, exclusive of any riparian and wetland areas outside the construction area.
- **FSH-5** – Sedimentation and turbidity would be avoided and minimized by implementing construction best management practices (BMPs) and preparing a Stormwater Pollution and Prevention Plan (SWPPP) acceptable to the Regional Water Quality Control Board. Additionally, in-channel work would comply with appropriate measures identified in Mitigation Measure SWQ-1A as included in Chapter 14 – Hydrology of the SJRRP Draft PEIS/R (p. 14-19). See also mitigation measures GEO-1, HM/PM-2, and WR-2.
- **FSH-6** – If individuals of listed species are observed present within a project area, then NMFS, USFWS, or DFG, as appropriate, would be notified. NMFS, USFWS, or DFG personnel would have access to construction sites during construction to evaluate species presence and condition and habitat conditions, as included in Conservation Measure CVS-2 in Table 2-7 of the SJRRP Draft PEIS/R. Access to the project area by agency staff after construction would be coordinated with HMRD.
- **FSH-7** – Potential injury and mortality associated within water pile driving would be avoided or minimized by implementing the following noise-reduction measures:
  - A cofferdam would be installed around the in-channel construction area, which would be dewatered before additional pile-driving and construction activities. Fish would not have access to the construction

site, and underwater sounds produced by pile driving would be attenuated. The number and size of piles would be limited to the minimum necessary to meet the engineering and design requirements of the Proposed Action.

- A Fish Rescue Plan would be prepared and implemented during any dewatering activities that have the potential to entrain fish. The plan would include using a qualified biologist(s) to capture, remove, and relocate fish using areas to be dewatered. The plan would be provided to NMFS for approval prior to the onset of construction activities.
- Vibratory hammers would be used whenever feasible, with the exception of impact testing for H-piles.

- **FSH-8** – The number and size of piles would be limited to the minimum necessary to meet the engineering and design requirements of the Proposed Action.
- **FSH-9** – The performance of the newly constructed fish screen would be evaluated to make sure that the fish screen is operated and maintained in accordance with acceptable fish screen performance criteria and/or recommendations established during consultation with NMFS and DFG. A hydraulic monitoring plan would be submitted to NMFS before completion of the Proposed Action.

Biological Resources – Terrestrial Species

- **TER-1** – To avoid and/or minimize effects on Pacific pond turtle, a qualified biologist would conduct surveys in aquatic habitats to be dewatered prior to dewatering and/or filling during project construction. Surveys would be conducted immediately after dewatering and before fill of aquatic habitat suitable for western pond turtles. If pond turtles are found, a biologist with valid authorization from DFG for species handling would capture them and move them to nearby DFG-approved areas of suitable habitat that would not be disturbed by project construction, as also referenced in Conservation Measure WPT-1 of the SJRRP Draft PEIS/R.
- **TER-2** – To avoid and minimize impacts on Swainson's hawk, as also referenced in SWH-1 of the SJRRP Draft PEIS/R:
  - HMRD would obtain an incidental take permit from DFG under Section 2081, and would comply with the terms of the permit.
  - Project mobilization and construction (including tree and vegetation removal) would commence prior to the Swainson's hawk nesting season (March 1 through September 15).
  - Given construction activities would occur during the Swainson's hawk nesting season (from March 1 through September 15), a qualified biologist would conduct preconstruction surveys in and around all

potential nest trees within a 0.5-mile radius of the project footprint, including haul routes. At least one survey would be conducted no more than 2 weeks prior to the initiation of construction activities. Surveys for Swainson's hawk and other special-status raptors would be conducted in accordance with the *Swainson's Hawk Technical Advisory Committee's Recommended Timing and Methodology for SWHA Nesting Surveys* (DFG 2000).

- If active nests (nests containing eggs or young) are identified within the survey area, a no-disturbance buffer zone would be established around the nest site. The width of the buffer zone would be determined by a qualified biologist in coordination with DFG. No construction activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). The buffer zone would be delineated with exclusionary fencing and flagging and/or signage as appropriate. Work would be allowed to continue as long as no abandonment behavior is noted by the biologist.
- If nesting birds are identified during preconstruction surveys, a biological monitor would be onsite during construction to address protection needs.
- If breeding Swainson's hawks (i.e., those exhibiting nest building or nesting behavior) are identified, a qualified biologist would be stationed near the nest to observe nesting and report any abandonment behavior to DFG as work continues.
- A non-disturbance distance (if determined necessary) may be modified on a case-by-case basis, with DFG approval, if a qualified biological monitor determines, through repeated observations, that the activity is not disruptive to the breeding pair. Any such nests would be monitored on a daily basis to determine whether construction activities are likely to affect nesting birds. Where disturbance to a Swainson's hawk nest cannot be avoided, such disturbance would be temporarily avoided (i.e., defer construction activities until later in the nesting cycle, such as after July 15, when the adults are less likely to abandon the nest).
- If a nest is abandoned or young fledge prematurely, due to construction activities related to the Proposed Action, HMRD would contact DFG.

- **TER-3** – To avoid and minimize impacts on western burrowing owl, as also referenced in Conservation Measures BRO-1 and BRO-2 of the SJRRP Draft PEIS/R:
  - Preconstruction surveys for burrowing owls would be conducted in areas supporting potentially suitable habitat within14 days prior to the

start of project construction and again within 24 hours prior to construction, using methods identified in the *Staff Report on Burrowing Owl Mitigation* (DFG 2012a). If ground-disturbing activities are delayed or suspended for more than 2 days after the initial or previous survey, the suitable habitat would be resurveyed. If occupied burrows are documented during preconstruction surveys, buffers would be established by a qualified biologist in coordination with DFG based on the recommended guidelines identified in the *Staff Report on Burrowing Owl Mitigation* (DFG 2012a) for activities that occur during the breeding and non-breeding season to protect reproductive and resident owls. Buffer size would range from 50 to 500 meters, depending on the level of disturbance and time of year. The level of disturbance, as defined in Environment Canada (2009), is anticipated to range from medium to high depending on timing and location of project activities, and would be verified with DFG prior to establishing buffers. Ground-disturbing activities would not occur within the buffers.

- If occupied burrows are documented and the recommended buffer distances cannot be adequately incorporated, the monitoring biologist would contact DFG and develop a plan to install one-way exit doors on the burrows to allow safe exit from the work site.

- **TER-4** – To avoid and/or minimize effects on other migratory nesting birds (including northern harrier and loggerhead shrike), as referenced in Conservation Measure MBTA-1 of the SJRRP Draft PEIS/R:

  - Tree and vegetation removal is scheduled to occur in January, prior to the nesting season. Clearing and grubbing activities are anticipated to remove most or all potential nesting areas prior to the nesting season with the exception of trees containing known raptor nests. Tree or vegetation removal activities would be avoided to the extent practicable during the nesting season for migratory birds (from February 1 to September 1).

  - If tree or vegetation removal is to occur during the nesting season, a qualified biologist would conduct a preconstruction survey within the construction area to determine the presence and absence of nesting birds. At least one survey would be conducted no more than 2 weeks prior to the onset of any construction activity. If no active nests are located, no further mitigation is necessary.

  - If active nests (nests containing eggs or young) are identified within the survey area, a no-disturbance buffer zone would be established around the nest site. The width of the buffer zone would be determined by a qualified biologist in coordination with USFWS and DFG. No construction activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as

determined by a qualified biologist). The buffer zone would be delineated with exclusionary fencing and flagging and/or signage as appropriate.

- **TER-5** – To avoid and/or minimize effects on white-tailed kite (a California fully protected species):
  - A qualified biologist would conduct preconstruction surveys in and around all potential nest trees within a 0.5-mile radius of the project footprint, including haul routes. At least one survey would be conducted no more than 2 weeks prior to the initiation of construction activities.
  - If active nests (nests containing eggs or young) are identified within the survey area, a no-disturbance buffer zone would be established around the nest site. The width of the buffer zone would be determined by a qualified biologist in coordination with USFWS and DFG. No construction activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). The buffer zone would be delineated with exclusionary fencing and flagging and/or signage as appropriate.
- **TER-6** – To avoid and/or minimize effects on western red bat:
  - If feasible, large riparian trees on the east side of San Joaquin River would not be removed during the western red bat maternity season (May 1 through August 31).
  - If large riparian trees on the east side of San Joaquin River are to be removed during the western red bat maternity season (May 1 through August 31), a roost assessment and/or surveys for roosting western red bats on the project site would be conducted by a qualified bat biologist prior to tree removal. The type of survey would depend on the condition of the potential roosting habitat, and may include the use of acoustic detectors. If no bat roosts are found, then no further study is required.
  - If evidence of western red bat use is observed, the number of bats using the roost would be determined. If active western red bat maternity roosts are determined to be present, the trees occupied by the roost would be avoided (not removed), if feasible.
  - If active maternity roosts are determined to be present and the trees occupied by the roost must be removed, the tree removal would be timed to avoid the maternity season (May 1 through August 31). A mitigation program addressing compensation and roost removal procedures would be developed in consultation with DFG prior to implementation.

Biological Resources – Vegetation and Wetland Species

- **VEG-1** – A restoration plan would be developed for disturbed portions of the San Joaquin River floodplain within the study area. Disturbed portions of the river floodplain would be seeded with a mix of native grasses and forbs to prevent the establishment of nonnative invasive plant species in coordination with DFG and USFWS. Details of the restoration plan, such as seed mix composition, planting areas, and planting densities, would be developed and implemented in coordination with DFG, and would also serve to facilitate compliance with Section 1602 of the California Fish and Game Code (which may include measures to protect and/or restore affected riparian habitat), and the project's SWPPP.

- **VEG-2** – Where project effects on waters of the United States and State cannot be avoided (an estimated 1.4 acres), the lead agencies would obtain Section 404, Section 401, and Section 1602 permits and comply with permit terms. Additionally, Conservation Measures WUS-1 and WUS-2 in Table 2-7 of the SJRRP Draft PEIS/R were incorporated as appropriate into the impact analysis of Section 3.4 (Biological Resources – Vegetation and Wetland Species) of this EA/IS, which includes measures to avoid and minimize impacts on waters of the United States.

- **VEG-3** – Erosion control materials used during construction of the Proposed Action would be certified as weed-free, and only native grasses and forbs would be used for erosion control or revegetation purposes.

Cultural Resources/Paleontological Resources

- **CUL-1** – Prior to initiating ground-disturbing activities that have the potential to have an impact on historical and archaeological resources, any previously unexamined sections of the area of potential effect would undergo pedestrian surveys to identify archaeological resources with surface components. This survey would be conducted by cultural resources staff meeting the Secretary of Interior *Standards and Guidelines of Archaeology and Historic Preservation* (48 Federal Register 447161 as amended). If cultural resources are identified and determined eligible for listing in the National Register of Historic Places, and it is determined that the Proposed Action would adversely affect them, the adverse effects would be resolved through the execution of a Memorandum of Agreement as outlined in the National Historic Preservation Act (NHPA) implementing regulations at 36 Code of Federal Regulations [CFR] Part 800.6. Resolution of the adverse effects may be accomplished by avoidance measures, modifications to the project, or mitigation.

- **CUL-2** – If archaeological resources are inadvertently discovered during earthmoving activities, the construction crew would immediately cease work near the find (recommended 100-foot radius, no less than 50-foot radius from location of discovery), and Reclamation's Mid-Pacific Regional Archaeologist would be called and consulted on how to proceed in accordance with regulations at 36 CFR 800.13. If additional measures to ensure avoidance of

potential buried archaeological resources result from Reclamation's consultation with the State Historic Preservation Officer (SHPO) under Section 106, they would be determined in coordination with the SHPO during the Section 106 consultation process prior to implementation of the Proposed Action.

- **CUL-3** – In the event that human remains are discovered, the discovery would be treated in accordance with the requirements of Section 750.5(b) of the California Health and Safety Code. Pursuant to Section 7050.5(c) of the California Health and Safety Code, if the county coroner determines that the human remains are of Native American origin, then the landowner, project proponent, or authorizing entity would ensure that the discovery would be treated in accordance with the provisions of Section 5097.98(a)-(d) of the California Public Resources Code.

- **CUL-4** – Prior to initiating construction activities that have the potential to have an impact on historical and archaeological resources, the NHPA Section 106 process would be completed, which may include additional studies, and/or monitoring, avoidance measures, or the execution of a Memorandum of Agreement to resolve adverse effects as outlined in the NHPA Section 106 regulations at 36 CFR Part 800.6.

- **PAL-1** – If paleontological resources are discovered during earthmoving activities, the construction crew would immediately cease work near the find. In accordance with Society of Vertebrate Paleontology guidelines (Society of Vertebrate Paleontology 2010), a qualified paleontologist would assess the nature and importance of the find, and recommend appropriate salvage, treatment, and future monitoring and mitigation.

Geology and Soils

- **GEO-1** – To minimize the potential release of fine sediment originating from earthmoving activities during project construction, including potential soil loss induced by streambank erosion into surface waters, an SWPPP would be prepared and implemented during project construction. The SWPPP would comply with applicable federal and State regulations concerning construction activities. See also mitigation measures FSH-5, HM/PH-2, and WR-2.

Greenhouse Gas Emissions

- **CC-1** – The following measures would be considered to lower greenhouse gas emissions during construction. These measures combine the currently proposed mitigation measures published by Sacramento Metropolitan Air Quality Management District (2011) and Bay Area Air Quality Management District (2011):

    - Maximize fuel efficiency of construction equipment.

    - Perform onsite material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines) to the extent possible.

- Use electricity from utility power lines rather than fossil fuel, where appropriate.
- Encourage construction workers to carpool.
- Reduce electricity use in the construction office by using compact fluorescent bulbs, powering off computers every day, and replacing heating and cooling units with more efficient ones as appropriate.
- Recycle construction waste and demolition debris to the maximum extent possible.
- Use locally sourced or recycled materials for construction materials to the maximum extent possible.
- Efficiently use water for adequate dust control.
- Comply with applicable future greenhouse gas regulations at the time of project-level permitting and construction.

Hazardous Materials and Public Health Hazards

- **HM/PH-1** – Hazardous materials and waste would be handled in compliance with applicable federal, State, and local laws and regulations, including licensing, training of personnel, accumulation limits and times, prevention and response to spills and releases, and reporting and recordkeeping.

- **HM/PH-2** – An SWPPP would be developed to include BMPs for the storage and use of hazardous materials and waste, and spill response procedures. Hazardous materials and waste would be stored in containers that prevent the release of material or hazardous content and within secondary containment, and spill kits would be placed throughout the study area for immediate response to spills, such as those that might occur during onsite refueling. Following initial response, follow-on investigation and cleanup to any spill would be performed in accordance with the SWPPP.

  The SWPPP would include BMPs for the handling of contaminated soil. Operators and construction personnel would be asked to report unusual conditions to the appropriate personnel. If contaminated soil is encountered during construction, the area and/or material would be properly contained during investigative actions. If soils require temporary stockpiling, piles would be placed on and covered with plastic sheeting or tarps that are secured safely with sand bags and bermed with fiber rolls or silt fencing to prevent runoff from leaving the area. Samples would be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste would be handled and properly disposed of in an authorized waste management facility. In addition, the appropriate local, State, and federal agencies would be notified. See also mitigation measures FSH-5, GEO-1, and WR-2.

- **HM/PH-3** – Hazardous materials would be stored and used in accordance with the Proposed Action's Health and Safety Plan during project operation and maintenance activities. The Health and Safety Plan would include guidelines on the storage and use of hazardous materials and spill response measures. Hazardous materials would be stored in containers that prevent the release of material or hazardous content and within secondary containment, and spill kits would be maintained throughout the project site for immediate response to spills.

- **HM/PH-4** – Transportation of hazardous materials and hazardous waste would comply with California Department of Transportation and California Highway Patrol regulations. Additionally, hazardous materials and wastes would only be transported along approved transportation routes. In the event of a vehicle accident, first responders would be notified immediately to direct emergency response requirements appropriate for the situation. Following initial emergency response, cleanup would be performed with agency oversight in accordance with applicable regulations.

- **HM/PH-5** – Before initiating ground-disturbing activities, the project proponent would survey the project site for unknown and abandoned wells. If the survey discovers an idle or abandoned well, ground-disturbing activities would not occur within 100 feet of the well, if feasible. If ground-disturbing activities need to occur within 100 feet of the abandoned well, the project proponent would either cover, fence, or otherwise clearly mark the well location and take measures to reduce hazards to workers and/or make sure that the well has been abandoned in accordance with State and local regulations, whichever is appropriate for the site. Madera County Department of Environmental Health or Fresno County Department of Public Health, Environmental Health Division would be notified, as appropriate.

- **HM/PH-6** – HMRD/Reclamation would comply with Mitigation Measure PHH-4 as identified in Chapter 20 – Hydrology of the SJRRP Draft PEIS/R (p. 20-21), which includes workplace precautions against West Nile Virus and Valley Fever at construction sites as follows:

    - Inspect work areas and eliminate sources of standing water that could potentially provide breeding habitat for mosquitoes. For example, eliminate uncovered upright containers that could accumulate water, and fill or drain potholes and other areas where water is likely to accumulate.

    - Conduct employee training that covers the potential hazards and risks of West Nile Virus and Valley Fever exposure and protection, including proper construction apparel. Employees would be instructed not to touch any dead birds with their bare hands.

    - Provide dust masks for worker use at construction sites during ground-disturbing activities.

- Recommend workers use insect repellant at construction sites with a minimum of 23.8 percent diethyl-meta-toluamide.
- Notify the appropriate county health department of dead birds seen on the construction site.

Public Services and Utilities

- **PUB-1** – To the extent practicable, demolished concrete would be used in conjunction with imported riprap for bank stabilization around the proposed dam. This measure would limit the amount of construction-generated waste material needing to be hauled offsite.
- **PUB -2** – To ensure that remaining waste does not exceed the permitted capacity of landfills, the proponent would implement the following, as included in Mitigation Measure UTL-4 in Chapter 24 – Utilities and Service Systems of the SJRRP Draft PEIS/R (p. 24-22):
  - Prepare an estimate of solid waste that would be generated by the action(s).
  - Maximize the recycling and/or composting of solid waste generated by the action at appropriate locations.
  - Identify appropriate recycling and/or disposal locations in accordance with applicable federal, State, and local regulations pertaining to solid waste.
  - Notify the operator of the recycling and/or disposal location and obtain approval for the type and amount of solid waste that would be generated by the action(s).
  - If sufficient capacity is unavailable at the identified location, identify and obtain approval for disposal at another location or multiple locations.

Transportation and Traffic

- **TRAN-1** – Prior to construction commencing, HMRD would work with local transportation planning agencies to assure cooperation with local policies regarding transportation infrastructure within the study area as required.
- **TRAN -2** – To minimize impacts on local traffic, HMRD would limit truck trips to less than 50 per hour on any affected roadway during morning and afternoon or evening peak-hour periods, as included in Mitigation Measure TRN-1 in Chapter 23 – Transportation and Traffic of the SJRRP Draft PEIS/R (p. 23-19).

Water Resources

- **WR-1** – As described in environmental commitment VEG-2, the lead agencies would obtain Section 404, Section 401, and Section 1602 permits and comply with permit terms. Additionally, conservation measures WUS-1 and WUS-2 in Table 2-7 of the SJRRP Draft PEIS/R are included by reference, which includes measures to avoid and minimize impacts on waters of the United States.

- **WR-2** – Construction and operations and maintenance activities associated with action alternatives would be subject to construction-related stormwater and other water quality-related permit requirements. The lead agencies would obtain any required permits before any ground-disturbing activities. The contractor, Reclamation, and HMRD would confirm that the SWPPP is kept on the project site and that water quality standards are followed. Following the completion of construction activities, disturbed areas would be stabilized and revegetated as required. See also mitigation measures FSH-5, GEO-1, and HM/PH-2.

- **WR-3** – To maintain continuous irrigation service to Arroyo Canal, cofferdams would be constructed around the fish screen and trash-rack structures to allow construction in the dry. Additionally, if construction occurs outside of the scheduled maintenance period for Poso Canal, it is anticipated that a temporary diversion would be used during construction of the crossing to maintain continuous irrigation service.

Determination

In accordance with Section 21082.1 of CEQA, HMRD has independently reviewed and analyzed the IS and Mitigated Negative Declaration (MND) for the Proposed Project and finds that the IS and MND reflect the independent judgment of HMRD. The lead agency further finds that the project mitigation measures will be implemented as stated in the IS and MND. This MND is filed in accordance with CEQA and the State CEQA guidelines.

_____ _____

Henry Miller Irrigation District #2131 Date

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List of Abbreviations and Acronyms

°C	degrees Celsius
µg/m^3	micrograms per cubic meter
AB	assembly bill
AE	Agricultural Exclusive
APE	area of potential effects
ATR	Annual Technical Report
BMP	best management practice
BO	biological opinion
B.P.	before present
BPS	best performance standards
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CDC	California Department of Conservation
Central Valley Water Board	Central Valley Regional Water Quality Control Board
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Society
CH_4	methane
CCID	Central California Irrigation District
cm	centimeter
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRHR	California Register of Historical Resources

CWA	Clean Water Act
CVFPB	Central Valley Flood Protection Board
dB	decibel(s)
dBA	decibel (A-weighted scale)
Delta	Sacramento-San Joaquin Delta
DFG	California Department of Fish and Game
DWR	California Department of Water Resources
EA	Environmental Assessment
EDD	California Employee Development Department
EFH	essential fish habitat
ESA	Endangered Species Act
FWUA	Friant Water Users Authority
GHG	greenhouse gas
GIS	geographic information system
GWP	global warming potential
headworks	Arroyo Canal Headworks
HMRD	Henry Miller Reclamation District #2131
I-5	Interstate 5
IPCC	Intergovernmental Panel on Climate Change
IS	Initial Study
ITA	Indian Trust Asset
IWM	in-stream woody material
Leq	equivalent sound level
MLD	most likely descendant
MT	metric tons
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOA	naturally occurring asbestos

NO_x	nitrogen oxide
NRDC	Natural Resources Defense Council
NRHP	National Register of Historic Places
O_3	ozone
PG&E	Pacific Gas and Electric Company
PM_{10}	particulate matter less than 10 micrometers in aerodynamic diameter
$PM_{2.5}$	particulate matter less than 2.5 micrometers in aerodynamic diameter
PRC	Public Resources Code
Proposed Action	Arroyo Canal Fish Screen and Sack Dam Fish Passage Project
RA	Restoration Administrator
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
river	San Joaquin River
RM	River Mile
ROG	reactive organic gas
Settlement	Stipulation of Settlement in *NRDC, et al., v. Kirk Rodgers, et al.*
SHPO	State Historic Preservation Officer
SJR	San Joaquin River
SJRRP	San Joaquin River Restoration Program
SJRRP Draft PEIS/R	*Draft Program Environmental Impact Statement/ Environmental Impact Report for the San Joaquin River Restoration Program*
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLCC	San Luis Canal Company
SO_2	sulfur dioxide
SR	State Route
SRA	Shaded Riverine Aquatic
State	State of California
SWPPP	Stormwater Pollution and Prevention Plan
Tribes	American Indian Tribes

tpd	tons per day
tpy	tons per year
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
Water Board	Regional Water Quality Control Board
WNV	West Nile Virus
WY	Water Year

1.0 Introduction and Statement of Purpose and Need

1.1 Introduction

This Environmental Assessment (EA)/Initial Study (IS) was jointly prepared by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), as the federal lead agency and Henry Miller Reclamation District #2131 (HMRD), as the state lead agency, to identify and analyze the anticipated environmental impacts of the proposed Arroyo Canal Fish Screen and Sack Dam Fish Passage Project (Proposed Action). This EA/IS was prepared to comply with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

HMRD is located in the San Joaquin Valley of California, approximately 7 miles southeast of Dos Palos (see Figure 1-1), and supplies irrigation water to approximately 47,000 acres within the San Luis Canal Company (SLCC) service area. HMRD serves as the operating agency for SLCC in that it owns or has easements on the majority of the water delivery facilities within the SLCC boundary. It performs all of the daily operations and maintenance functions for the benefit of SLCC and the neighboring refuge lands. HMRD delivers water to SLCC landowners as well as the federal San Luis Wildlife Refuge Complex, the California State Wildlife Refuge, and refuge lands within Grasslands Water District. The water supply is surface diversions from the San Joaquin River (SJR or river) via releases from Mendota Dam, located within the Mendota Pool at the downstream end of the Delta-Mendota Canal. SLCC's contractual diversion is off of the SJR at Sack Dam, approximately 22 miles downstream of the Mendota Dam. This diversion includes HMRD's unscreened Arroyo Canal Headworks (or headworks) and the existing Sack Dam.

1.2 Project Background

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit challenging the renewal of long-term water service contracts between the United States and the Central Valley Project Friant Division contractors. After more than 18 years of litigation of this lawsuit, known as *NRDC, et al., v. Kirk Rodgers, et al.*, a Stipulation of Settlement (Settlement) was reached. On September 13, 2006, the Settling Parties, including NRDC, Friant Water Users Authority (FWUA), and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of the Settlement, which was subsequently approved by the U.S. Eastern District Court of California on October 23, 2006. The San Joaquin River Restoration

Settlement Act (Public Law 111-11) authorizes and directs the Secretary of the Interior to implement the Settlement.

The San Joaquin River Restoration Program (SJRRP) was established in late 2006, to implement the Stipulation of Settlement. The "Implementing Agencies" responsible for management of the SJRRP include the U.S. Department of the Interior through Reclamation and U.S. Fish and Wildlife Service (USFWS), the U.S. Department of Commerce through the National Marine Fisheries Service (NMFS), the State of California (State) Natural Resources Agency through the California Department of Water Resources (DWR), and California Department of Fish and Game (DFG). The Settlement also stipulates the appointment of a Restoration Administrator (RA), in consultation with a Technical Advisory Committee, to make recommendations to the Secretary of the Interior to help meet the Restoration Goal.

The two primary goals established by the Settlement are as follows:

- **Restoration Goal** – To restore and maintain fish populations in "good condition" in the main stem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.

- **Water Management Goal** – To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

To achieve the Restoration Goal, the Settlement requires a combination of channel and structural modifications along the SJR below Friant Dam, releases of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration Flows), and the reintroduction of Chinook salmon. Restoration Flows are specific volumes of water to be released from Friant Dam during different year types, according to Exhibit B of the Settlement (see Table 1-1). Interim Flows are experimental flows that began in 2009 and will continue until full Restoration Flows are initiated, with the purpose of collecting relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse.

To achieve the Water Management Goal, the Settlement calls for recirculation, recapture, reuse, exchange, or transfer of the Interim and Restoration Flows to reduce or avoid impacts on water deliveries to all of the Friant Division long-term contractors caused by the Interim and Restoration Flows

Barriers to migration for anadromous and other fish in SJR encompass a wide range of both adult and juvenile passage impediments. Fish passage in the river has been essentially blocked since the 1940s, and upstream diversions have resulted in the river being dewatered under dry to normal conditions, with the exception of return flows from agricultural operations and uncontrolled flow releases in wet years. The Settlement requires the restoration of flows to SJR, improvements in fish passage at a number of structures, and actions to prevent fish entrainment at certain structures and sloughs.

Table 1-1.
San Joaquin River Restoration Flow Release Schedule (Reach 4) and Nonflood Friant Dam Releases[1]

Month	Water Year Type[2]											
	Critical-Low (cfs)		Critical-High (cfs)		Dry (cfs)		Normal-Dry (cfs)		Normal-Wet (cfs)		Wet (cfs)	
	Reach 4	Friant	Reach 4	Friant	Reach 4	Friant	Reach 4	Friant	Reach 4	Friant	Reach 4	Friant
October	0	160	0	160	115	350	115	350	115	350	115	350
November 1 through 10	0	130	175	400	475	700	475	700	475	700	475	700
November 11 through 30	0	120	0	120	155	350	155	350	155	350	155	350
December	0	120	0	120	155	350	155	350	155	350	155	350
January	0	100	0	110	175	350	175	350	175	350	175	350
February	0	100	0	110	175	350	175	350	175	350	175	350
March 1 through 15	0	130	285	500	285	500	285	500	285	500	285	500
March 16 through 31	0	130	1,225	1,500	1,225	1,500	1,225	1,500	1,225	1,500	1,225	1,500
April 1 through 15	0	150	0	200	125	350	2,180	2,500	2,180	2,500	2,180	2,500
April 16 through 30	0	150	0	200	125	350	125	350	3,655	4,000	3,655	4,000
May	0	190	0	215	85	350	85	350	85	350	1,650	2,000
June	0	190	0	215	85	350	85	350	85	350	1,650	2,000
July	0	230	0	255	45	350	45	350	45	350	45	350
August	0	230	0	255	45	350	45	350	45	350	45	350
September	0	210	0	260	65	350	65	350	65	350	65	350

Notes:
[1] Friant Dam Releases according to the Settlement – nonflood conditions.
[2] Restoration Flow release schedule, as documented in Exhibit B of the Settlement.
Key:
cfs = cubic feet per second

The Fisheries Management Plan identifies a number of potential actions, consistent with those recommended in the Settlement, to provide fish passage, including the retrofit of Sack Dam, and to reduce entrainment, including the screening of Arroyo Canal.

The Settlement-required improvements at the Arroyo Canal and Sack Dam facilities are proposed to be designed, built, and operated in accordance with Public Law 111-11 and the Memorandum of Understanding between Reclamation and HMRD.

1.3 Purpose and Need for the Proposed Action and Project Objectives

1.3.1 Purpose and Need

The purpose of the Proposed Action is to implement the Settlement-required Phase 1 improvements at the Arroyo Canal and Sack Dam facilities on the SJR, as authorized and directed by Public Law 111-11.

The following are the "Phase 1 improvements" in paragraph 11 of the Settlement (numbers in parentheses are from the Settlement, p. 9) related to the Arroyo Canal and Sack Dam:

- *Screening the Arroyo Canal water diversion immediately upstream of Sack Dam to prevent entrainment of anadromous fish (Item 6)*
- *Modifications at Sack Dam to ensure fish passage (Item 7)*

The need for the Proposed Action stems directly from the Settlement, which states the following (page 7):

> ***Implementation of This Settlement – The Restoration Goal Channel and Structural Improvements***
>
> 9. *The Parties agree that the channel and structural improvements listed in Paragraph 11 are necessary to fully achieve the Restoration Goal. The Secretary shall promptly commence activities pursuant to applicable law and provisions of this Settlement to implement the improvements listed in Paragraph 11, provided that funds are appropriated by Congress or available from non-federal sources for that purpose.*

1.3.2 Statement of Objectives

HMRD, as the lead agency under CEQA, has the following objectives for the Proposed Action:

- Implement the environmental, design, and construction activities for Sack Dam and the Arroyo Canal Headworks in a manner that will not modify or diminish the SLCC water rights, that will maintain water deliveries to SLCC

(through HMRD facilities), and that will maintain pre-project water quality levels.

- Construct and operate a fish screen to protect out-migrating salmonids and upstream migrating adults from straying consistent with federal and State fish screen design criteria.
- Improve fish passage at Sack Dam to allow for passage of anadromous and other native fish.
- Cooperatively implement the Proposed Action with Reclamation as identified in the Settlement.
- Secure federal funding, pursuant to Public Law 111-11, to finance the construction, operation, and maintenance of the Proposed Action.

1.4 Responsibility of Lead Agencies, Responsible Agencies, and Implementing Agencies

Federal laws, permits, licenses, and policy requirements have directed, limited, or guided the NEPA and CEQA analyses and decision-making process of this EA/IS and include the following (Section 4, Consultation and Coordination, provides full discussions of these related authorizations):

- **USFWS and NMFS –** Consultation under Section 7 of the federal Endangered Species Act (ESA)
- **USFWS –** Fish and Wildlife Coordination Act
- **NMFS –** Consultation under the Magnusen-Stevens Fishery Conservation and Management Act
- **U.S. Army Corps of Engineers (USACE) –** Compliance with Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act
- **U.S. Coast Guard** – Navigability determination under Title 33 Code of Federal Regulations (CFR) Section 2.40
- **DFG –** Compliance with Section 2081 of the California Endangered Species Act (CESA) and Section 1600 Lake or Streambed Alteration Agreement
- **Central Valley Regional Water Quality Control Board (Central Valley Water Board) –** Compliance with Section 401 of the CWA
- **State Lands Commission –** Land use lease
- **California State Historic Preservation Officer (SHPO) –** Consultation under Section 106 of the National Historic Preservation Act (NHPA)

- **Central Valley Flood Protection Board –** California Code of Regulations, Title 23, encroachment permit
- **San Joaquin Valley Air Pollution Control District (SJVAPCD) –** federal Clean Air Act, Indirect Source Review

1.5 Study Area

The study area for this EA/IS includes areas that may be affected directly, indirectly, or cumulatively by the Proposed Action. The Proposed Action is located in Fresno and Madera counties, approximately 7 miles southeast of Dos Palos, California (see Figure 1-1). Sack Dam is on the SJR in the western region of the San Joaquin Valley, just north of Arroyo Canal at the junction of reaches 3 and 4. The facilities are owned and operated by HMRD.

1.6 Potential Environmental Issues

This EA/IS analyzes potential impacts and cumulative effects associated with the Proposed Action on the following resource areas:

- Aesthetics
- Air Quality
- Biological Resources – Fish Species
- Biological Resources – Terrestrial Species
- Biological Resources – Vegetation and Wetland Species
- Cultural Resources
- Environmental Justice
- Geology and Soils
- Growth-Inducing
- Global Climate Change
- Hazards Hazardous Materials and Public Health Hazards
- American Indian Trust Assets
- Land Use and Agricultural Resources
- Noise
- Paleontological Resources
- Public Services and Utilities
- Recreation
- Socioeconomics
- Transportation and Traffic
- Water Resources

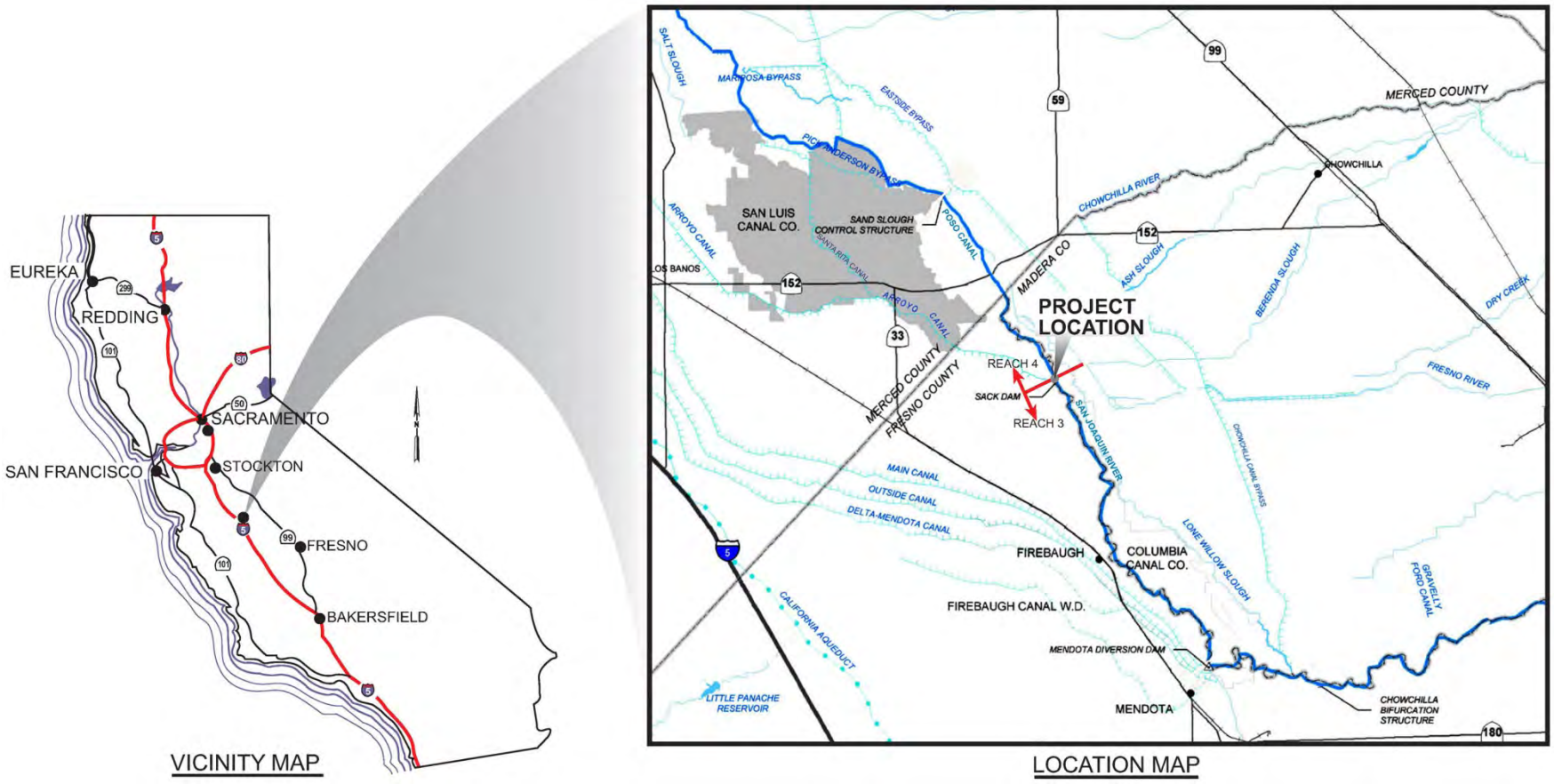

Figure 1-1.
Location Map

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2.0 Description of Alternatives

The No-Action Alternative, the Proposed Action, and the Vertical Slot Fish Ladder and Fish Bypass System Alternative are described in this section.

2.1 No-Action Alternative

The No-Action Alternative is assumed to be the continued operation of the existing Sack Dam and Arroyo Canal without the installation of a new fish ladder or fish screen. HMRD would operate the dam using the recently installed Lopac gates (interim gates) to assist in passing up to 500 cubic feet per second (cfs) of the Restoration Flows. Sack Dam becomes inundated at flows greater than 1,000 cfs; therefore, HMRD would need to remove the interim gates for any flows above this level (including long-term Restoration Flows) to prevent damage to the gates and supervisory control and data acquisition system. It is also likely that HMRD would need to repair the east side of the river channel after high-flow events, which would likely require the use of heavy equipment for 2 to 3 days per occurrence. Fish passage across Sack Dam would be limited to those periods when river flows are greater than 1,000 cfs. Periodic sediment dredging around Sack Dam and the approach channel is anticipated for the No-Action Alternative. This dredging effort would be similar to the SJR dredge described below in the Proposed Action/Preferred Alternative.

The No-Action Alternative would result in not being able to meet the Restoration Goal stipulated by the Settlement.

2.2 Proposed Action/Preferred Alternative

The Proposed Action, shown in Figure 2-1, includes the following key components:

- Construct a new Sack Dam to accommodate fish passage and improve operational control under the scheduled Restoration Flow regime.
- Demolish the existing Sack Dam structure, and recontour the resulting disturbed channel.
- Provide stabilization improvements to the east side of the SJR channel between the east abutment of Sack Dam and the adjacent levee.
- Construct a new 700-cfs positive barrier fish screen structure within the Arroyo Canal in a single vee configuration with profile bar screens. The fish screen would be designed to meet the criteria and/or recommendations of the guidelines issued by DFG and NMFS.

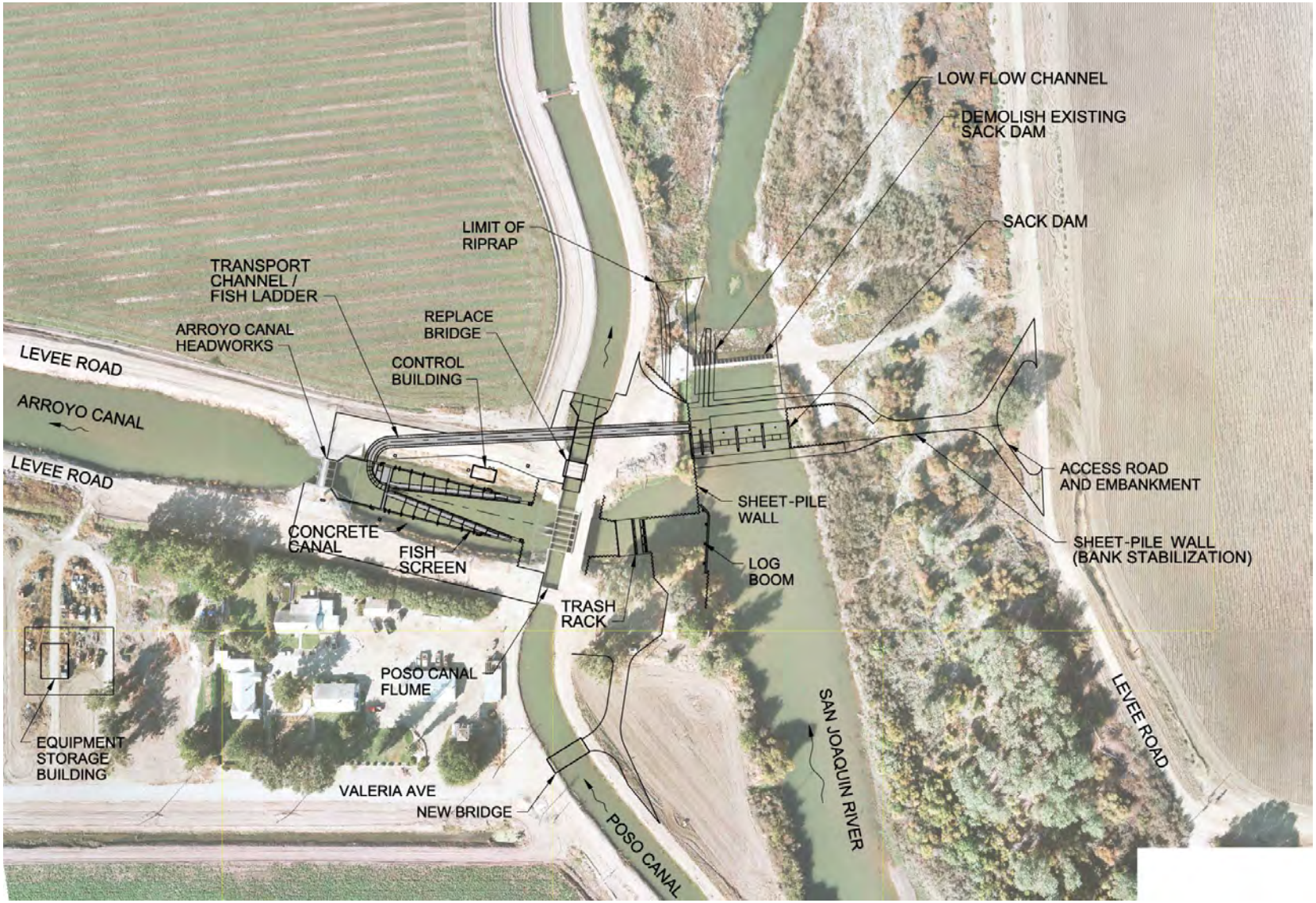

Figure 2-1.
Proposed Action Site Plan

- Construct a new trash-rack structure at the head of the Arroyo Canal, upstream of the new fish screen structure, with an automated raking mechanism.
- Construct a new transport channel/fish ladder, beginning at the downstream end of the vee screen and terminating at the west abutment of Sack Dam. The transport channel/fish ladder would convey downstream migrating fish and accommodate upstream migrating fish past Sack Dam.
- Construct a defined work bench area adjacent to the west abutment of Sack Dam to facilitate operation and maintenance access to the dam and the Arroyo Canal approach channel.
- Construct a new control building to accommodate mechanical, electrical, and instrumentation and control equipment related to Proposed Action improvements.
- Construct a new equipment storage building to accommodate maintenance equipment related to Proposed Action improvements.
- Replace an existing bridge across the Poso Canal (located immediately north of the Arroyo Canal) to accommodate project operation and maintenance equipment access needs.
- Construct a new bridge across the Poso Canal to facilitate site access from Valeria Avenue during inclement weather conditions. This bridge would also be designed to accommodate project operation and maintenance equipment.

Sections 2.4 and 2.5 present the proposed construction schedule and anticipated operations and maintenance activities for the Proposed Action/Preferred Alternative.

2.2.1 Sack Dam Replacement

The Proposed Action includes removing the existing dam and constructing a new dam approximately 100 feet upstream, near the Arroyo Canal divergence to enable fish passage at Sack Dam and improve operational control under the scheduled Restoration Flow regime (see Table 1-1). Relocating Sack Dam immediately downstream of the Arroyo Canal divergence would enhance the ability of the dam to influence and ultimately manage sediment within the Arroyo Canal approach channel. Relocating Sack Dam would also allow the transport channel/fish ladder to be aligned in a manner that would minimize impacts on the adjacent agricultural field.

The new dam would consist of an automated pneumatic crest control gate system. The dam would include two smaller gate bays (approximately 10 feet wide) adjacent to the west abutment, and three to four larger gate bays (approximately 20 feet wide to 30 feet wide) between the former gate bays and the east abutment. The first smaller gate bay (closest to the west abutment) would serve to “shadow” the fish ladder entrance (located downstream of the dam in the west abutment) and to periodically manage sediment that may accumulate at the fish ladder entrance. The second smaller gate bay would include a removable baffle, composed of a 4-foot-wide slot, and positioned at the downstream end

of the bay to provide an alternative fish passage mechanism during transitional flow periods (Reach 4 Restoration Flows between 475 cfs and 1,225 cfs). All gate bays would be lowered during high Restoration Flows and flood flows (Reach 4 flows in excess of approximately 1,550 cfs) to preserve the flood profile and allow volitional fish passage across Sack Dam.

The new dam would retain an upstream water elevation approximately 8 inches higher than the existing structure's capability to enable the design diversion rate of 700 cfs. The increase in headwater elevation is a function of the hydraulic losses imposed by the proposed trash rack and fish screen facility.

The new dam would include revetment protection (for example, stones or articulating concrete block) on the riverbed and banks upstream and downstream of the dam to resist channel degradation and bank erosion. Revetment details are included in Section 2.2.3, Stabilization Improvement.

2.2.2 Demolition of the Existing Sack Dam

The existing dam would be demolished in its entirety up to 3 feet below the channel bed elevation. The channel bed and active channel banks, disturbed and/or depressed as a result of demolition activities would be backfilled with suitable onsite borrow material, compacted, and shaped to conform to the river channel upstream and downstream. All disturbed areas within the levees, including the disturbed area on the east side of the river, would be graded to drain to the active channel. Riprap would be placed along the left channel bank (facing downstream), between the new dam and the existing left abutment area to repair and minimize future erosion along the toe of the levee. The existing riprap immediately downstream of the existing dam would be reused elsewhere on the project site. The anticipated extent of channel recontouring upstream of the existing dam would be set by the location of the upstream cofferdam used to construct the new dam.

2.2.3 Stabilization Improvement

To provide a permanent fill for the east side of the Sack Dam embankment, an engineered embankment and sheet-pile cutoff wall would be constructed. Upstream and downstream of the embankment, revetment protection would be necessary to resist channel degradation and bank erosion. Preliminary estimates of revetment extents range from 25 feet to 50 feet upstream and downstream of the embankment. The embankment configuration would also provide vehicle and foot traffic access from SJR east levee to the east abutment of Sack Dam.

2.2.4 In-Canal Positive Barrier Fish Screen and Associated Facilities

The proposed in-canal fish screen is an off-river, vertical flat-plate screen in a single vee configuration. The in-canal vee screen was selected as the Proposed Action/Preferred Alternative to minimize the fish exposure time to the screen and associated bypass requirements, and to minimize streambank impacts. In addition, the current point of diversion at Sack Dam is limited to a water depth of about 4 feet, which precludes the effectiveness of an in-river diversion facility.

The in-canal fish screen would be placed in a rectangular canal extending from the Poso Canal flume (old headworks structure) to the Arroyo Canal Headworks. The fish screen structure would include a fish screen cleaning mechanism, sediment jetting system, and a transport channel/fish ladder to allow upstream and downstream fish passage past Sack Dam. The in-canal fish screen structure would consist of 20 fish screen panels, configured to permit a peak diversion rate of 700 cfs and meet DFG and NMFS salmonid fish protection criteria.

A trash-rack structure would be located immediately upstream of the fish screen structure (upstream of the old headwords structure) to prevent large debris from damaging the screens. The trash-rack structure would include provisions for bulkheads to facilitate maintenance and repair of the fish screen facility in the dry. The trash-rack bar spacing would accommodate sturgeon and other migrating fish species.

2.2.5 Transport Channel/Fish Ladder

The transport channel/fish ladder would accommodate both upstream and downstream migrating fish past Sack Dam. The design flow for the transport channel/fish ladder is coincident with the minimum Reach 4 Restoration Flow of 45 cfs. The transport channel/fish ladder would consist of the bypass entrance at the downstream end of the fish screen, a transport channel, and a fish ladder.

The proposed entrance to the transport channel would use an inclined ramp to control flow through the transport channel/fish ladder. The entrance would transition from 2.5-foot-wide to a 6-foot-wide transport channel extending from the centerline of the fish screen to the fish ladder. The fish ladder would be composed of a roughened invert (for example, loose cobbles) and a series of full-depth-vertical-slot fabricated metal weirs. The fish ladder would terminate at the west abutment of Sack Dam.

The fish ladder would cross under the Poso Canal, which is owned and operated by the Central California Irrigation District. The transport channel/fish ladder is intended to allow passage to native fish species, including Chinook salmon and white sturgeon.

2.2.6 Arroyo Canal Approach Channel and Work Bench

The approximate 100-foot-long section of canal beginning at SJR and extending to the proposed trash-rack structure is defined as the “approach channel.” Sediment would need to be removed from the approach channel to maintain the channel geometry and approach velocity hydraulics. To manage the approach channel effectively, a work bench would be constructed along the west bank of the river, as shown in Figure 2-1. The work bench would be defined by a sheet-pile wall aligned along the north bank of the approach channel that would intersect a sheet-pile wall along the west abutment of Sack Dam.

The work bench would be accessible by a long-reach excavator and hydraulic boom truck (and other operation and maintenance vehicles) during normal operating conditions to remove sediment and debris from the approach channel and to perform maintenance and repairs on the Sack Dam pneumatic crest control gates.

2.2.7 Control Building and Equipment Storage Building

A control building would be required to accommodate mechanical, electrical, and instrumentation and control equipment related to the Proposed Action improvements. The anticipated size of the control building is between 600 square feet and 1,000 square feet. Figure 2-1 shows the location for this building.

An equipment storage building would be required to accommodate the maintenance equipment required at the project site. The anticipated size of this building is approximately 1,500 square feet (not including the proposed 1,500-square-foot storage yard). Figure 2-1 shows the location for this building and storage yard.

2.2.8 Bridge Crossings over Poso Canal

The existing north access bridge that spans the Poso Canal (located approximately 50 feet north of the old headworks structure) would be demolished and replaced with a new bridge that would accommodate equipment anticipated for future operation and maintenance. In addition, a new south access bridge would be constructed to span the Poso Canal (located approximately 200 feet south of the old headworks structure) to accommodate equipment anticipated for future operation and maintenance, and to provide all-weather access to the project site.

2.3 Proposed Action/Preferred Alternative Construction Schedule and Sequencing

2.3.1 Construction Schedule

Table 2-1 provides a general construction schedule for the Proposed Action/Preferred Alternative.

Table 2-1.
General Construction Schedule

Construction Phase	Start Date	Completion Date
Contract Bidding, Award, and Notice to Proceed	September 2012	January 2013
Site Preparation	January 2013	February 2013
Construction	February 2013	September 2014
In-River Construction	February 2013	September 2014
Demobilization	October 2014	October 2014

Construction would occur during daylight hours for an estimated 10 hours per day, Monday through Friday, with potential for Saturday and Sunday work in certain instances. In the event that flood flows occur during the construction period, it is anticipated that the contractor would vacate those areas subject to inundation until such time that work can be performed in a condition and manner consistent with the contractor's intent.

2.3.2 Construction Sequencing

Construction would begin in January 2013 and extend through October 2014, and would include the following overlapping steps:

- Step 1 – Site Preparation
    - Clear and grub work areas.
    - Prepare contractor staging areas.
    - Relocate utilities as required before construction begins.
    - Provide temporary diversion facilities to maintain Arroyo Canal, Poso Canal, and SJR flows during construction. This may include a cofferdam around the fish screen structure, trash rack, and Sack Dam (both existing and proposed dams) to accommodate canal and river operations. A temporary diversion channel around the east side of Sack Dam may be used to maintain in-river flow requirements downstream of the dam during construction. Alternatively, the contractor may use a staged cofferdam system to maintain in-river flow requirements.
    - Construct a temporary crossing, downstream of the existing Sack Dam, through the active SJR flow channel.
- Step 2 – Sack Dam Replacement
    - Demolish the existing Sack Dam.
    - Construct the new Sack Dam and adjacent work bench.
    - Construct engineered embankments.
    - Complete finish grading and implement erosion control measures.
- Step 3 – Construction of Fish Screen, Trash Rack, and Transport Channel/ Fish Ladder
    - Construct fish screen and trash-rack structures.
    - Construct transport channel/fish ladder.
    - Construct Poso Canal bridges and canal.
    - Construct control building and equipment storage building.
    - Complete finish grading and implement erosion control measures.

2.3.3 In-River Construction

The Proposed Action would require the following in-river construction tasks: demolition of the existing dam, construction of the new dam, construction of the trash-rack structure, and construction of the work bench. This section summarizes potential methods the contractor may use during construction of the Proposed Action.

The Proposed Action improvements would require construction access to both sides of the river. To facilitate the movement of labor, equipment, and materials across the river, the contractor would construct a temporary low-water access crossing downstream of Sack Dam. If used by the contractor, the conveyance aspect (for example, culvert) of the temporary crossing is anticipated to accommodate low Restoration Flows (approximately 45 cfs to 115 cfs). Flows exceeding low Restoration Flows would overtop the temporary crossing. This crossing would be constructed of suitable, pre-washed rock installed over temporary culverts. After construction is complete, the rock would either be spread within the river or removed, and the river channel returned to its preconstruction condition.

As previously mentioned, the contractor may install cofferdams to allow construction in the dry and to minimize river turbidity. Sheet piles would be installed using a crane directly adjacent to the dam (that is, near the west abutment) or from a crane positioned on a temporary work trestle. The sheet piles would be driven using a vibratory hammer and supplemented with an impact hammer if required by subsurface conditions.

The contractor would likely use one of the following in-river construction methods to construct Sack Dam:

- Method 1 – Construct a cofferdam around the entire perimeter of the dam. This method would require construction of a temporary diversion channel to convey flows around the cofferdam. Figure 2-2 shows the anticipated alignment of the temporary diversion channel. This temporary diversion channel would be filled in, and the affected area recon toured after construction is complete.

- Method 2 – Construct a cofferdam around half or some portion (that is, a staged cofferdam) of the dam. This method would allow for approximately 50 percent of the river channel to remain open for the controlled release of flows. After the first half of the dam construction is complete, the cofferdam would be removed and installed around the remaining portion.

Construction of the trash-rack structure would entail similar cofferdam configurations.. Continuous irrigation service to the Arroyo Canal is required during construction.

Additionally, it is anticipated that a temporary diversion configuration(for example, pumped bypass) would be required during construction of the Poso Canal crossing to maintain continuous irrigation service.

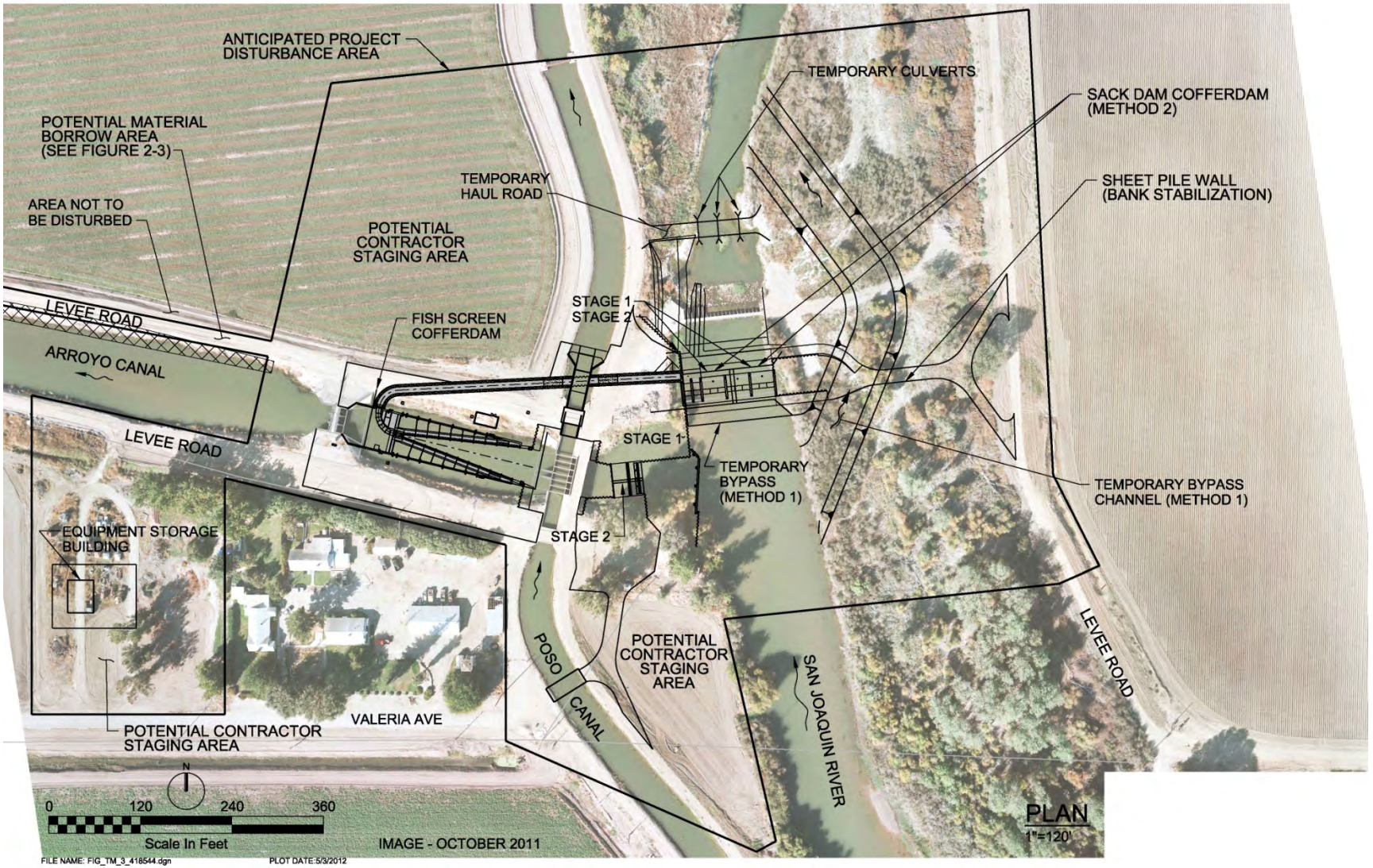

Figure 2-2.
Construction Sequencing

2.3.4 Site Access

The following roads would provide site access on the west side of SJR (roads providing access to the project site would not be upgraded):

- Highway 152 (through Merced County) to Indiana Road, south on Indiana Road (turns into Brannon Avenue at the border of Merced and Fresno counties), east on Valeria Avenue to the project site.

2.3.5 Staging Areas

Three potential construction staging areas have been identified for the contractor's use (see Figure 2-2). The contractor may make temporary surface improvements to the staging areas to accommodate all-weather use during construction. Upon completion of the Proposed Action, the staging areas would be restored to pre-project conditions.

2.3.6 Borrow Material

The Proposed Action would require approximately 9,500 cubic yards of suitable soil, primarily for backfill, behind the proposed rectangular canal and associated fish screen within the Arroyo Canal.

Following are potential borrow area sources:

- Arroyo Canal north levee (right levee facing downstream) between the Arroyo Canal Headworks and the diversion to the Temple Santa Rita Canal, approximately 3 miles long (see Figures 2-2 and 2-3)
- Offsite borrow areas with local property owners (contractor would obtain permits and approvals for such sites)
- Quarries in the general area (closest quarry is approximately 40 miles from the project site, so quarries are not preferred given the cost of hauling material)

Borrow area sources would be selected after soil samples have been obtained and evaluated during design and construction. Material hauled to the project site would be transported using the access roads previously identified.

Borrow material from the Arroyo Canal north levee would be limited to the top of the levee, as shown in Figure 2-3. The contractor would be responsible for maintaining control measures and best management practices (BMPs) to prevent material from entering the adjacent ditch. A minimum of 3 feet of freeboard would be maintained on the Arroyo Canal levee.

The local quarries previously mentioned could potentially recycle portions of the existing Sack Dam structure after it is demolished. If the material cannot be recycled, it would be disposed of as close to the project site as possible, in accordance with local, State, and federal regulations.

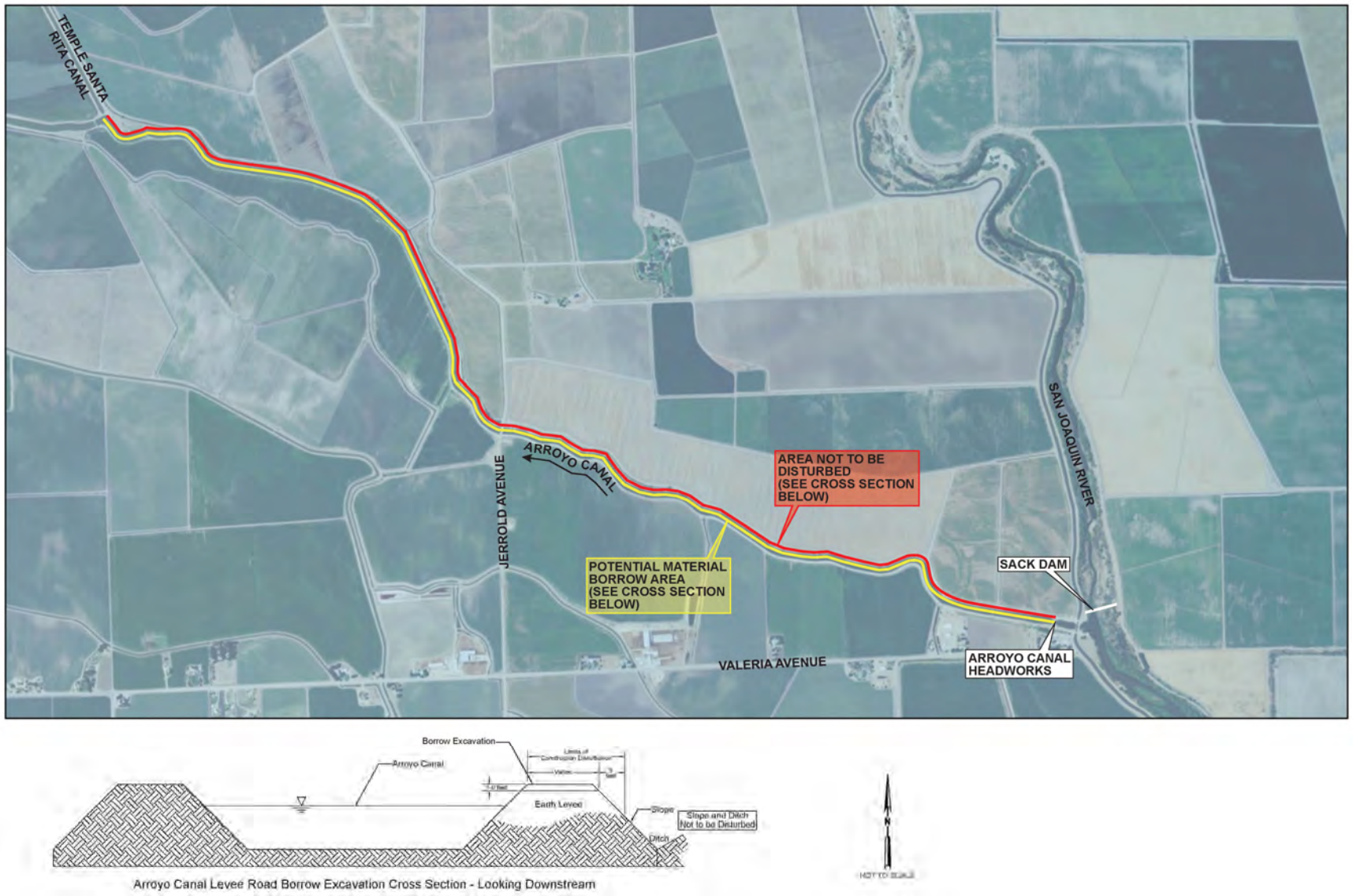

Figure 2-3.
Potential Material Borrow Area

2.3.7 Construction Equipment and Required Personnel

Construction equipment, vehicles, personnel, and materials would be staged onsite during periods of continuous use. Equipment use would be planned to optimize onsite staging and reduce offsite traffic and travel. Carpooling would be encouraged to the extent feasible. Table 2-2 lists anticipated construction equipment. Crew and pickup trucks would access the site daily throughout the construction period. Flaggers, cones, and other measures would be used to control the flow of traffic entering and leaving the site. Signs would be posted during construction, and neighbors would be notified prior to commencement of construction.

Approximately 10 to 20 workers would be onsite at any time during project construction. Construction personnel would be either local or from out of area, using hotels as necessary during the construction period.

Table 2-2.
Estimated Equipment Use for Construction

Equipment Type	Estimated Number in Use	Hours Per Day	Total Duration (weeks)
Crane	2	2 to 8	60
Drill Rig	1	4 to 8	8
Excavator	2	2 to 4	30
Concrete Truck	4	2 to 8	15
Bulldozer	2	4 to 8	5
Backhoe	1	2 to 4	60
Sheet-Pile Driver/Vibrator	1	6 to 8	15
Loader	2	2 to 4	30
Grader	1	4 to 8	10
Scraper	3	4 to 8	5
Compactor	1	4 to 8	5
Forklift	1	2 to 4	70
Onsite Haul Truck	2	2 to 4	30
Generator	1	4 to 8	97
Water Truck	1	2 to 4	97

2.4 Proposed Action/Preferred Alternative Post-Construction Operation and Maintenance Requirements

The project would preserve the historical operational philosophy for the Arroyo Canal, including SLCC's contractual diversion on SJR. HMRD would provide the daily demand for irrigation and refuge water to the San Joaquin River Exchange Contractors Water Authority Water Master. Flow in Reach 3 of the river (upstream of Sack Dam) would be determined by the San Joaquin River Exchange Contractors Water Authority Water Master, in coordination with HMRD, to provide the required diversions into the Arroyo Canal, and the RA to provide desired Restoration Flows in Reach 3 and 4 (upstream and downstream of Sack Dam, respectively). Arroyo Canal diversions will be measured at the Arroyo Canal Measuring Bridge (canal gage, approximately 850 feet downstream of Arroyo Canal Headworks) and will be automatically controlled by the existing headworks.

Maintenance of the fish screen and dam for the Proposed Action/Preferred Alternative would include removing sediment and debris in SJR (immediately upstream of Sack Dam), the Arroyo Canal approach channel, the concrete canal, and around the fish screen structure. This maintenance would generally be conducted as necessary in December and January during the low-demand period for agricultural water deliveries. Dredged material would be placed in approved areas to ensure that material does not re-enter the river.

Routine inspection of the fish screen and trash rack would be required. Large debris would be removed from the trash rack so that it does not affect entrance conditions. A small loader, such as a Bobcat, is typically used to remove sediment around the fish screen structure and within the concrete canal. This operation would require dewatering the fish screen structure by installing bulkheads in the trash-rack structure and closing the Arroyo Canal headgates. A small hydraulic dredge would be used around the fish screen structure if the Arroyo Canal cannot be dewatered and sediment removal is required. Similarly, a long-reach excavator or dredge would be required to remove sediment from SJR (immediately upstream of Sack Dam) and the Arroyo Canal approach channel.

Maintenance would also include equipment testing, equipment monitoring, and repair. Preventive maintenance and emergency and routine procedures for service continuity would be performed as necessary.

2.5 Vertical Slot Fish Ladder and Fish Bypass System Alternative

An alternative that would include a vertical slot fish ladder and fish bypass system instead of the proposed transport channel/fish ladder was also considered (see Figure 2-4). This alternative would preclude effective passage to some native fish species (excluding salmonids), including sturgeon. This alternative would include similar

improvements to Sack Dam as the Proposed Action and would have similar construction staging, equipment, and personnel. This alternative would include replacing the existing dam in its current location; thus, the dam would not be relocated upstream, as described in the Proposed Action. The additional components (instead of the transport channel/fish ladder) of this alternative include the following:

- A new vertical slot fish ladder near the west abutment of Sack Dam to accommodate fish passage upstream of the dam
- A new fish bypass system, including a bypass entrance, pump station, pipeline, and outlet structure to accommodate fish passage downstream of the dam

2.5.1 Vertical Slot Fish Ladder

Fish passage upstream of Sack Dam would be provided through a vertical slot fish ladder. The vertical slot fish ladder would be composed of a series of pools, each separated by a weir with a full-depth slot. An auxiliary water system would be incorporated into the ladder structure to provide additional attraction flow at the entrance. The auxiliary water system would be operated to maintain 1 foot of head differential from the tailwater to the entrance bay. The conceptual layout includes three entrance bays, positioned to operate in various tailwater conditions.

2.5.2 Fish Bypass System

The fish bypass system would consist of an entrance, pipeline, pump station, and outlet structure. The bypass entrance would be located at the downstream end of the fish screen structure. The entrance would use an inclined ramp to control flow through the bypass. The bypass pipe diameter would be approximately 36 inches to accommodate bypass flow velocity criteria. The bypass pump station, if required, would include fish-friendly pumps, which would be used when gravity bypass operations are infeasible because of reduced river differentials across Sack Dam. The bypass outlet structure would be located downstream of Sack Dam near the downstream end of the vertical slot fish ladder.

2.6 Vertical Slot Fish Ladder and Fish Bypass System Alternative Construction Schedule and Sequencing

The construction schedule and sequencing under the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be nearly identical to the Proposed Action.

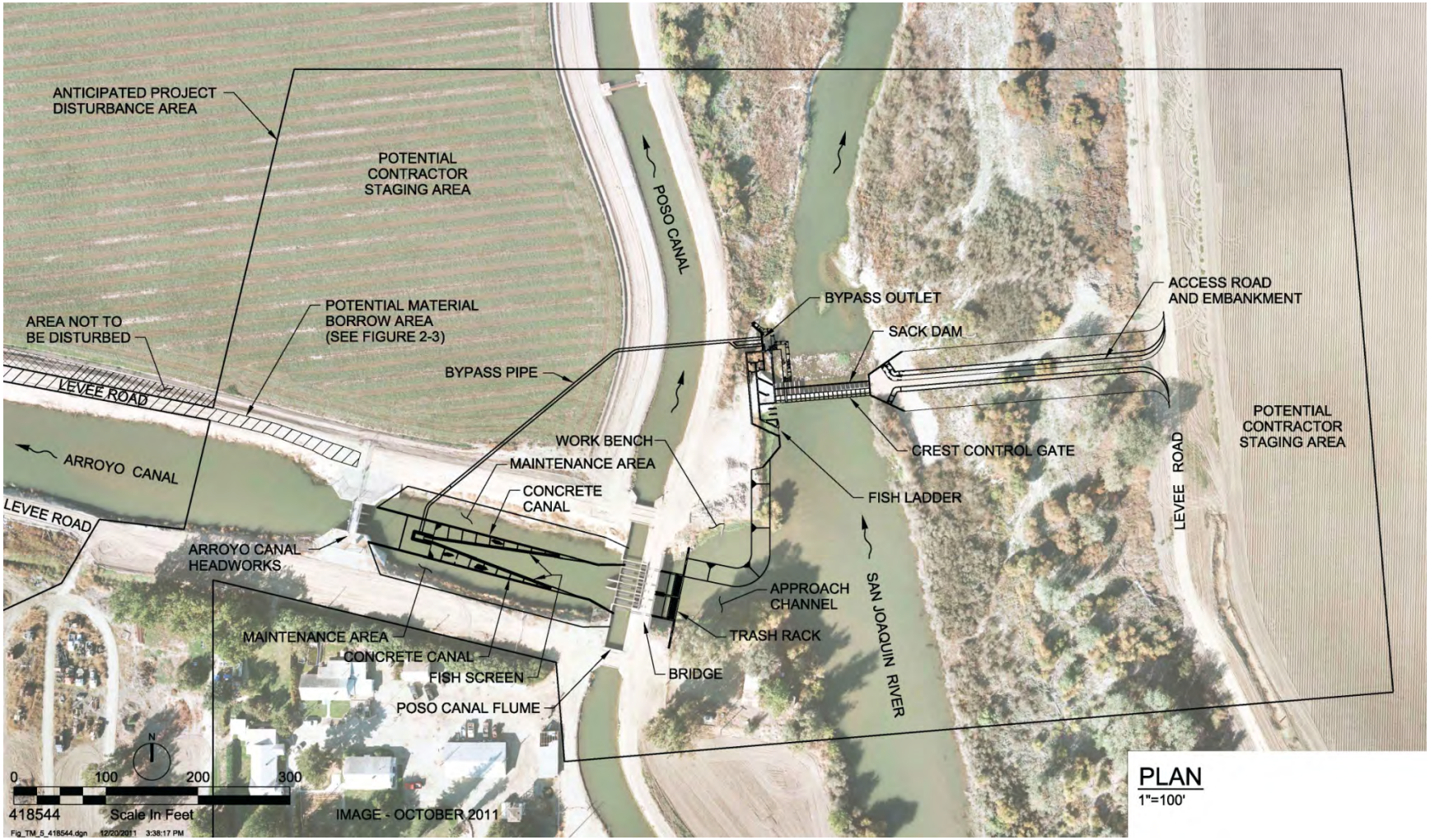

Figure 2-4.
Proposed Vertical Slot Fish Ladder and Fish Bypass System Alternative Site Plan

2.7 Vertical Slot Fish Ladder and Fish Bypass System Alternative Post-Construction Operation and Maintenance Requirements

The post-construction operation and maintenance under the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be nearly identical to the Proposed Action.

2.8 Environmental Commitments

Environmental commitments are measures or practices adopted by a project proponent to reduce or avoid adverse effects that could result from project operations. These commitments are synonymous with mitigation measures under CEQA, which are included as part of the project description. The following sections describe the environmental commitments/mitigation measures that would be conducted in coordination with implementation of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid any potentially adverse environmental consequences. These commitments are consistent with those commitments provided in the *Draft Program Environmental Impact Statement/ Environmental Impact Report for the San Joaquin River Restoration Program* (SJRRP Draft PEIS/R [Reclamation and DWR 2011]) and would serve as mitigation under CEQA.

2.8.1 Aesthetics

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential effects on aesthetics:

- **AES-1 –** Lights would be installed at the lowest allowable height and wattage, screened and directed downwards and away from residences to the highest degree possible; and the amount of nighttime lights used would be minimized to the extent possible.

2.8.2 Air Quality

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential effects on air quality (a summary of the control measures follows, and details of the measures are included in Appendix A). Additionally, Mitigation Measure AIR-1 (p. 4-27) from the SJRRP Draft PEIS/R is included in the environmental commitments identified below:

- **AQ-1** – The Proposed Action is subject to SJVAPCD Rule 9510 for compliance with the emission reduction requirements set forth in this rule. Compliance with SJVAPCD's Rule 9510 would result in a minimum

20 percent reduction in nitrogen oxide (NO_x) emissions from heavy-duty diesel equipment, compared to statewide average emissions. Implementing the SJVAPCD Rule 9510 would also reduce emissions of reactive organic gas (ROG) and particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}) exhaust from heavy-duty diesel equipment by 5 percent and 45 percent, respectively. All or part of the reductions may be based on the selection of onsite equipment and fuels. The remainder would result from offsite reductions achieved by paying fees that would be applied to other SJVAPCD programs that reduce the same pollutants, but at other sources. The actual amount of emissions subject to offsite emission reduction fee will be determined based on the procedures and fee rates in Rule 9510, when detailed construction equipment and onsite mitigation measure information becomes available.

- **AQ-2** – The Proposed Action would be implemented so as to comply with required fugitive dust control measures listed in SJVAPCD Regulation VIII: *Fugitive Dust PM_{10} 4 Prohibitions*, to minimize the fugitive dust emissions from construction activities.

- **AQ-3** – The demolition of asbestos-containing materials is subject to the limitations of the National Emissions Standards for Hazardous Air Pollutants regulations and would require an asbestos inspection. The SJVAPCD's Compliance Division would be consulted before demolition begins; however, no asbestos removal is anticipated for the project.

2.8.3 Biological Resources – Fish Species

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential effects on fish species. Additionally, Conservation Measures as listed in Table 2-7 of the SJRRP Draft PEIS/R are included in the environmental commitments identified below where appropriate:

- **FSH-1** – A qualified biologist who possesses valid authorization from DFG and/or USFWS for species handling would conduct preconstruction and construction monitoring activities throughout project implementation, inclusive of all construction phases, and as needed during all facets of the project construction. The biological monitor would also conduct worker awareness training as necessary prior to and during project construction.

- **FSH-2** – Riparian vegetation removed or damaged would be replaced or allowed an opportunity for natural recruitment, coordinated with USFWS, NMFS, or DFG, as appropriate, within the immediate area of the disturbance to maintain habitat quality. Additionally, work within areas of riparian habitats would comply with the following measures as identified in Table 2-7 of the SJRRP Draft PEIS/R (RHSNC-1):

    - Biological surveys would be conducted to identify, map, and quantify riparian and other sensitive habitats in potential construction areas.

- If effects occur on riparian habitat, emergent wetland, or other sensitive natural communities, as associated with streams, the State lead agency would comply with Section 1602 of the California Fish and Game Code.

- **FSH-3** – Prior to implementation of the project, HMRD/Reclamation would conduct an education program for all site workers relative to protected species that may be encountered within the project area, and required practices for their avoidance and protection, as included in Conservation Measure CVS-1 in Table 2-7 of the SJRRP Draft PEIS/R.

- **FSH-4** – Stockpiling of materials, including portable equipment, and vehicles and supplies, including chemicals, would be restricted to the designated construction staging areas, exclusive of any riparian and wetland areas outside the construction area.

- **FSH-5** – Sedimentation and turbidity would be avoided and minimized by implementing construction BMPs and preparing a Stormwater Pollution and Prevention Plan (SWPPP) acceptable to the Regional Water Quality Control Board (Water Board). Additionally, in-channel work would comply with appropriate measures identified in Mitigation Measure SWQ-1A as included in Chapter 14 – Hydrology of the SJRRP Draft PEIS/R (p. 14-19). See also environmental commitments GEO-1, HM/PM-2, and WR-2.

- **FSH-6** – If individuals of listed species are observed present within a project area, then NMFS, USFWS, or DFG, as appropriate, would be notified. NMFS, USFWS, or DFG personnel would have access to construction sites during construction to evaluate species presence and condition and habitat conditions, as included in Conservation Measure CVS-2 in Table 2-7 of the SJRRP Draft PEIS/R. Access to the project area by agency staff after construction would be coordinated with HMRD.

- **FSH-7** – Potential injury and mortality associated within water pile driving would be avoided or minimized by implementing the following noise-reduction measures:

    - A cofferdam would be installed around the in-channel construction area, which would be dewatered before additional pile-driving and construction activities. Fish would not have access to the construction site, and underwater sounds produced by pile driving would be attenuated. The number and size of piles would be limited to the minimum necessary to meet the engineering and design requirements of the Proposed Action.

    - A Fish Rescue Plan would be prepared and implemented during any dewatering activities that have the potential to entrain fish. The plan would include using a qualified biologist(s) to capture, remove, and relocate fish using areas to be dewatered. The plan would be provided to NMFS for approval prior to the onset of construction activities.

121 - Vibratory hammers would be used whenever feasible, with the
122 exception of impact testing for H-piles.

123 • **FSH-8** – The number and size of piles would be limited to the minimum
124 necessary to meet the engineering and design requirements of the Proposed
125 Action.

126 • **FSH-9** – The performance of the newly constructed fish screen would be
127 evaluated to make sure that the fish screen is operated and maintained in
128 accordance with acceptable fish screen performance criteria and/or
129 recommendations established during consultation with NMFS and DFG. A
130 hydraulic monitoring plan would be submitted to NMFS before completion of
131 the Proposed Action.

132 ### 2.8.4 Biological Resources – Terrestrial Species

133 The following environmental commitments have been incorporated into the Proposed
134 Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid
135 and minimize potential effects on terrestrial wildlife species. Several of the
136 environmental commitments identified below are in large part based on the Conservation
137 Measures included in Table 2-7 of the SJRRP Draft PEIS/R where appropriate:

138 • **TER-1** – To avoid and/or minimize effects on Pacific pond turtle, a qualified
139 biologist would conduct surveys in aquatic habitats to be dewatered prior to
140 dewatering and/or filling during project construction. Surveys would be
141 conducted immediately after dewatering and before fill of aquatic habitat
142 suitable for western pond turtles. If pond turtles are found, a biologist with
143 valid authorization from DFG for species handling would capture them and
144 move them to nearby DFG-approved areas of suitable habitat that would not
145 be disturbed by project construction, as also referenced in Conservation
146 Measure WPT-1 of the SJRRP Draft PEIS/R.

147 • **TER-2** – To avoid and minimize impacts on Swainson's hawk, as also
148 referenced in SWH-1 of the SJRRP Draft PEIS/R:

149 - HMRD would obtain an incidental take permit from DFG under
150 Section 2081, and would comply with the terms of the permit.

151 - Project mobilization and construction (including tree and vegetation
152 removal) would commence prior to the Swainson's hawk nesting
153 season (March 1 through September 15).

154 - Given construction activities would occur during the Swainson's hawk
155 nesting season (from March 1 through September 15), a qualified
156 biologist would conduct preconstruction surveys in and around all
157 potential nest trees within a 0.5-mile radius of the project footprint,
158 including haul routes. At least one survey would be conducted no
159 more than 2 weeks prior to the initiation of construction activities.
160 Surveys for Swainson's hawk and other special-status raptors would
161 be conducted in accordance with the *Swainson's Hawk Technical*

Advisory Committee's Recommended Timing and Methodology for SWHA Nesting Surveys (DFG 2000).

- If active nests (nests containing eggs or young) are identified within the survey area, a no-disturbance buffer zone would be established around the nest site. The width of the buffer zone would be determined by a qualified biologist in coordination with DFG. No construction activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). The buffer zone would be delineated with exclusionary fencing and flagging and/or signage as appropriate. Work would be allowed to continue as long as no abandonment behavior is noted by the biologist.
- If nesting birds are identified during preconstruction surveys, a biological monitor would be onsite during construction to address protection needs.
- If breeding Swainson's hawks (i.e., those exhibiting nest building or nesting behavior) are identified, a qualified biologist would be stationed near the nest to observe nesting and report any abandonment behavior to DFG as work continues.
- A non-disturbance distance (if determined necessary) may be modified on a case-by-case basis, with DFG approval, if a qualified biological monitor determines, through repeated observations, that the activity is not disruptive to the breeding pair. Any such nests would be monitored on a daily basis to determine whether construction activities are likely to affect nesting birds. Where disturbance to a Swainson's hawk nest cannot be avoided, such disturbance would be temporarily avoided (i.e., defer construction activities until later in the nesting cycle, such as after July 15, when the adults are less likely to abandon the nest).
- If a nest is abandoned or young fledge prematurely, due to construction activities related to the Proposed Action, HMRD would contact DFG.

- **TER-3** – To avoid and minimize impacts on western burrowing owl, as also referenced in Conservation Measures BRO-1 and BRO-2 of the SJRRP Draft PEIS/R:
  - Preconstruction surveys for burrowing owls would be conducted in areas supporting potentially suitable habitat within14 days prior to the start of project construction and again within 24 hours prior to construction, using methods identified in the *Staff Report on Burrowing Owl Mitigation* (DFG 2012a). If ground-disturbing activities are delayed or suspended for more than 2 days after the initial or previous survey, the suitable habitat would be resurveyed.

If occupied burrows are documented during preconstruction surveys, buffers would be established by a qualified biologist in coordination with DFG based on the recommended guidelines identified in the *Staff Report on Burrowing Owl Mitigation* (DFG 2012a) for activities that occur during the breeding and non-breeding season to protect reproductive and resident owls. Buffer size would range from 50 to 500 meters, depending on the level of disturbance and time of year. The level of disturbance, as defined in Environment Canada (2009), is anticipated to range from medium to high depending on timing and location of project activities, and would be verified with DFG prior to establishing buffers. Ground-disturbing activities would not occur within the buffers.

- If occupied burrows are documented and the recommended buffer distances cannot be adequately incorporated, the monitoring biologist would contact DFG and develop a plan to install one-way exit doors on the burrows to allow safe exit from the work site.

- **TER-4** – To avoid and/or minimize effects on other migratory nesting birds (including northern harrier and loggerhead shrike), as referenced in Conservation Measure MBTA-1 of the SJRRP Draft PEIS/R:

  - Tree and vegetation removal is scheduled to occur in January, prior to the nesting season. Clearing and grubbing activities are anticipated to remove most or all potential nesting areas prior to the nesting season with the exception of trees containing known raptor nests. Tree or vegetation removal activities would be avoided to the extent practicable during the nesting season for migratory birds (from February 1 to September 1).

  - If tree or vegetation removal is to occur during the nesting season, a qualified biologist would conduct a preconstruction survey within the construction area to determine the presence and absence of nesting birds. At least one survey would be conducted no more than 2 weeks prior to the onset of any construction activity. If no active nests are located, no further mitigation is necessary.

  - If active nests (nests containing eggs or young) are identified within the survey area, a no-disturbance buffer zone would be established around the nest site. The width of the buffer zone would be determined by a qualified biologist in coordination with USFWS and DFG. No construction activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). The buffer zone would be delineated with exclusionary fencing and flagging and/or signage as appropriate.

- **TER-5** – To avoid and/or minimize effects on white-tailed kite (a California fully protected species):
    - A qualified biologist would conduct preconstruction surveys in and around all potential nest trees within a 0.5-mile radius of the project footprint, including haul routes. At least one survey would be conducted no more than 2 weeks prior to the initiation of construction activities.
    - If active nests (nests containing eggs or young) are identified within the survey area, a no-disturbance buffer zone would be established around the nest site. The width of the buffer zone would be determined by a qualified biologist in coordination with USFWS and DFG. No construction activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). The buffer zone would be delineated with exclusionary fencing and flagging and/or signage as appropriate.
- **TER-6** – To avoid and/or minimize effects on western red bat:
    - If feasible, large riparian trees on the east side of SJR would not be removed during the western red bat maternity season (May 1 through August 31).
    - If large riparian trees on the east side of SJR are to be removed during the western red bat maternity season (May 1 through August 31), a roost assessment and/or surveys for roosting western red bats on the project site would be conducted by a qualified bat biologist prior to tree removal. The type of survey would depend on the condition of the potential roosting habitat, and may include the use of acoustic detectors. If no bat roosts are found, then no further study is required.
    - If evidence of western red bat use is observed, the number of bats using the roost would be determined. If active western red bat maternity roosts are determined to be present, the trees occupied by the roost would be avoided (not removed), if feasible.
    - If active maternity roosts are determined to be present and the trees occupied by the roost must be removed, the tree removal would be timed to avoid the maternity season (May 1 through August 31). A mitigation program addressing compensation and roost removal procedures would be developed in consultation with DFG prior to implementation.

2.8.5 Biological Resources – Vegetation and Wetland Species

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to prevent and minimize potential effects on vegetation and wetland species. Additionally, the

Conservation Measures as listed in Table 2-7 of the SJRRP Draft PEIS/R are included in the environmental commitments identified below where appropriate:

- **VEG-1** – A restoration plan would be developed for disturbed portions of the SJR floodplain within the study area. Disturbed portions of the river floodplain would be seeded with a mix of native grasses and forbs to prevent the establishment of nonnative invasive plant species in coordination with DFG and USFWS. Details of the restoration plan, such as seed mix composition, planting areas, and planting densities, would be developed and implemented in coordination with DFG, and would also serve to facilitate compliance with Section 1602 of the California Fish and Game Code (which may include measures to protect and/or restore affected riparian habitat), and the project's SWPPP.

- **VEG-2** – Where project effects on waters of the United States and State cannot be avoided (an estimated 1.4 acres), the lead agencies would obtain Section 404, Section 401, and Section 1602 permits and comply with permit terms. Additionally, Conservation Measures WUS-1 and WUS-2 in Table 2-7 of the SJRRP Draft PEIS/R were incorporated as appropriate into the impact analysis of Section 3.4 (Biological Resources – Vegetation and Wetland Species) of this EA/IS, which includes measures to avoid and minimize impacts on waters of the United States.

- **VEG-3** – Erosion control materials used during construction of the Proposed Action would be certified as weed-free, and only native grasses and forbs would be used for erosion control or revegetation purposes.

2.8.6 Cultural Resources

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential impacts on cultural resources:

- **CUL-1** – Prior to initiating ground-disturbing activities that have the potential to have an impact on historical and archaeological resources, any previously unexamined sections of the area of potential effects (APE) would undergo pedestrian surveys to identify archaeological resources with surface components. This survey would be conducted by cultural resources staff meeting the Secretary of Interior *Standards and Guidelines of Archaeology and Historic Preservation* (48 Federal Register 447161 as amended). If cultural resources are identified and determined eligible for listing in the National Register of Historic Places (NRHP), and it is determined that the Proposed Action would adversely affect them, the adverse effects would be resolved through the execution of a Memorandum of Agreement as outlined in the NHPA implementing regulations at 36 CFR Part 800.6. Resolution of the adverse effects may be accomplished by avoidance measures, modifications to the project, or mitigation.

- **CUL-2** – If archaeological resources are inadvertently discovered during earthmoving activities, the construction crew would immediately cease work near the find (recommended 100-foot radius, no less than 50-foot radius from location of discovery) and Reclamation's Mid-Pacific Regional Archaeologist would be called and consulted on how to proceed in accordance with regulations at 36 Code of Federal Regulations (CFR) 800.13. If additional measures to ensure avoidance of potential buried archaeological resources result from Reclamation's consultation with SHPO under Section 106, they would be determined in coordination with the SHPO during the Section 106 consultation process prior to implementation of the Proposed Action.

- **CUL-3** – In the event that human remains are discovered, the discovery would be treated in accordance with the requirements of Section 750.5(b) of the California Health and Safety Code. Pursuant to Section 7050.5(c) of the California Health and Safety Code, if the county coroner determines that the human remains are of Native American origin, then the land owner, project proponent, or authorizing entity would ensure that the discovery would be treated in accordance with the provisions of Section 5097.98(a)-(d) of the California Public Resources Code.

- **CUL-4** – Prior to initiating construction activities that have the potential to have an impact on historical and archaeological resources, the NHPA Section 106 process would be completed, which may include additional studies, and/or monitoring, avoidance measures, or the execution of a Memorandum of Agreement to resolve adverse effects as outlined in the NHPA Section 106 regulations at 36 CFR Part 800.6.

2.8.7 Environmental Justice

No environmental commitments associated with environmental justice have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

2.8.8 Geology and Soils

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential effects on geology and soils. Additionally, in-channel work would comply with and incorporates Mitigation Measure GEO-1 as identified in Chapter 10 – Geology and Soils of the SJRRP Draft PEIS/R (p. 10-32):

- **GEO-1** – To minimize the potential release of fine sediment originating from earthmoving activities during project construction, including potential soil loss induced by streambank erosion into surface waters, an SWPPP would be prepared and implemented during project construction. The SWPPP would comply with applicable federal and State regulations concerning construction activities. See also environmental commitments FSH-5, HM/PH-2, and WR-2.

2.8.9 Growth-Inducing

No growth-inducing environmental commitments have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

2.8.10 Global Climate Change

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential effects on global climate change. Compliance with Mitigation Measure CLM-1 as identified in Chapter 7 – Climate Change and Greenhouse Gas Emissions of the SJRRP Draft PEIS/R (p. 7-22) would be accomplished with the following best available information as listed below:

- **CC-1** – The following measures would be considered to lower greenhouse gas (GHG) emissions during construction. These measures combine the currently proposed mitigation measures published by Sacramento Metropolitan Air Quality Management District (2011) and Bay Area Air Quality Management District (2011):
    - Maximize fuel efficiency of construction equipment
    - Perform onsite material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines) to the extent possible
    - Use electricity from utility power lines rather than fossil fuel, where appropriate
    - Encourage construction workers to carpool
    - Reduce electricity use in the construction office by using compact fluorescent bulbs, powering off computers every day, and replacing heating and cooling units with more efficient ones as appropriate
    - Recycle construction waste and demolition debris to the maximum extent possible
    - Use locally sourced or recycled materials for construction materials to the maximum extent possible
    - Efficiently use water for adequate dust control
    - Comply with applicable future GHG regulations at the time of project-level permitting and construction

2.8.11 Hazardous Materials and Public Health Hazards

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential effects on hazardous materials and public health hazards:

- **HM/PH-1** – Hazardous materials and waste would be handled in compliance with applicable federal, State, and local laws and regulations, including licensing, training of personnel, accumulation limits and times, prevention and response to spills and releases, and reporting and recordkeeping.

- **HM/PH-2** – An SWPPP would be developed to include BMPs for the storage and use of hazardous materials and waste, and spill response procedures. Hazardous materials and waste would be stored in containers that prevent the release of material or hazardous content and within secondary containment, and spill kits would be placed throughout the study area for immediate response to spills, such as those that might occur during onsite refueling. Following initial response, follow-on investigation and cleanup to any spill would be performed in accordance with the SWPPP.

  The SWPPP would include BMPs for the handling of contaminated soil. Operators and construction personnel would be asked to report unusual conditions to the appropriate personnel. If contaminated soil is encountered during construction, the area and/or material would be properly contained during investigative actions. If soils require temporary stockpiling, piles would be placed on and covered with plastic sheeting or tarps that are secured safely with sand bags and bermed with fiber rolls or silt fencing to prevent runoff from leaving the area. Samples would be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste would be handled and properly disposed of in an authorized waste management facility. In addition, the appropriate local, State, and federal agencies would be notified. See also environmental commitments FSH-5, GEO-1, and WR-2.

- **HM/PH-3** – Hazardous materials would be stored and used in accordance with the Proposed Action's Health and Safety Plan during project operation and maintenance activities. The Health and Safety Plan would include guidelines on the storage and use of hazardous materials and spill response measures. Hazardous materials would be stored in containers that prevent the release of material or hazardous content and within secondary containment, and spill kits would be maintained throughout the project site for immediate response to spills.

- **HM/PH-4** – Transportation of hazardous materials and hazardous waste would comply with California Department of Transportation and California Highway Patrol regulations. Additionally, hazardous materials and wastes would only be transported along approved transportation routes. In the event of a vehicle accident, first responders would be notified immediately to direct emergency response requirements appropriate for the situation.

Following initial emergency response, cleanup would be performed with agency oversight in accordance with applicable regulations.

- **HM/PH-5** – Before initiating ground-disturbing activities, the project proponent would survey the project site for unknown and abandoned wells. If the survey discovers an idle or abandoned well, ground-disturbing activities would not occur within 100 feet of the well, if feasible. If ground-disturbing activities need to occur within 100 feet of the abandoned well, the project proponent would either cover, fence, or otherwise clearly mark the well location and take measures to reduce hazards to workers and/or make sure that the well has been abandoned in accordance with State and local regulations, whichever is appropriate for the site. Madera County Department of Environmental Health or Fresno County Department of Public Health, Environmental Health Division would be notified, as appropriate.

- **HM/PH-6** – HMRD/Reclamation would comply with Mitigation Measure PHH-4 as identified in Chapter 20 – Hydrology of the SJRRP Draft PEIS/R (p. 20-21), which includes workplace precautions against West Nile Virus (WNV) and Valley Fever at construction sites as follows:

    - Inspect work areas and eliminate sources of standing water that could potentially provide breeding habitat for mosquitoes. For example, eliminate uncovered upright containers that could accumulate water, and fill or drain potholes and other areas where water is likely to accumulate.

    - Conduct employee training that covers the potential hazards and risks of WNV and Valley Fever exposure and protection, including proper construction apparel. Employees would be instructed not to touch any dead birds with their bare hands.

    - Provide dust masks for worker use at construction sites during ground-disturbing activities.

    - Recommend workers use insect repellant at construction sites with a minimum of 23.8 percent diethyl-meta-toluamide.

    - Notify the appropriate county health department of dead birds seen on the construction site.

2.8.12 American Indian Trust Assets

No environmental commitments associated with American Indian Trust Assets (ITAs) have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

2.8.13 Land Use and Agricultural Resources

No environmental commitments associated with land use have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

2.8.14 Noise

No environmental commitments associated with noise have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

2.8.15 Paleontological Resources

The following environmental commitment has been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential effects on paleontological resources, as included in Mitigation Measure PAL-1 in Chapter 18 – Paleontological Resources of the SJRRP Draft PEIS/R (p. 18-11):

- **PAL-1** – If paleontological resources are discovered during earthmoving activities, the construction crew would immediately cease work near the find. In accordance with Society of Vertebrate Paleontology guidelines (Society of Vertebrate Paleontology 2010), a qualified paleontologist would assess the nature and importance of the find, and recommend appropriate salvage, treatment, and future monitoring and mitigation.

2.8.16 Public Services and Utilities

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential impacts on public utilities:

- **PUB-1** – To the extent practicable, demolished concrete would be used in conjunction with imported riprap for bank stabilization around the proposed dam. This measure would limit the amount of construction-generated waste material needing to be hauled offsite.
- **PUB-2** – To ensure that remaining waste does not exceed the permitted capacity of landfills, the proponent would implement the following, as included in Mitigation Measure UTL-4 in Chapter 24 – Utilities and Service Systems of the SJRRP Draft PEIS/R (p. 24-22):
    - Prepare an estimate of solid waste that would be generated by the action(s).
    - Maximize the recycling and/or composting of solid waste generated by the action at appropriate locations.

- Identify appropriate recycling and/or disposal locations in accordance with applicable federal, State, and local regulations pertaining to solid waste.
- Notify the operator of the recycling and/or disposal location and obtain approval for the type and amount of solid waste that would be generated by the action(s).
- If sufficient capacity is unavailable at the identified location, identify and obtain approval for disposal at another location or multiple locations.

2.8.17 Recreation

No environmental commitments related to recreation have been identified as necessary for the Proposed Action or the Vertical Slot Fish ladder and Fish Bypass System Alternative.

2.8.18 Socioeconomics

No environmental commitments related to socioeconomics have been identified as necessary for the Proposed Action or the Vertical Slot Fish ladder and Fish Bypass System Alternative.

2.8.19 Transportation and Traffic

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential impacts on transportation and traffic:

- **TRAN-1** – Prior to construction commencing, HMRD would work with local transportation planning agencies to assure cooperation with local policies regarding transportation infrastructure within the study area as required.
- **TRAN-2** – To minimize impacts on local traffic, HMRD would limit truck trips to less than 50 per hour on any affected roadway during morning and afternoon or evening peak-hour periods, as included in Mitigation Measure TRN-1 in Chapter 23 – Transportation and Traffic of the SJRRP Draft PEIS/R (p. 23-19).

2.8.20 Water Resources

The following environmental commitments have been incorporated into the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative to avoid and minimize potential impacts on water resources:

- **WR-1** – As described in environmental commitment VEG-2, the lead agencies would obtain Section 404, Section 401, and Section 1602 permits and comply with permit terms. Additionally, conservation measures WUS-1 and WUS-2 in Table 2-7 of the SJRRP Draft PEIS/R are included by

reference, which includes measures to avoid and minimize impacts on waters of the United States.

- **WR-2** – Construction and operations and maintenance activities associated with action alternatives would be subject to construction-related stormwater and other water quality-related permit requirements. The lead agencies would obtain any required permits before any ground-disturbing activities. The contractor, Reclamation, and HMRD would confirm that the SWPPP is kept on the project site and that water quality standards are followed. Following the completion of construction activities, disturbed areas would be stabilized and revegetated as required. See also environmental commitments FSH-5, GEO-1, and HM/PH-2.

- **WR-3** – To maintain continuous irrigation service to Arroyo Canal, cofferdams would be constructed around the fish screen and trash-rack structures to allow construction in the dry. Additionally, if construction occurs outside of the scheduled maintenance period for Poso Canal, it is anticipated that a temporary diversion would be used during construction of the crossing to maintain continuous irrigation service.

2.9 Alternatives Considered and Eliminated

Two alternatives were considered and eliminated, both of which would involve constructing a new canal from the Mendota Pool (which would require relocating HMRD's point of diversion from the main flow channel of SJR at Sack Dam) and making significant modifications to existing conveyance infrastructure to deliver water at flows up to 700 cfs to the head of the Arroyo Canal. The canal alignment alternatives were defined by the Main Canal, Poso Canal, and Parsons Canal, which are owned and operated by the Central California Irrigation District (CCID). Neither of the alternatives would meet the purpose and need of the project, which includes screening the Arroyo Canal to prevent entrainment of anadromous fish and modifying Sack Dam to enable the fish passage specified in the Settlement Phase 1 improvements. Additional reasons for elimination include the following:

- Subsidence is a known issue near the considered canal alignments, which presents a serious problem for gravity conveyance systems and related infrastructure. U.S. Geological Survey maps showing lines of equal subsidence during the period from 1926 to 1972 indicate subsidence ranging from 2 to 6 feet in the proximity of the Mendota Dam, City of Firebaugh, and, to a lesser extent, the Sack Dam. Information provided by CCID indicates that the Delta-Mendota Canal and Outside Canal, which parallel the Main Canal (considered canal alignment), have subsidence-related, diminished conveyance capacity of about 15 and 50 percent, respectively.

- Substantial property acquisition would be unavoidable along the entire length (approximately 20 miles) of the two canal alignments considered. A significant amount of time, effort, negotiation, and funding would be required to acquire temporary and permanent easements.

- Substantial modifications and/or complete replacement of existing infrastructure (for example, canals, in-line conveyance structures, bridges, groundwater wells, and utilities) would be required.
- Water quality is important to SLCC customers, which include State and federal wildlife refuges. The water delivered to the head of the Arroyo Canal would be of lesser quality than is available through HMRD's current diversion because CCID water originates from various return water sources (for example, tile water, well water, and tailwater).
- Water supply reliability and operational flexibility could be compromised because the improved conveyance system would be shared with CCID.
- Ultimately, CCID would own the facilities rather than HMRD.
- Significant constructability issues would be encountered to maintain continuous water supply for irrigation service during construction for CCID customers, such as bypass channels and control structures.
- The project implementation period would be significantly longer than required to implement the Arroyo Canal and Sack Dam improvements stipulated in the Settlement. A project of this size, with the significant constructability and property acquisition requirements described, would take at least 6 years to complete.
- The total capital cost would be significantly higher (approximately 10 times the cost of the Proposed Action) than required to implement the Arroyo Canal and Sack Dam improvements stipulated in the Settlement.

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3.0 Affected Environment and Environmental Consequences

This section provides detailed descriptions of the physical environment and existing conditions that could be affected by the Proposed Action, as well as the environmental consequences anticipated from construction and operation of the Proposed Action, the Vertical Slot Fish Ladder and Fish Bypass System Alternative, and the No-Action Alternative, consistent with NEPA and CEQA Guidelines. Construction sequencing in the Proposed Action for the new dam and the trash rack describes two methods of construction (see Section 2.3.3). The impact analysis for each resource area analyzes the potential impacts related to both construction methods. Although this section is titled "Affected Environment" for the purposes of NEPA, it also constitutes the "Environmental Setting" required under CEQA. Additionally, the "Environmental Consequences" are described as such for the purposes of NEPA and are synonymous with "Environmental Impacts" under CEQA.

Each resource area evaluated in this section also includes an analysis of cumulative effects resulting from all past, present, and reasonably foreseeable future projects as required by NEPA and CEQA implementing regulations. Cumulative impacts are defined in the State CEQA Guidelines (14 California Code of Regulations Section 15355) as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." A cumulative impact occurs from "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (14 California Code of Regulations Section 15355(b)).

Actions considered in the cumulative effects analyses include those actions that were identified in the SJRRP Draft PEIS/R, as well as all other known projects that are, or have the potential to, occur within the general project area. These actions include the following:

- Past and present conversion of natural vegetation to agricultural and developed land uses
- Past and present introduction of nonnative plant and animal species
- Past and present resource extraction (such as mining)
- Past and present Central Valley Project operations and local water development actions
- Other SJRRP actions

- Two Gates fish protection demonstration project
- Conveyance of Refuge Water Supply, South San Joaquin Valley Study Area, Mendota Wildlife Area
- San Joaquin River Salinity Management Plan, San Joaquin River Water Quality Improvement Project
- CALFED Ecosystem Restoration Program
- Comprehensive Conservation Management Plans for National Wildlife Refuges
- Habitat Management Preservation and Restoration Plan for Suisun Marsh
- Jensen River Ranch Habitat Enhancement and Public Access Project
- Lost Lake Park Master Plan
- Millerton Lake Resource Management Plan/General Plan
- Peoria Wildlife Management Area
- Riparian Habitat Joint Venture
- Brighton Crest
- Gunner Ranch West Specific Plan
- Ventana Annexation
- Gateway Village Specific Plan
- USACE Levee Vegetation Policy
- Fresno County General Plan
- Madera County General Plan Policy Document
- Merced County General Plan
- City of Fresno General Plan

3.1 Aesthetics

3.1.1 Environmental Setting

Existing Visual Character

The study area is characterized by SJR and its riparian corridor meandering through a flat patchwork of agricultural fields. The study area is accessed by Valeria Avenue on the western, Fresno County, side of the river. The Poso Canal runs roughly parallel to SJR through the study area, and the Arroyo Canal is roughly perpendicular to the river (see Figure 3.1-1, Photograph 1). The existing diversion structures along Arroyo Canal and the existing Sack Dam across the river are anthropogenic features present within the landscape that detract from the intactness and unity of the agricultural landscape (see Figure 3.1-1, Photograph 2). SJR is bounded by a thin riparian corridor that separates the river from the adjacent agricultural fields.

As described in the SJRRP Draft PEIS/R (Reclamation and DWR 2011), the study area has low vividness,[1] because it is common to views associated with the river and lacks distinctive features. The intactness[2] and unity[3] are low to moderate because of views of the diversion structures on the river and canals combined with the presence of the river and riparian corridor, and adjacent agricultural landscape. The overall visual quality in this reach is moderate (Reclamation and DWR 2011).

Viewer Groups

Viewer groups of the Proposed Action include residents living in the homes along Valeria Avenue, farm workers, and recreationists accessing the study area. Although the study area can be accessed by county roads, the private property owners preclude public access to the area. Still, recreationists occasionally use the levees to take walks, to walk their animals, and to fish in the river; swimming is likely; and evidence of hunting is present. However, as discussed in Section 3.14, Recreation, the study area contains private lands that do not allow recreational uses, because such uses are unsanctioned.

[1] *Vividness* is the visual power or memorability of landscape components, as they combine in striking or distinctive visual patterns.

[2] *Intactness* is the visual integrity of the natural and human-built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as natural settings.

[3] *Unity* is the visual coherence and compositional harmony of the landscape considered as a whole; it frequently attests to the careful design of individual components in the artificial landscape (Federal Highway Administration 1988).

The nearest permanent residence is adjacent to the study area, at the end of Valeria Avenue. Diversion structures are common visual elements in the landscape, and farming practices include the use of heavy machinery.

Photograph 1: View looking north toward the Poso Canal, bridge over the Poso Canal, and San Joaquin River, near the north end of the Poso Canal flume.

Photograph 2: View looking northwest toward the Arroyo Canal Headworks from the bridge over the Arroyo Canal, near the middle of the Poso Canal flume.

Figure 3.1-1.
Representative Photographs of Study Area

3.1.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An impact on visual resources would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Have a substantial adverse effect on a scenic vista
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway
- Substantially degrade the existing visual character or quality of the site and its surroundings
- Create a new source of substantial light or glare that would adversely affect day or nighttime public views

No scenic vistas or scenic highways are within proximity to the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative, resulting in no impact on these resources. Therefore, these resources are not discussed further in this EA/IS.

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.1 (Environmental Commitments, Aesthetics) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

The concepts presented above are combined in an aesthetic impact assessment process, which involves identification of the following:

- Visual character and quality of the study area
- Relevant policies and concerns for protection of visual resources
- General visibility of the study area and site using descriptions and photographs
- Viewer response and potential impacts

No-Action

Under the No-Action Alternative, existing site features would remain, and there would not be any vegetation removal, construction, or new site features. In addition, ongoing maintenance and repair activities would continue, so there would be no impact on aesthetic resources.

Proposed Action

Construction.

Impact AES-1: Temporary visual impacts caused by construction activities. As previously noted, the construction schedule would preclude the use of high-intensity lighting needed for nighttime construction.

Construction of the Proposed Action would create temporary changes in views of and from the study area. Construction activities would introduce considerable heavy equipment and associated vehicles, including dozers, graders, backhoe, compactor, scrapers, cranes, and trucks, into the viewshed of nearby seasonal residents, farm workers, and recreationists. However, heavy equipment and machinery is a common visual element in this landscape, because it is used in agricultural operations. As described in Section 3.1.1, viewer groups include residents living in the homes along Valeria Avenue, farm workers, and recreationists accessing the study area (though recreational uses are unsanctioned). The nearest residence is adjacent to the study area, and private property owners preclude public access to the area. As such, a low sensitivity for visual impacts in this area is present. Vegetation removal on the east riverbank would also negatively impact the existing visual character. However, as stated in Section 2.8.5 (Environmental Commitments, Biological Resources – Vegetation and Wetland Species), environmental commitment VEG-1, a restoration plan would be developed for disturbed portions of SJR that includes reseeding with a mix of native grasses and forbs and replanting the disturbance area with Fremont cottonwood and black willow cuttings. ***Therefore, this impact would be less than significant.***

Operation.

Impact AES-2: Degrade the existing visual character or quality of the site and its surroundings during operation. New project features, would require periodic maintenance and inspection of the fish screen and dam that would include annual sediment and debris removal around those features during the low-demand period in December and January. Sediment removal would require dewatering the fish screen facility and the use of a small Bobcat loader, or similar equipment, to remove sediment around the fish screen structure and within the concrete canal. A long-reach excavator or dredge would also be required to remove sediment from the river immediately upstream of new Sack Dam and the Arroyo Canal approach channel. These activities would be similar to existing maintenance activities. Additionally, the Proposed Action is consistent with the existing visual character of the study area; therefore, ***visual impacts resulting from maintenance and operation of new facilities would be less than significant.***

Impact AES-3: Create a new source of light or glare during operation. Workbench areas and the control and equipment storage buildings may be lit for safety purposes. Implementation of environmental commitment AES-1 would reduce the potential for glare resulting from the Proposed Action. ***Therefore, this impact would be less than significant.***

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

Environmental commitments, as included in Section 2.8, would help to reduce adverse visual effects resulting from past, present, and reasonably foreseeable future projects by vegetative and topographic screening of structures, and through the use of other measures such as limiting glare and light spill/glow, and appropriately designing buildings. Because the impacts associated with the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative are considered less than significant, they would not result in a cumulatively significant contribution to visual impacts.

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3.2 Air Quality

3.2.1 Environmental Setting

Local Meteorological Conditions

The rate and location of pollutant emissions and the meteorological conditions that influence movement and dispersal of pollutants in the atmosphere affect air quality. Atmospheric conditions, such as wind speed, wind direction, and air temperature gradients, along with local topography, provide the link between air pollutant emissions and local air quality levels.

Elevation and topography can affect localized air quality. The hills and mountains surrounding the San Joaquin Valley restrict air movement through and out of the majority of the basin. The San Joaquin Valley Air Basin (SJVAB) encompasses the southern two-thirds of California's Central Valley. Mountain ranges border the sides and southern boundary of the bowl. The valley's weather conditions include frequent temperature inversions; long, hot summers; and stagnant, foggy winters, all of which are conducive to forming and retaining air pollutants (SJVAPCD 2009a).

The SJVAB is typically arid in the summer, with cool temperatures and prevalent tule fog (such as, a dense ground fog) in the winter and fall. The average high temperature in the summer is in the mid 90s, and the average low temperature in the winter is in the high 40s. January is typically the wettest month of the year, with an average of about 2 inches of rain. Wind direction is typically from the northwest, with speeds around 30 miles per hour (Western Regional Climate Center 2009).

Local Air Quality and Attainment Status of Study Area

The U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) for the following air pollutants (termed "criteria" pollutants): carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter defined as PM_{10}, fine particulate matter defined as particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$), and lead. NAAQS represent the pollutant safety levels required to avoid specific adverse health effects associated with each pollutant. California has also established ambient air quality standards, known as the California Ambient Air Quality Standards (CAAQS), which are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles. The current NAAQS, CAAQS, and regulatory settings related to air quality are presented in Appendix B.

The California Air Resources Board (CARB) maintains ambient air monitoring stations for criteria pollutants throughout California. The stations closest to the project site are the Pump Yard and 28261 Avenue 14 monitoring stations in Madera County, and M Street and Coffee Street stations in Merced County. These stations monitor NO_2, O_3, PM_{10}, and $PM_{2.5}$, but do not monitor CO and SO_2. Exceedances of the NAAQS and

CAAQS, primarily for O_3 and particulate matter, have been recorded in the past 3 years at these stations (CARB 2012a).

Both USEPA and CARB designate each county (or portions of counties) within California as attainment, maintenance, or nonattainment based on the area's ability to maintain ambient air concentrations below the air quality standards. Table 3.2-1 shows the designation status of the SJVAB for each criteria pollutant.

Table 3.2-1.
Federal and State Attainment Status of the Study Area

Pollutant	Federal Classification	State Classification
O_3	Nonattainment (Extreme)	Nonattainment
PM_{10}	Maintenance	Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
CO	Urban portion of Fresno County: Maintenance Remaining basin: Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

Sources: USEPA 2012; CARB 2012b.
Key:
CO = carbon monoxide
NO_2 = nitrogen dioxide
O_3 = ozone
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
SO_2 = sulfur dioxide

Under NAAQS, the SJVAB is currently designated as nonattainment for 8-hour O_3, the 1997 $PM_{2.5}$ standard (annual standard of 15 micrograms per cubic meter [$\mu g/m^3$] and 24-hour standard of 65 $\mu g/m^3$), and the 2006 24-hour $PM_{2.5}$ standard (35 $\mu g/m^3$). The SJVAB is a maintenance area for PM_{10}, and the Fresno Urbanized Area is a maintenance area for CO. The SJVAB is designated as attainment for the NO_2 and SO_2, and unclassified for lead.

Under CAAQS, the SJVAB is currently designated as nonattainment for 1-hour O_3, 8-hour O_3, PM_{10}, and $PM_{2.5}$. The SJVAB is designated as an attainment/unclassified area for the State CO standard and an attainment area for the State NO_2, SO_2, and lead standards. The SJVAB is an unclassified area for the State hydrogen sulfide standard and the visibility-reducing particle standard; it is an attainment area for sulfates and vinyl chloride.

Asbestos

Madera and Fresno counties are designated by California Department of Conservation (CDC) Division of Mines and Geology as areas likely to contain naturally occurring asbestos (NOA). However, the specific locations of the counties where the study area occurs are in areas designated not likely to contain NOA (CDC Division of Mines and Geology 2000).

3.2.2 Environmental Consequences

Significance Criteria

General Conformity. The General Conformity Rule applies to all federal actions, except for those addressed by the Transportation Conformity Rule. The General Conformity Rule is used to determine if federal actions meet the requirements of the Clean Air Act (CAA) and the applicable state implementation plan by ensuring that air emissions related to the action do not result in the following:

- Cause or contribute to new violations of NAAQS
- Increase the frequency or severity of any existing violation of NAAQS
- Delay timely attainment of NAAQS or interim emission reduction

Conformity regulatory criteria are listed in 40 CFR 93.158. To determine whether federally funded projects are subject to detailed general conformity determination requirements, USEPA has established general conformity de minimis threshold values (in tons per calendar year) for each of the criteria pollutants for each type of designated nonattainment and maintenance area. If the emissions generated by construction or operation of a project are less than the de minimis threshold values, the impacts of the project are not considered to be significant, and no additional analyses are required. If the emissions are greater than these values, compliance with the General Conformity Rule must be demonstrated.

The study area is in an area designated by USEPA as extreme nonattainment for the 8-hour O_3 standard, nonattainment for $PM_{2.5}$, and maintenance for PM_{10}, and maintenance for CO in an urbanized area in Fresno County. Although the study area is located in rural areas of Fresno County, to be conservative, CO emissions were evaluated as if the Proposed Action would be in the maintenance area. The general conformity de minimis threshold values for the area, according to 40 CFR Part 93, are 10 tpy for volatile organic compounds (VOCs), 10 tpy for NO_x, and 100 tpy for SO_2, $PM_{2.5}$, PM_{10}, and CO. Table 3.2-2 presents the de minimis thresholds applicable for the Proposed Action.

California Environmental Quality Act Thresholds. The Proposed Action is also subject to evaluation under CEQA. An impact on air quality would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Conflict with or obstruct implementation of the applicable air quality plan
- Exceed or contribute to an exceedance of any air quality standard or contribute substantially to an existing or projected air quality violation
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or State ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)
- Expose sensitive receptors to substantial pollutant concentrations
- Create objectionable odors affecting a substantial number of people

Table 3.2-2.
General Conformity De Minimis Thresholds Applicable to the Proposed Action

Pollutant	Federal Attainment Status	Threshold Values (tpy)[1]
NO_2	Attainment	NA
Ozone Precursor (Nitrogen Oxides [NO_x])[2]	Nonattainment: Extreme	10
Ozone Precursor (VOC)[2]	Nonattainment: Extreme	10
CO[3]	Maintenance	100
Sulfur Oxides (SO_x)	Attainment	NA
$PM_{2.5}$	Nonattainment	100
$PM_{2.5}$ Precursor (SO_2)	Nonattainment	100
PM_{10}	Maintenance	100
Lead	No Designation	NA

Source: USEPA 2012.
Notes:
[1] Thresholds from 40 CFR Parts 51 and 93.
[2] Ozone reclassifications were made by USEPA on May 5, 2010. VOC is assumed to be the same as ROG.
[3] Only the urban portion of Fresno County is a maintenance area for CO.
Key:
CO = carbon monoxide
NA = not applicable
NO_2 = nitrogen dioxide
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
ROG = reactive organic gas
SO_2 = sulfur dioxide
tpy = tons per year
VOC = volatile organic compound

The SJVAPCD *Guide for Assessing and Mitigating Air Quality Impacts* (SJVAPCD 2002) contains emissions thresholds used to evaluate the significance of a project's emissions. If a project's emissions are below the significance thresholds, impacts would be considered less than significant; if either the construction or operation emissions are greater than these values, impacts for that project phase would be considered significant. Table 3.2-3 presents the SJVAPCD significance thresholds for CEQA analysis. In this analysis, ROG is assumed to be equivalent to VOC.

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.2 (Environmental Commitments, Air Quality) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

Construction. Construction of the Proposed Action was assumed to occur between February 2013 and October 2014. Exhaust emissions are expected from construction worker commute vehicles, delivery trucks, and off-road construction equipment. These emissions would primarily consist of CO, NO_x, PM_{10}, $PM_{2.5}$, SO_2, and ROGs. In addition, vehicle travel on unpaved roads would result in fugitive dust emissions.

Table 3.2-3.
San Joaquin Valley Air Pollution Control District California Environmental Quality Act Construction and Operational Thresholds of Significance

Pollutant	Thresholds (tpy)
NO_x	10
Reactive Organic Gases (ROGs)	10
PM_{10}	15
$PM_{2.5}$	15

Sources: SJVAPCD 2002; Barber 2012.
Key:
NO_x = nitrogen oxide
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
tpy = tons per year

The off-road construction equipment emissions of NO_x, SO_2, PM_{10}, $PM_{2.5}$, CO, and ROG from project construction were estimated using CARB's URBEMIS2007 model (CARB 2007a) based on the project-specific construction schedule and estimated equipment type and usage. URBEMIS output files, included in Appendix C, contain detailed assumptions used in the URBEMIS modeling.

Emissions associated with workers' commute, onsite working vehicles, and material hauling trucks were estimated based on anticipated number of trips and vehicle miles traveled by each type of vehicle. Vehicle emission factors were modeled using the EMFAC2007 program (CARB 2007b) for the SJVAPCD vehicle fleet for calendar year 2013 and 2014. The EMFAC2007 emission factors for passenger cars and heavy-duty diesel trucks were used to calculate workers' commute emissions and material hauling truck emissions, respectively. Onsite working vehicles were assumed to be light-duty trucks.

Fugitive dust emissions may occur from construction equipment movement and vehicle travel on unpaved roads. The URBEMIS default fugitive dust emission factor of 10 pounds per day per acre of disturbed surface was used to estimate the fugitive PM_{10} emissions from construction activities. Fugitive dust emissions from vehicle travel on unpaved roads were estimated using the equation in Appendix B of the URBEMIS2007 User's Guide (Jones & Stokes Associates 2007). Vehicle re-entrained dust from paved roads was assumed to be negligible because of the limited trips and distance traveled by haul trucks during the construction period.

Appendix C presents details of the assumptions and emission calculation methodologies.

Operation. Operation emissions would be minimal, generated mostly from the operation of off-road equipment and on-road maintenance vehicle for facility maintenance. Off-road equipment and on-road vehicle emissions were estimated using the same methodologies as construction emissions.

No-Action

Under the No-Action Alternative, project construction activities would not occur, and the operation of the facilities would be similar, as compared to current maintenance activities. Dredging and repair of the east side of the channel would continue to occur as needed. Repair of the east side of the river channel would require the use of heavy equipment for 2 to 3 days per occurrence. As such, small amounts of criteria pollutants, and fugitive dust would occur during these periods; however, the emissions would be temporary and minimal and would not exceed current SJVAPCD thresholds.

Proposed Action

Construction. The project construction site is located in rural area in Fresno and Madera counties, surrounded by agricultural land use. The closest town is located about 7 miles away. The only few isolated residences near the construction site are located more than 1,000 feet from the construction areas. Construction of the Proposed Action is not expected to expose sensitive receptors to substantial pollutant concentrations or create objectionable odors affecting a substantial number of people.

Impact AQ-1: Exceed or contribute to an exceedance of any air quality standard or contribute substantially to an existing or projected air quality violation. Short-term air emissions, including CO, NO_x, ROGs, $PM_{10,}$ $PM_{2.5}$, and toxic air contaminants such as diesel exhaust particulate matter, would occur during the construction phase for the Proposed Action. In addition, there would be fugitive particulate emissions generated by excavation, grading, hauling, and various other surface disturbing activities. Tables 3.2-4 and 3.2-5 list the summaries of the estimated construction emissions in 2013 and 2014 for the Proposed Action.

Table 3.2-4.
Estimated Construction Emissions for Proposed Action – Construction 2013

Emission Source	ROG (tpy)	CO (tpy)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Off-Road Equipment Exhaust	0.52	2.44	4.41	0.000	0.21	0.19
Haul Truck/Working Vehicle Exhaust	0.03	0.16	0.46	0.001	0.02	0.02
Worker Commute Exhaust	0.00	0.14	0.01	0.000	0.00	0.00
Fugitive Dust	NA	NA	NA	NA	2.12	0.34
2013 Total Construction Emissions	0.55	2.74	4.87	0.001	2.35	0.55
SJVAPCD CEQA Threshold	10	NA	10	NA	15	15

Key:
CEQA = California Environmental Quality Act
CO = carbon monoxide
NA = not applicable
NO_x = nitrogen oxide
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
ROG = reactive organic gas
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_2 = sulfur dioxide
tpy = tons per year

Table 3.2-5.
Estimated Construction Emissions for Proposed Action – Construction 2014

Emission Source	ROG (tpy)	CO (tpy)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Off-Road Equipment Exhaust	0.33	1.67	2.76	0.000	0.13	0.12
Haul Truck/Working Vehicle Exhaust	0.02	0.11	0.32	0.001	0.01	0.01
Worker Commute Exhaust	0.00	0.10	0.01	0.000	0.00	0.00
Fugitive Dust	NA	NA	NA	NA	1.56	0.25
2014 Total Construction Emissions	0.35	1.88	3.09	0.001	1.71	0.38
SJVAPCD CEQA Threshold	10	NA	10	NA	15	15

Key:
CEQA = California Environmental Quality Act
CO = carbon monoxide
NA = not applicable
NO_x = nitrogen oxide
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
ROG = reactive organic gas
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_2 = sulfur dioxide
tpy = tons per year

As shown in Tables 3.2-4 and 3.2-5, construction emissions would be below the SJVAPCD emissions thresholds. Therefore, project construction emissions are not expected to cause new violation to NAAQS or CAAQS, or contribute substantially to an existing or projected air quality violation. ***This impact would be less than significant.***

Although NOA is not likely to occur during construction, strict compliance with existing asbestos regulations, as depicted in environmental commitment AQ-3, would prevent asbestos from being a significant impact under CEQA (SJVAPCD 2002) or a substantial impact under NEPA.

Operation.

Impact AQ-2: Exceed or contribute to an exceedance of any air quality standard or contribute substantially to an existing or projected air quality violation. Operation of the Proposed Action would require one or two vehicle trips per year for facility maintenance and the occasional use of dredging equipment and a portable emergency generator. Project operation would not require other additional combustion sources or additional workers. Routine maintenance is anticipated to occur up to twice per year, and the emergency generator would not be used, except during required testing or in case of a power outage.

As shown in Table 3.2-6, operation emissions are expected to be minimal, and would be below the SJVAPCD CEQA thresholds. Project operation emissions are not expected to cause new violation to NAAQS or CAAQS, or contribute substantially to an existing or projected air quality violation. ***This impact would be less than significant.***

Table 3.2-6.
Estimated Operation Emissions for Proposed Action

Emission Source	ROG (tpy)	CO (tpy)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Off-Road Equipment Exhaust	0.0033	0.0161	0.0263	0.0000	0.0013	0.0012
On-Road Vehicles	0.0000	0.0002	0.0008	0.0000	0.0000	0.0000
Emergency engine	0.0012	0.0306	0.0207	0.0000	0.0001	0.0001
Annual Operation	0.005	0.047	0.048	0.000	0.001	0.001
SJVAPCD CEQA Threshold	10	NA	10	NA	15	15

Key:
CEQA = California Environmental Quality Act
CO = carbon monoxide
NA = not applicable
NO_x = nitrogen oxide
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
ROG = reactive organic gas
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_2 = sulfur dioxide
tpy = tons per year

General Conformity Applicability Analysis. The Proposed Action is located in an area designated as extreme nonattainment for the 8-hour O_3 standard, nonattainment for $PM_{2.5}$, maintenance for PM_{10}, and maintenance for CO in an urbanized area in Fresno County. The Proposed Action is subject to general conformity rule requirements. In accordance with 40 CFR 93.153 (b), the applicable general conformity de minimis levels for the Proposed Action are 10 tons per year (tpy) for emissions of O_3 precursors (VOCs and $NO_{x)}$, 70 tpy for PM_{10}, and 100 tpy for $PM_{2.5,}$ SO_2 (precursor of $PM_{2.5}$), and CO.

Table 3.2-7 summarizes annual emissions due to the project construction and operation for each calendar year, as compared to the general conformity de minimis levels. As shown in Table 3.2-7, annual emissions during project construction and operation would be below the de minimis levels, and construction and operation of the Proposed Action would comply with the general conformity requirements and would have less than significant impacts on air quality. Further demonstration of conformity is not required.

Table 3.2-7.
Estimated Operation Emissions for Proposed Action

Emission Source	VOC (tpy)	CO (tpy)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
2013 (construction)	0.55	2.74	4.87	0.00	2.35	0.55
2014 (construction)	0.35	1.88	3.09	0.00	1.71	0.38
2015 and beyond (operation)	0.00	0.05	0.05	0.00	0.00	0.00
General Conformity De Minimis Threshold	10	100	10	100	100	100

Key:
CO = carbon monoxide
NO_x = nitrogen oxide
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
SO_2 = sulfur dioxide
tpy = tons per year
VOC = volatile organic compound

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

General Conformity Applicability Analysis. Construction emissions and operation emissions are expected to be similar to the Proposed Action for each calendar year for the Vertical Slot Fish Ladder and Fish Bypass System Alternative (see Table 3.2-7). Emission of each pollutant is expected to be less than the relevant general conformity applicability de minimis level for this alternative. Therefore, the Vertical Slot Fish Ladder and Fish Bypass System Alternative complies with the general conformity requirements and would have less than significant impacts on air quality. Demonstration of conformity is not required.

Cumulative Effects

SJVAPCD adopted a cumulative threshold of significance of 10 tpy for O_3 precursors (VOC and NO_x) and 15 tpy for PM_{10} and $PM_{2.5}$ (SJVAPCD 2002; Barber 2012). Construction emissions of these pollutants associated with the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be temporary and below these thresholds; therefore, the project construction emission impacts are not considered cumulatively significant.

Additionally, operation of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative requires minimal periodic maintenance activities. Emissions associated with project operation would be considerably lower than CEQA significance thresholds for cumulative impacts. Therefore, emissions from operation of the Proposed Action would not be expected to have a cumulatively significant impact on air quality.

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3.3 Biological Resources – Fish Species

This section provides the environmental and regulatory settings for fisheries resources, and analyzes the potential for fish in SJR in the immediate vicinity of the study area to be affected by implementation of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

3.3.1 Environmental Setting

Study Area

The study area for this EA/IS includes areas that may be affected directly, indirectly, or cumulatively by the Proposed Action. For the purposes of this EA/IS, the study area includes all areas of the Proposed Action described in the Section 2.0, Description of Alternatives.

San Joaquin River. Immediately upstream of Sack Dam (Reach 3), SJR is confined by local dikes and canals on both banks. The sandy channel meanders through a predominantly agricultural area, except where the City of Firebaugh borders the river's west bank. The river at this location has a low stage but is perennial and supports a narrow riparian corridor along the edge of the river channel.

Immediately downstream of Sack Dam (Reach 4), the river is sand-bedded and usually dewatered, with the exception of flood flows in wet years. The upstream portion of Reach 4 starting at Sack Dam (Subreach 4A) is bounded by canals and local dikes down to the Sand Slough control structure near Merced Wildlife Refuge. The floodplain of Reach 4A is broad, with levees set back from the active channel. The subreach is sparsely vegetated, with a thin and discontinuous band of vegetation along the channel margin. This subreach has the fewest functioning stream habitat types and the lowest ratio of natural vegetation per river mile in the Restoration Area (SJRRP 2010).

High fish predation rates are known to occur below small dams, such as Sack Dam (SJRRP 2010). As fish pass over small dams, they are subject to conditions that may disorient them, making them highly susceptible to predation by fish or birds. In addition, deep pools tend to form immediately downstream from such dams, creating conditions that promote congregation of Sacramento pikeminnow, striped bass, and other predatory fish (Reclamation and DWR 2011).

Arroyo Canal. Arroyo Canal is an unlined trapezoidal channel; small portions are paved where there are structures such as bridges and headworks (SJRRP 2011a). The Arroyo Canal is largely devoid of aquatic and riparian habitat because of hydraulic conveyance maintenance (McBain & Trush, Inc. 2002, as cited in Reclamation and DWR 2011), containing no emergent or floating vegetation during recent field surveys (SJRRP 2011a). Arroyo Canal provides very little perennial habitat for some fish and other aquatic species that may be present in the canal during wet conditions (Reclamation and DWR 2011).

Aquatic Resources

Fish assemblages currently found in SJR are the result of substantial changes to the physical environment, combined with more than a century of nonnative species introductions. Areas where unique and highly endemic fish assemblages once occurred are now inhabited by assemblages composed primarily of introduced species. Of the native fish species historically present in SJR, at least eight are now uncommon, rare, or extinct; and nonnative warm-water fish species have become dominant (Reclamation and DWR 2011). Nonnative species appear better adapted to current, disturbed habitat conditions than native assemblages.

SJRRP (2010) describes the three Central Valley stream native fish assemblages as well as current and historical fish populations in SJR. Fish assemblages that occur within the Restoration Area include the rainbow trout assemblage (that is, rainbow trout, sculpin, Sacramento sucker, Kern brook lamprey, and threespine stickleback), pikeminnow-hardhead-sucker assemblages, and the deep-bodied fish assemblage. Only the pikeminnow-hardhead-sucker assemblage can be found downstream of Reach 1, which includes the study area. In the San Joaquin drainage the pikeminnow-hardhead-sucker assemblage can be sharply separated from assemblages above and below it, largely because most streams occupied by the assemblage become warm or intermittent (or both) in summer. Typically, the rainbow trout assemblage is found upstream of the pikeminnow assemblage, and the deep-bodied fishes assemblage found downstream (Moyle 2002).

Moyle (2002) indicates that rainbow trout live in much of the Sacramento-San Joaquin zone in the larger and colder streams. Many anadromous fishes (mainly Chinook salmon, steelhead rainbow trout, and Pacific lamprey) spawning grounds in the Sacramento-San Joaquin zone, and their young are often part of the pikeminnow-hardhead sucker assemblage (Moyle 2002). Hardhead are largely confined to cooler waters in reaches with deep, rock-bottomed pools, often found with other native fishes such as rainbow trout (Moyle 2002).

Rainbow trout assemblage habitat is described as high-gradient, coolwater streams. Historically, this assemblage likely occurred upstream from Friant Dam. Cooler, perennial flows from Friant Dam have created environmental conditions suitable for the rainbow trout assemblage in Reach 1 (upstream of the study area). However, downstream of Reach 1, habitat conditions are not suitable for salmonids rearing and spawning. Increased flows associated with the SJRRP are intended to support migration to and from Reach 1, including through the study area. Although the quality of migration habitat in the study area during the near future is unknown, it is expected to be low and unlikely to support any long-term juvenile rearing. The likelihood of juvenile salmon and steelhead using the study area beyond migration is considered low, and thus, the potential for anadromous salmonids to occur in the study area during the implementation phase of this project is low. In the long term, the study area would not provide habitat for spawning (SJRRP 2011a). However, once spring-run Chinook salmon are re-established, the study area would become a migratory corridor between spawning and rearing habitat in Reach 1 and the Delta.

Table 3.3-1 lists the fish that may have historically occurred and those that currently inhabit SJR. Over 30 species of fish are known to use the river. Of these, a number of both native and introduced species are anadromous. Anadromous species include Chinook salmon, steelhead, white sturgeon, striped bass, and American shad. Many of the fish species listed in Table 3.3-1 are not currently known to be present in the project area, including those species identified in the pikeminnow-hardhead-sucker assemblage by SJRRP (2010).

Other SJR fish are considered resident species that complete their life cycles entirely within fresh water, often in a localized area. Resident species include rainbow trout, largemouth, and smallmouth bass; channel catfish; sculpin; Sacramento pikeminnow; hardhead; and common carp (Moyle 2002).

Table 3.3-1.
Fish Species Presumed to Occur in the San Joaquin River

Common Name	Scientific Name	Native or Introduced	Current Presence
spring-run Chinook salmon	*Oncorhynchus tshawytscha*	Native	No
fall-run Chinook salmon	*O. tschawytscha*	Native	Periodic
rainbow trout/steelhead	*O. mykiss*	Native	Yes
delta smelt[1]	*Hypomesus transpacficus*	Native	Yes
river lamprey	*Lampetra ayersi*	Native	Unknown
Kern brook lamprey	*Lampetra hubbsi*	Native	Yes
western brook lamprey	*Lampetra richardsoni*	Native	Unknown
white sturgeon[2]	*Acipenser transmontanus*	Native	Yes
green sturgeon[2]	*Acipenser medirostris*	Native	No
hitch	*Lavinia exilicauda*	Native	Yes
California roach	*Lavinia symmetricus*	Native	Yes
Sacramento blackfish	*Orthodon microlepidotus*	Native	Yes
Sacramento splittail	*Pgonichthys macrolepidotus*	Native	Yes
hardhead	*Mylopharodon conocephalus*	Native	Yes
Sacramento pikeminnow	*Ptychocheilus grandis*	Native	Yes
Sacramento sucker	*Catostomus occidentalis*	Native	Yes
threespine stickleback	*Gasterosteus aculeatus*	Native	Yes
prickly sculpin	*Cottus asper*	Native	Yes
riffle sculpin	*Cottus gulosus*	Native	Yes
Sacramento perch	*Archoplites interruptus*	Native	Extirpated

Table 3.3-1.
Fish Species Presumed to Occur in the San Joaquin River

Common Name	Scientific Name	Native or Introduced	Current Presence
tule perch	*Hysterocarpus traski*	Native	Yes
threadfin shad	*Dorosoma petenense*	Introduced	Yes
common carp	*Cyprinus carpio*	Introduced	Yes
fathead minnow	*Pimephales promelas*	Introduced	Yes
red shiner	*Cyprinella lutrensis*	Introduced	Yes
bullhead catfish	*Ameiurus nebulosus*	Introduced	Yes
black catfish	*Ameiurus melas*	Introduced	Yes
white catfish	*Ameiurus catus*	Introduced	Yes
striped bass	*Morone saxatilis*	Introduced	Yes
black crappie	*Pomoxis nigromaculatus*	Introduced	Yes
bluegill sunfish	*Lepomis macrochirus*	Introduced	Yes
green sunfish	*Lepomis cyanellus*	Introduced	Yes
largemouth bass	*Micropterus salmoides*	Introduced	Yes
redear sunfish	*Lepomis microlophus*	Introduced	Yes
spotted bass	*Micropterus punctulatus*	Introduced	Yes
white crappie	*Pomoxis annularis*	Introduced	Yes

Sources: SJRRP 2010; USFWS 1996a.
Note:
[1] Delta smelt occur in the Sacramento-San Joaquin Delta below Mossdale on the SJR.

[2] Although there is some recent evidence that white sturgeon occur in the SJR, no current or historical records confirm green sturgeon use of this drainage (NMFS 2005a).

Special-status fish species considered in this section are those that are State or federally listed as threatened or endangered, proposed for State or federal listing as threatened or endangered, species classified as candidates for future State or federal listing, and State species of special concern. Special-status fish species potentially occurring in the region were identified through queries of the USFWS species lists and DFG's California Natural Diversity Database (CNDDB) databases for the Oxalis, Poso Farm, Delta Ranch, Santa Rita Bridge, Bliss Ranch, Chowchilla, Dos Palos, Firebaugh NE, Hammonds Ranch, Broadview Farms, Firebaugh, and Mendota Dam 7.5-minute U.S. Geological Survey (USGS) quadrangle maps (USFWS 2012; DFG 2012b). Environmental documents for other projects in the study area were also reviewed. Table 3.3-2 presents special-status fish species that could occur within the study area and their regulatory status.

Table 3.3-2.
Special-Status Fish Species with Potential to Occur within the Region

Common Name	Scientific Name	Status	Habitat in Study Area
Central Valley fall-/late-fall-run Chinook salmon	*Oncorhynchus tshawytscha*	FSC, CSC	Yes
Central Valley spring-run Chinook salmon	*Oncorhynchus tshawytscha*	T, ST	Yes
Central Valley steelhead	*Oncorhynchus mykiss*	T	Yes
Delta smelt	*Hypomesus transpacificus*	T, ST	No
Sacramento splittail	*Pogonichthys macrolepidotus*	CSC	Yes
hardhead	*Mylopharodon conocephalus*	CSC	No
California/San Joaquin roach	*Lavinia symmetricus ssp.*	CSC	No
Green sturgeon	*Acipenser medirostris*	T	No

Key:
CSC = State Species of Special Concern
FSC = Federal Species of Concern
ST = State Threatened
T = Federal Threatened

Special emphasis is placed on these species to facilitate compliance with applicable laws, particularly the State and federal ESAs, and to be consistent with State and federal restoration/recovery plans and NMFS and USFWS biological opinions (BOs). This focus is consistent with the following:

- CALFED's 2000 Ecosystem Restoration Program Plan and Multi-Species Conservation Strategy
- The programmatic determinations for the CALFED program, which include DFG's Natural Community Conservation Planning Act approval and the programmatic BOs issued by NMFS and USFWS
- USFWS's 1997 Draft Anadromous Fish Restoration Program, which identifies specific actions to protect anadromous salmonids
- DFG's 1996 Steelhead Restoration and Management Plan for California, which identifies specific actions to protect steelhead
- Public Draft Recovery Plan for the Evolutionarily Significant Units of Sacramento River winter-run Chinook salmon and Central Valley spring-run Chinook salmon and the Distinct Population Segment of Central Valley steelhead
- Biological and Conference Opinion on the long-term operations of the Central Valley Project and State Water Project
- DFG's Restoring Central Valley Streams, A Plan for Action (1993), which identifies specific actions to protect anadromous salmonids

Improvement of habitat conditions for these species of primary management concern could protect or enhance conditions for other fish resources, including native resident species.

Evaluating potential impacts on fishery resources within the study area requires an understanding of fish species' life histories and life stage-specific environmental requirements. General information is provided in Appendix D regarding fish species considered but dismissed from further evaluation in this EA/IS, as well as life histories of fish species of primary management concern occurring within the study area. Time periods associated with individual species life stages are derived from a combination of literature review and analyses of survey data.

3.3.2 Environmental Consequences

Significance Criteria

Appendix G of the CEQA Guidelines provides impact indicators and significance criteria for use while assessing biological resources in an environmental review process. These criteria are general and refer to fish and aquatic resources, wildlife, vegetation communities, federally protected wetlands, local biological policies and ordinances, and habitat conservation plans. To specifically evaluate potential project-related impacts on fish and aquatic resources, more focused impact indicators and significance criteria were developed. These significance criteria are consistent with the criteria for Mandatory Findings of Significance provided in Section 15065(a)(1) of the CEQA Guidelines. The section of the CEQA Guidelines that is specifically related to fish and wildlife resources states that a project may have a significant effect on the environment if:

> *"…the project has the potential to substantially degrade the quality of the environment; substantially reduce the habitat of a fish or wildlife species; cause a fish or wildlife population to drop below self-sustaining levels; threaten to eliminate a plant or animal community; substantially reduce the number or restrict the range of an endangered, rare, or threatened species…"*

An impact on fisheries resources or aquatic habitat would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Degradation in the quantity or suitability of aquatic habitat of sufficient magnitude and/or duration to substantially affect species of primary management concern, relative to the basis of comparison. For example, increase in sedimentation and turbidity increases risk to exposure to toxins that may be buried in substrate (for example., mercury, selenium, and pesticides/herbicides)

- Loss of existing riparian habitat and/or SRA cover, relative to the basis of comparison

- Increase in predation of substantial magnitude and/or frequency to substantially affect species of primary management concern, relative to the basis of comparison

- Interference with the movement (or migration) of species of primary management concern resulting in habitat modification or degradation of substantial magnitude to substantially affect the species, relative to the basis of comparison

Additional significance criteria are associated primarily with sensitive natural communities (not including riparian habitat as a component of fisheries habitat), federally protected wetlands, local policies or ordinances, and habitat conservation plans are evaluated in Section 3.4, Biological Resources – Terrestrial Species, and Section 3.5, Biological Resources – Vegetation and Wetland Species.

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.3 (Environmental Commitments, Biological Resources – Fish Species) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

The assessment methodology includes evaluation of both short-term, construction-related potential impacts, as well as potential impacts associated with altered habitat conditions during the operation of the project (such as long-term impacts). Potential short-term impacts would be limited to the immediate study area and would primarily be associated with construction-related activities. Construction-related impacts assessed in this EA/IS include those associated with in-river work and habitat modifications. The evaluation of potential short-term, construction-related impacts is based on several considerations including construction timing, physical habitat disturbance, potential for physical injury, hazardous spills, turbidity, sedimentation and erosion resulting from dredging and bank revetment, short-term changes in habitat conditions, and the life-stage periodicity and habitat use of evaluated species of primary management concern in the study area. The evaluation of potential long-term impacts is based on considerations including long-term changes and impacts on fish passage, changes to impingement and entrainment, alteration of aquatic and riparian habitat, and risk associated with predation.

No-Action

Sack Dam diverts water into the Arroyo Canal, and as currently structured, it can block upstream passage of adult Chinook salmon and inhibit juveniles from moving safely downstream without modification. The No-Action Alternative is assumed to be the continued operation of the existing Sack Dam and Arroyo Canal without the installation of a new fish ladder or fish screen. Although HMRD would operate the dam using the recently installed Lopac gates (interim gates) to assist in passing up to 500 cfs of the Restoration Flows, when Sack Dam becomes inundated at flows greater than 1,000 cfs, HMRD would need to remove the interim gates for any flows above this level (including long-term Restoration Flows) to prevent damage to the gates and supervisory control and

data acquisition system. Fish passage across Sack Dam would be limited to those periods when river flows are greater than 1,000 cfs.

As stated in Paragraph 11(a)(6) and 11(a)(7) of the Settlement, "Screening the Arroyo Canal water diversion immediately upstream of Sack Dam to prevent entrainment of anadromous fish," and "modifications at Sack Dam adequate to ensure fish passage" will be necessary to successfully meet the Restoration Goal. In the absence of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative, Sack Dam would continue to be a passage impediment, and Arroyo Canal would continue to be an entrainment hazard for migrating fish. Without modifying Arroyo Canal and Sack Dam, the No-Action Alternative would conflict with the Settlement; and therefore, result in a significant effect on fish resources in the study area.

Proposed Action

Potential impacts on special-status fish species are categorized by type of impact rather than type of fish because special-status fish species that are present could be affected in a similar manner.

Construction.

Impact FSH-1: Temporary increase in sedimentation and turbidity. Construction activities (for example, access, staging, storage, and disposal areas) that result in disturbance to soil and vegetation on the bank and channel of SJR may cause increases in sedimentation and turbidity of these waters. These conditions, if prolonged, could affect the growth, survival, and reproductive success of aquatic organisms. Prolonged exposure to high levels of suspended sediment can create the following:

- A loss of visual capability, leading to a reduction in feeding and growth rates
- Thickening of the gill epithelium, potentially causing loss of respiratory function
- Clogging and abrasion of gill filaments
- Increases in stress levels, reducing the tolerance of fish to disease and toxicants (Waters 1995, as cited in Reclamation and City of Yuba City 2009).

Bash et al. (2001, as cited in Reclamation and City of Yuba City 2009) characterized the effects of suspended sediment and turbidity on salmonids into three general categories: (1) physiological, (2) behavioral, and (3) habitat.

The effects of sediment on salmon depend on temperature, size, and life stage (Bash et al. 2001, as cited in Reclamation and City of Yuba City 2009). Although salmonids and other fish species potentially present are highly migratory and capable of moving freely throughout the study area, a sudden localized increase in turbidity may potentially affect some fish by temporarily disrupting normal behaviors that are essential to growth and survival such as feeding, sheltering, and migrating (NMFS 2003b). Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments on salmonids (Birtwell et al. 1984; DeVore et al. 1980; Scannell 1988). Fish would not

occupy areas that are not suitable for survival unless they have no other option. Additional turbidity-related effects associated with behavioral alteration include disruption of feeding behaviors, which increases the likelihood that individual fish would face increased competition for food and space, and experience reduced growth rates, or possibly weight loss (NMFS 2003b). Habitat can become limiting in systems where high turbidity precludes a species from occupying habitat required for specific life stages.

Increase in sedimentation and turbidity may increase the risk for exposure to toxins that may be buried in substrate (for example, mercury, selenium, and pesticides/herbicides). Excavation could resuspend contaminants if contamination is present in the surface sediments. Dredging and/or excavation of contaminated sediments does present the potential for release of contaminants to the water column, and for the uptake of contaminants by organisms contacting resuspended material (USACE 2004). However, most contaminants are tightly bound in the sediments and are not easily released during short-term resuspension (USACE 2004). McBain & Trush (2002) report that selenium, boron, and mercury concentrations are elevated in agricultural drain waters in SJR. The Mendota Dam to Merced River (reaches 3, 4, and 5 of SJR), which includes the project area, has been designated as impaired and placed on the Central Valley Water Board Section 303 (d) list for the following pollutants: boron, chlorpyrifos, dichlorodiphenyltrichloroethane, diazinon, electrical conductivity, Group A pesticides[4], and unknown toxicity (McBain & Trush 2002). Reaches 3 through 5 are reported to have an increase in both conductivity and total dissolved solids above the Central Valley Water Board water quality objectives for SJR at Dos Palos (River Mile [RM] 180) near Sack Dam (FWUA and NRDC 2002). McBain & Trush (2002) also reports that pesticides and other toxicity have been associated with land use activities in these areas, and organophosphate insecticide concentrations (for example, diazinon, and chlorpyrifos) in runoff to Reach 5 are elevated and highly variable during winter storms. Long-banned organochlorine insecticides (such as dichlorodiphenyltrichloroethane) continue to be transported to streams by soil erosion of contaminated agricultural fields, resulting in contamination of suspended sediment, bed sediment, and aquatic organisms (McBain & Trush 2002).

Increased sedimentation and turbidity resulting from project construction would be temporary and limited to a small portion of the river during installation and removal of the cofferdam. Implementation of an SWPPP, as discussed in environmental commitments FSH-5, GEO-1, HM/PH-2, and WR-2, would minimize sediment inputs. ***Therefore, this impact would be less than significant.***

Impact FSH-2: Temporary decrease in habitat use. Construction of a temporary cofferdam would either be (1) around the entire perimeter of Sack Dam, or (2) around half or some portion (that is, a staged cofferdam) of Sack Dam, allowing continued conveyance of Restoration Flows. If a temporary cofferdam were constructed around the entire perimeter of Sack Dam, this method would require construction of an approximate 20-foot-wide, 600-foot-long temporary diversion channel to convey Restoration Flows

[4] Group A pesticides = one or more of the Group A pesticides. The Group A pesticides include aldrin, dieldrin, chlordane, endrin, heptachlor, epoxide, hexachlorocyclohexane (including lindane), endosulfan, and toxaphene.

around the temporary cofferdam (see Figure 2-3). If a temporary cofferdam around half or some portion of Sack Dam were used, this method would allow for approximately 50 percent of the river channel to remain open for the controlled release of flows past Sack Dam. After the first half of the dam construction is complete, the temporary cofferdam would be removed and installed around the remaining portion of Sack Dam.

The project improvements would require construction access to both sides of the river. To facilitate the movement of labor, equipment, and materials across the river, the contractor would construct a temporary low-water access crossing downstream of Sack Dam. The low-water crossing would be upstream of the temporary diversion channel (see Figure 2-2). This crossing would likely be constructed of suitable, pre-washed rock installed over four 24-inch-diameter temporary culverts. Installation of the stream crossing would not be expected to substantively affect movement of fish potentially present in the area. The inclusion of culverts would continue to allow passage. However, fish passage is dependent on sufficiently high year-round natural flow through the study area to maintain fish passage through these culverts. If low flows occur during the construction period, fish may not be able to pass through the culverts; however, there is a low likelihood that special-status fish species would occur in the study area during the construction period.

Once construction is complete, the low-water access crossing would be removed, the rock would be spread within the river, and the river channel returned to its preconstruction condition. The addition of the NMFS-approved gravel to SJR downstream of Sack Dam is expected to provide improved substrate conditions for juvenile fish foraging due to increased opportunity for aquatic macroinvertebrate colonization. The increase in macroinvertebrates would be considered a temporary benefit, as gravels would eventually be transported downstream by high flows and/or covered with sediment in this mostly sand-bedded channel.

With implementation of environmental commitments FSH-1 through FSH-9, which have been incorporated into the Proposed Action, ***this impact would be less than significant***.

Impact FSH-3: Temporary increase in underwater noise and vibrations from pile driving. Noise, vibrations, and other physical disturbances can harass fish, disrupt, or delay normal activities, or cause injury or mortality (Reclamation and City of Yuba City 2009). In fish, the hearing structures and swim bladder and surrounding tissues are particularly vulnerable to high-pressure sounds; the ear is vulnerable to extreme pressure and motion; and the swim bladder expands and contracts with the passage of a pressure wave (Popper et al. 2006, as cited in Reclamation and City of Yuba City 2009). The potential magnitude of effects depends on several factors, including the type and intensity of the sound, proximity of the action to the water body, timing of actions relative to the occurrence of sensitive life stages, and frequency and duration of activities (Reclamation and City of Yuba City 2009). For most activities, the effects on fish would be limited to avoidance behavior in response to movements, noises, and shadows caused by construction personnel and equipment operating in or adjacent to the water body. In these instances, fish may be more vulnerable to predation if the disturbance causes fish to leave protective habitat. Injury or mortality may result from direct contact with

machinery and materials or sound pressure (pile driving) if it occurs at high sound-pressure levels (Reclamation and City of Yuba City 2009).

As mentioned previously in the Project Description, sheet piles would be installed using a crane directly adjacent to Sack Dam (that is, near the west abutment) or from a crane positioned on a temporary work trestle. The sheet piles would be driven using a vibratory hammer and supplemented with an impact hammer if required because of subsurface conditions.

The area where sheet piles would be driven would be dewatered using a cofferdam so that pile driving can be performed "in the dry." No in-water pile driving (without mitigation or attenuation) would be permitted. Driving steel sheet piles with a vibratory hammer supplemented with an impact hammer in water (unattenuated conditions) has been reported (case studies with similar substrate) to result in underwater sound pressure levels of 177 decibels (dB) (peak pressure), 163 dB (root mean square), and 162 dB (sound exposure level) at 10 meters from the pile being driven and 15-meter depth (California Department of Transportation 2007). According to NMFS guidelines, physical injury thresholds begin at approximately 206 dB (peak pressure) or 183 dB (sound exposure level). Based on the reports of noise-monitoring data on pile driving in open water with similar substrate and within dewatered cofferdams, pile driving associated with the construction of the Proposed Action is not anticipated to reach or exceed NMFS noise thresholds resulting in injury to fish.

Noise levels are expected to be below the accepted thresholds provided in Table 3.3-3 because pile driving would occur within the cofferdam following dewatering. Furthermore, with implementation of environmental commitments FSH-7 and FSH-8, ***impacts associated with pile driving are less than significant.***

Table 3.3-3.
National Marine Fisheries Service Underwater Noise Thresholds to Fish Exposed to Elevated Levels of Underwater Sounds Produced during Pile Driving

Effect	Metric	Fish Mass	Threshold
Onset of Physical Injury	Peak pressure	N/A	206 dB (re: 1 µPa)
	Accumulated sound exposure level	≥ 2 g	187 dB (re: 1 μPa^2•sec)
		≤ 2 g	183 dB (re: 1 μPa^2•sec)
Adverse Behavioral Effects	Root mean square pressure	N/A	150 dB (re: 1 µPa)

Source: NMFS 2010.
Key:
dB = decibel
g = grams
N/A = not applicable
µPa = microPascal, The peak pressure is the instantaneous maximum overpressure or underpressure observed during each pulse and can be presented in Pascals (Pa) or Sound Pressure Level in dB referenced to a pressure of 1 micropascal (dB re: 1 µPa)
μPa^2•sec = Cumulative pressure squared (p^2), integrating over time, and normalizing to 1 second – Unit for sound exposure level

Impact FSH-4: Fish stranding in cofferdams. Closure of the cofferdam would require dewatering of the area contained by the cofferdam, which may potentially affect fish by confining them to areas of increased water temperature, decreased dissolved oxygen concentration, and predation (Cushman 1985). Juvenile fish are most susceptible to entrapment because of their slower escape response and tendency to remain along shallow river margins. The potential effects of stranding could include increased stress and direct mortality of stranded individuals. Although there is a low likelihood that special-status fish species would occur in the study area during the construction period, measures that would minimize potential adverse effects on listed fish species include the construction of the cofferdam in an upstream to downstream direction and implementation of a fish rescue plan, as described in environmental commitment FSH-7. ***This impact would be less than significant.***

Impact FSH-5: Alteration of aquatic and riparian habitat. The Proposed Action would require the removal of riparian vegetation and SRA cover associated with the fish screen, trash rack, transport channel/fish ladder, and Sack Dam replacement. In addition, the Proposed Action includes construction of engineered embankments consisting of soil cement over a sheet-pile cutoff wall, which would require minor streambank alteration. The stabilization of embankments within the study area would reduce erosion associated with high flows into SJR.

Riparian vegetation directly influences the quality of salmonid habitat, affecting cover, food, in-stream habitat complexity, streambank stability, and water temperatures. Large woody debris usually originates from riparian trees and provides cover and habitat complexity within the stream – essential components of fish habitat. Riparian vegetation also provides shade and an insulating canopy that moderates water temperatures in both summer and winter.

Riparian vegetation provides a filter that reduces the transport of fine sediment to the stream, and the roots provide streambank stability and cover for rearing fish (Meehan 1991). Riparian vegetation influences the food chain of a stream, providing organic detritus and terrestrial insects. Because of the numerous ways riparian vegetation influences the stream ecosystem, the effects of altering riparian vegetation are highly variable, ranging from increased sedimentation and warmer stream temperatures to decreased food production and habitat complexity.

The removal of riparian habitat via bank revetment would temporarily discontinue recruitment of small and large pieces of in-stream woody material (IWM) and SRA in the study area. Specifically, discontinuing recruitment of small pieces of IWM would reduce juvenile salmonid rearing habitat, and discontinuing recruitment of large pieces of IWM (such as, large riparian tree trunks) would reduce the potential for creation of adult immigration and holding habitat, including deep pools. As described in environmental commitment VEG-1, bank revetment with embedded tree and brush clusters and riparian restoration would mitigate these effects by increasing smaller IWM, which creates juvenile rearing habitat to greater than pre-project levels and mitigates temporary loss of SRA. In addition, the SRA cover losses would be negligible because of the low quality of existing nearshore habitat and the lack of significant in-stream and overhead cover in the study area. Overall, the effect of bank revetment on total IWM and SRA would be of

short duration, extending only through the construction period. Because of the temporary nature of altering the aquatic and riparian habitat in the study area, ***this impact would be less than significant***.

Impact FSH-6: Harm to fish as a result of accidental hazardous materials and chemical spills. Construction-related activities (for example, activities associated with access routes, storage, and staging areas) could potentially impair water quality if hazardous chemicals (for example, fuels and petroleum-based lubricants) or other construction materials are spilled or enter SJR. In general, construction-related chemical spills could potentially affect fisheries and aquatic resources by causing physiological stress, reducing biodiversity, altering primary and secondary production, interfering with fish passage, and causing direct mortality. Implementation of environmental commitments FSH-5 and HM/PH-2 would minimize the potential for the Proposed Action to adversely affect fish and other biological resources resulting from accidental spills of hazardous, toxic, or petroleum substances. ***Therefore, this impact would be less than significant***.

Impact FSH-7: Increase the Risk of Predation. Construction activities associated with the Proposed Action have the potential to increase the risk of predation due to (1) cofferdam closure and dewatering, (2) noise associated with pile-driving activities, (3) increased turbidity above those levels normally found in SJR, (4) habitat modification or disturbance from construction and excavation activities, and (5) glare from lights that may reflect on water.

Predatory fish tend to hold at or below structures in rivers. The temporary crossing, trash rack, and dam may provide additional holding habitat for these predators; however, these structures would not be placed until dewatering is completed. Dewatering associated with cofferdam closure reportedly may confine special-status fish and expose them to an increased risk of predation (NMFS 2000). Typically, fish salvage operations (removal of all fish, including predatory species) are used when construction activities require dewatering and confinement. However, fish salvage operations also can disorient and injure fish, further increasing the risk of predation following removal and subsequent release from the dewatered and confined study area (NMFS 2003b).

Disorientation caused by noise associated with pile driving can temporarily disrupt normal fish behaviors, thereby increasing the risk of predation (NMFS 2000; NMFS 2003b). Additionally, construction and excavation activities may increase turbidity, which in turn, could alter normal fish behavior and increase the risk of predation (DeVore et al. 1980; Birtwell et al. 1984; Scannell 1988, as cited in NMFS 2003a).

Predation is expected to be minimal and temporary. Sensitive fish would not likely be exposed to predation risk because current habitat present in the study area is not optimal for predatory fish. If exposure to predators does occur, it would be for a limited duration during dewatering within the cofferdam. Most predatory fish prefer warm water temperatures, and are inactive when water temperature is cold. Water temperatures in SJR are warm for most of the year with the exception of late-winter and early spring. Dewatering activities associated with building a cofferdam are expected to occur during the late-winter, early spring when water temperatures are cold. Because of their inactive behavior, predation risk associated with dewatering activities is considered extremely low. Additionally, because of the low likelihood that predatory and special-status fish

species would be present in the study area during construction, it is expected that the populations of special-status fish are not expected to decline any further.

The implementation of environmental commitments FSH-5, VEG-1, HM/PH-2, and WR-2 would minimize impacts from sedimentation and turbidity, hazardous spills, and vibration and pressure waves. ***This would reduce any potentially significant effects associated with increased predation risk to less than significant levels***. Additionally, glare from lights that may reflect on water where migrating salmonid may be at night has the potential to increase predator/prey interactions and may affect salmonid timing. Lighting may facilitate nocturnal predation on juvenile Chinook salmon by visual predators like smallmouth bass and piscivorous birds. However the project does not include any construction during nighttime hours; ***therefore, no impacts would be associated with nighttime glare***.

Impact FSH-8: Changes in impingement and entrainment. As described in the project description, Arroyo Canal deliveries would continue during project construction. To accommodate continued water deliveries in the Arroyo Canal, similar to the construction method for Sack Dam, the contractor would construct a cofferdam around the fish screen and trash-rack structures; and flow would continue to gravity divert into the Arroyo Canal, similar to existing conditions. Fish screens would not be in place during construction; however, the low frequency of steelhead in the mainstem San Joaquin River, and non-existence of spring-run Chinook, makes it unlikely that these species will be encountered during the project. Furthermore, USFWS (2011a) has identified that emigrating reintroduced juvenile spring-run Chinook salmon would be physically moved downstream of Sack Dam, thus avoiding any entrainment and stranding potential during the construction period. ***This impact is less than significant***.

Operation.

Impact FSH-9: Changes in fish passage. Under existing conditions, Sack Dam is considered a fish passage impediment to upstream and downstream migrating fish species. Installation of a new transport channel/fish ladder would serve to both convey fish screen bypass flows and to efficiently provide upstream and downstream fish passage across Sack Dam. The design flow for the transport channel/fish ladder is coincident with the minimum Reach 4 Restoration Flow of 45 cfs. Once construction of the fish ladder system is complete, the fish ladder would terminate downstream of Sack Dam at the west abutment. The transport channel/fish ladder is intended to allow passage to Chinook salmon and other migratory native fish species. ***Changes in fish passage would have beneficial impacts on special-status fish species***.

Impact FSH-10: Changes in impingement and entrainment. Operation of a fish screen in Arroyo Canal would reduce the potential for incidental take of special-status fish species associated with continued HMRD operations. The Proposed Action would include the construction of an approved positive barrier fish screen structure within the inlet to the existing unscreened Arroyo Canal. The positive barrier fish screen structure would be designed to meet the criteria and/or recommendations and guidelines developed by DFG and NMFS. The design was based on protective criteria for juvenile salmonids but also included consideration of green sturgeon and other migrating fish species.

Environmental commitment FSH-9 includes preparation and implementation of a hydraulic plan to ensure that the fish screen is operated and maintained in accordance with the fish screen performance criteria. The potential adverse impacts on special-status fish species from the continued diversion by HMRD would be more than offset by the benefits of the new screened intake, which would eliminate the risk of straying. Presently, there is no fish screen at Arroyo Canal; thus, impingement and entrainment would be significantly reduced with the construction of the Proposed Action. ***Therefore, this impact is less than significant and would have a net beneficial impact on fish species in SJR***.

Impact FSH-11: Alteration of aquatic and riparian habitat. The installation of riprap has the potential to increase predator habitat and/or decrease native fish refuge habitat during the operation of the Proposed Action; however, riprap could have many advantages over other bank protection techniques, including the ability for vegetation to grow between the rocks, increasing stability of the bank and improving habitat value of the structure (Fischenich 2003). Although there are numerous large- and small-scale negative ecological impacts associated with riprap bank stabilization structures, and construction could result in severe damage to riparian and instream habitats, riprap structures also have ecological benefits (Fischenich 2003). Riprap can reduce sediment loads, improve water quality, and allow re-establishment of riparian vegetation. Stone used in riprap structures provides hard substrate habitat that can be important in sand-bed streams (such as this study area) where it might be limited, and spaces between riprap stones provide velocity refuge and cover for aquatic invertebrates and small fish (Fischenich 2003). Generally, streams with healthy riparian vegetation communities and the habitat features associated with such communities (shade, relatively stable undercut banks, and large woody debris) will be harmed ecologically from the addition of riprap structures (Fischenich 2003). On the other hand, habitat may be improved on streams where natural hard substrate is rare or lacking (such as the study area) (Fischenich 2003). As discussed in *Impact FSH-5*, the incorporation of environmental commitment VEG-1, bank revetment with embedded tree and brush clusters and riparian restoration, would mitigate any long-term effects from the installation of riprap for bank stabilization. ***Therefore, this impact is less than significant***.

Impact FSH-12: Increase the risk of predation. Bank revetments serve as a barrier between the aquatic and terrestrial ecosystem, restricting biotic movement between these zones and potentially increasing predation. When riprap is the primary or only form of riverbank stabilization measure, the end result is typically a uniform, smooth channel, with no complexity. This means that there are no areas of vegetation either in or overhanging the water, leaving fish at risk from predation (Federal Emergency Management Agency 2009). Schmetterling et al. (2001, as cited in Quigley and Harper 2004) found that riprap can provide habitat for juvenile salmonids and bolster densities along reaches of streams that have been severely degraded (for example, study area). As discussed previously, the incorporation of environmental commitment VEG-1 would minimize any effects associated with risk of predation, especially when the embedded tree and brush clusters become stabilized and begin to grow. ***Therefore, this impact is less than significant***.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be nearly identical as impacts discussed under the Proposed Action.

Cumulative Effects

As described in the SJRRP Draft PEIS/R, cumulative impacts on fisheries could occur in SJR upstream from Friant Dam, in the Restoration Area, downstream from Merced River, and in the Sacramento-San Joaquin Delta (Delta) due to pollutant and sediment discharge, short- and long-term geomorphic changes from channel alterations, displacement, predation, interbreeding, introduction of disease, and entrainment at diversions and pumping plants. Although the improvements associated with the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative are identified as elements of the greater Restoration Program, implementation of these improvements would only result in temporary effects on fisheries resources and have substantial long-term beneficial effects on fish. A beneficial cumulative impact could occur with fish passage improvements at Sack Dam and installation of a fish screen at Arroyo Canal.

3.4 Biological Resources – Terrestrial Species

3.4.1 Environmental Setting

Wildlife Resources

Wildlife habitats and species in the study area were assessed during May 2010, April 2011, and September 2011 field surveys by Stillwater Sciences (see Appendix E, Field Survey Methods and Results Technical Memorandum, and Appendix F, Field Survey Methods and Results Technical Memorandum Supplement #1). The vegetation types present in the study area provide suitable habitat for a variety of common and special-status wildlife species. Table 3.4-1 lists wildlife species (or their sign such as tracks or scat) observed in the study area during field surveys. In addition to the species observed, other common and special-status amphibians, reptiles, birds, and mammals may use the study area for foraging, cover, dispersal, and breeding.

Table 3.4-1.
Wildlife Species Observed in the Study Area on May 18, 2010, April 11, 2011, and September 30, 2011

Common Name	Scientific Name
Birds	
mallard	*Anas platyrhynchos*
California quail	*Callipepla californica*
great egret	*Ardea alba*
northern harrier	*Circus cyaneus*
Swainson's hawk	*Buteo swansoni*
red-tailed hawk	*Buteo jamaicensis*
American coot	*Fulica americana*
mourning dove	*Zenaida macroura*
Anna's hummingbird	*Calypte anna*
western wood pewee	*Contopus sordidulus*
black phoebe	*Sayornis nigricans*
western kingbird	*Tyrannus verticalis*
western scrub-jay	*Aphelocoma californica*
American crow	*Corvus brachyrhyncos*
cliff swallow	*Petrochelidon pyrrhonota*
barn swallow	*Hirundo rustica*
American robin	*Turdus migratorius*
California thrasher	*Toxostoma redivivum*
spotted towhee	*Pipilo maculatus*
lark sparrow	*Chondestes grammacus*
song sparrow	*Melospiza melodia*

Table 3.4-1.
Wildlife Species Observed in the Study Area on May 18, 2010, April 11, 2011, and September 30, 2011

Common Name	Scientific Name
red-winged blackbird	*Agelaius phoeniceus*
Brewer's blackbird	*Euphagus cyanocephalus*
brown-headed cowbird	*Molothrus ater*
house finch	*Carpodacus mexicanus*
American goldfinch	*Spinus tristis*
Eurasian collared dove	*Streptopelia decaocto*
wood duck	*Aix sponsa*
canvasback	*Aythya valisineria*
marsh wren	*Cistothorus palustris*
downy woodpecker	*Picoides pubescens*
yellow-rumped warbler	*Dendroica coronata*
loggerhead shrike	*Lanius ludovicianus*
golden-crowned sparrow	*Zonotrichia querula*
white-crowned sparrow	*Zonotrichia leucophrys*
Lincoln's sparrow	*Melospiza lincolnii*
savannah sparrow	*Passerculus sandwichensis*
yellow-billed magpie	*Pica nuttalli*
killdeer	*Charadrius vociferus*
spotted sandpiper	*Actitis macularia*
belted kingfisher	*Ceryle alcyon*
white-tailed kite	*Elanus leucurus*
Caspian tern	*Sterna caspia*
American bittern	*Botaurus lentiginosus*
great horned owl	*Bubo virginianus*
house sparrow	*Passer domesticus*
Amphibians and Reptiles	
bullfrog	*Rana catesbeiana*
Pacific pond turtle	*Actinemys marmorata*
western fence lizard	*Sceloporus occidentalis*
Mammals	
domestic dog[1]	*Canis lupus familiaris*[1]
raccoon[1]	*Procyon lotor*[1]
American beaver[1]	*Castor canadensis*[1]

Note:
[1] Identified by sign (tracks, scat).

The majority of the study area consists of SJR and its seasonally inundated and densely vegetated floodplain. Other features in the study area include Arroyo Canal, Poso Canal,

and adjacent agricultural croplands. Unvegetated levees and dirt access roads border the river and canals. Soils in the study area are well-drained alluvium, and vegetation includes nonnative herbaceous and native riparian woodland and shrubland types (vegetation types are discussed in more detail in Section 3.5).

Riparian woodlands are valuable for wildlife since they provide water, favorable microclimates, and important movement corridors. Riparian woodlands typically support higher bird species diversity and abundance compared to other habitat types. The mature trees in the woodland stands and alliances of the study area, particularly cottonwoods, ash, and walnut, may provide cover, roosting, foraging, and nesting habitat for numerous songbirds, sparrows, and other migratory birds while they move along their seasonal migration routes. Nesting season for migratory birds is generally February 1 through August 15. Shrublands in the study area may also provide cover and forage habitats for wildlife including birds and mammals. The overall value of shrub habitats is higher when it occurs in juxtaposition with adjacent riparian woodland vegetation, because it increases the habitat complexity of the area.

Nonnative annual grassland may provide some wildlife species with food resources (for example, seeds from grasses and forbs), although, in general, it does not provide high-quality wildlife habitat, particularly for special-status species. Similarly, nonnative giant reed (*Arundo donax*) and eucalyptus trees (*Eucalyptus* spp.) that occur in the study area do not generally provide food or habitat resources that are equivalent to native plant species; however, bird species may nest in eucalyptus trees.

Special-Status Species

Special-status terrestrial wildlife species with the potential to occur in the study area were identified through review of existing information, including queries of DFG's CNDDB and USFWS databases for Oxalis, Poso Farm, Delta Ranch, Santa Rita Bridge, Bliss Ranch, Chowchilla, Dos Palos, Firebaugh NE, Hammonds Ranch, Broadview Farms, Firebaugh, and Mendota Dam 7.5-minute USGS quadrangle maps (DFG 2010a; USFWS 2010). Additional wildlife-related information for the study area and vicinity were obtained by reviewing California Wildlife Habitat Relationships data (DFG and California Interagency Wildlife Task Group 2008) through DFG's Biogeographic Information and Observation System. A list of special-status wildlife species with the potential to occur in the study area was compiled and is provided in Appendix G. The distribution and habitat preferences of these species were compared with habitat conditions observed in the study area during field surveys in May 2010, April 2011, and September 2011 to create a refined list of special-status species with the potential to occur in the study area and potentially be affected by the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative (see Table 3.4-2).

Table 3.4-2.
Special-Status Wildlife Species with Potential to Occur in the Arroyo Canal and Sack Dam Study Area and Be Affected by the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative

Common Name *Scientific Name*	Status[1] (Federal/ State)	Habitat Associations	Potential to Occur in Study Area
Amphibians/Reptiles			
Pacific pond turtle *Actinemys marmorata*	–/SSC	Permanent, slow-moving fresh or brackish water with available basking sites and adjacent open habitats or forest for nesting.	High (present); observed during habitat assessment surveys.
Birds			
white-tailed kite *Elanus leucurus*	–/FP	Lowland grasslands and wetlands with open areas; nests in trees near open foraging area.	High (present); observed during habitat assessment surveys; suitable foraging and nesting habitat present.
northern harrier *Circus cyaneus*	–/SSC	Nests, forages, and roosts in wetlands or along rivers or lakes, but also in grasslands, meadows, or grain fields.	High (present); observed foraging in adjacent agriculture; potential for nesting.
Swainson's hawk *Buteo swainsoni*	–/ST	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields.	High (present); observed during habitat assessment surveys.
western burrowing owl *Athene cunicularia hypugea*	–/SSC	Level, open, dry, heavily grazed or low-stature grassland or desert vegetation with available burrows.	Moderate; suitable nesting and foraging habitat present near the study area.
loggerhead shrike *Lanius ludovicianus*	–/SSC	Open shrubland or woodlands with short vegetation and bare ground for hunting; some tall shrubs, trees, fences or powerlines for perching; typically nests in isolated trees or large shrubs.	High (present); observed during habitat assessment surveys.
Mammals			
western red bat *Lasiurus blossevillii*	–/SSC	Riparian forests, woodlands near streams, fields, and orchards.	Moderate; suitable roosting and foraging habitat present.

Note:
[1] Status:

Federal
– = no status

State
FP = Fully Protected
SSC = Species of Special Concern
ST = listed as threatened under CESA
– = no status

Forty-nine special-status terrestrial wildlife species (terrestrial invertebrates, amphibians, reptiles, birds, and mammals) were identified during initial scoping as having potential to occur in the study area (see Appendix G). Thirty of these species were identified as having no potential to occur in or near the study area (because no suitable habitat is

present in the study area, or the study area is outside of the species' range) and were eliminated from further consideration (see Appendix G). The nineteen remaining species had low, moderate, or high potential to occur in the study area. Species accounts – including listing status, distribution, habitat associations, and life history requirements – for the twenty species with low, moderate, or high potential to occur within the study area are provided in Appendix G. Of these twenty species, seven special-status wildlife species were determined to have moderate or high potential to occur within or near the study area as well as potential to be affected by implementation of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative. These seven species are listed in Table 3.4-2, and their potential to occur in the study area is discussed in further detail below. Though not considered to occur in the project area, blunt-nosed leopard lizard is included in the discussion below because of its federal and State listing status as endangered, State status as fully protected, and attention given by DFG during project planning and geotechnical surveys.

Four of the special-status species identified as having the potential to occur in the study area – Pacific pond turtle, Swainson's hawk, northern harrier, and loggerhead shrike – were documented during field surveys (see Appendices E and F).

Pacific Pond Turtle. Two pond turtles were observed in SJR upstream of Sack Dam during the habitat assessments (see Appendices E and F). There is suitable aquatic and upland basking habitat in the study area. In dry years when no flooding occurs, the floodplain provides suitable nesting habitat; however, nesting in the floodplain does not occur during wet years.

Blunt-Nosed Leopard Lizard. The study area is unsuitable for blunt-nosed leopard lizard. Blunt-nosed leopard lizards prefer flat areas with open space for running, and avoid densely vegetated habitats. They are absent from areas with thick vegetation, steep slopes, or areas subject to seasonal flooding (USFWS 1998). This species cannot survive on cultivated lands. The SJR floodplain is seasonally inundated, many other areas are too densely vegetated or are in agricultural production, and no sparse grasslands or alkali areas are present. The few burrows (typically made by other ground-dwelling animals) in the study area along narrow strips of unvegetated dirt roads and canal banks between the floodplain and croplands are not suitable for blunt-nosed leopard lizard, as the burrow locations conflict with the lizard's preference for wide, expansive areas. Additional burrows in the study area are located along Poso Canal, but these are also unsuitable for blunt-nosed leopard lizard; the burrows are located on steep slopes immediately adjacent to the canal and do not provide the open space for running that is preferred by the lizard. Many of the burrows in the study area were unoccupied during field surveys, as evidenced by networks of spider webs in such burrows. Although blunt-nosed leopard lizards have been documented in suitable habitats within an approximate 5-mile radius southeast of the study area in 1990, the cultivated croplands surrounding the study area present a substantial movement barrier for blunt-nosed leopard lizards that could otherwise emigrate from those suitable, open, sparsely vegetated habitats. As a result of largely unsuitable conditions in the study area and because identified burrows were unoccupied or in unsuitable areas, habitats in the study area are deemed unsuitable for blunt-nosed leopard lizard. Because of the lack of suitable habitat in the study area, this species is not considered further in the evaluation of effects.

White-Tailed Kite. Moderately suitable foraging habitat for white-tailed kites is in agricultural fields near the study area, and suitable nesting habitat for white-tailed kites is within small groves of trees in the study area, particularly in the cottonwoods and other riparian trees on the east side of SJR.

Northern Harrier. Two northern harriers were observed in the alfalfa field adjacent to the northern Arroyo Canal levee in April and September 2011 (see Appendices E and F). Suitable nesting habitat may be present in agricultural areas adjacent to the study area.

Swainson's Hawk. Nine CNDDB occurrence records for Swainson's hawk have been documented within 5 miles of the study area (DFG 2010a). A nesting pair of Swainson's hawks was observed in the study area during focused surveys in April 2011 (see Appendix F). This pair of Swainson's hawks was observed performing aerial courtship displays and tending a nest placed on a clump of mistletoe in a cottonwood tree on the right bank of SJR, in the southeast portion of the study area (see Appendix F). This documented nest is located 45 feet south of the closest study area boundary. A pair of Swainson's hawks was also observed within the study area in April 2010 (see Appendix E). The cottonwoods and other mature riparian trees on the east side of SJR may provide additional nesting sites for Swainson's hawks.

Western Burrowing Owl. Potential habitat for burrowing owl occurs at the upper margins of the ditch adjacent to Arroyo Canal, where numerous suitable burrows were observed (see Appendix F). The ditch adjacent to Arroyo Canal would be avoided during project activities.

Loggerhead Shrike. Loggerhead shrike was observed during Swainson's hawk surveys (see Appendix F). Although suitable nesting habitat for loggerhead shrike in tall trees in the study area is present, most of the study area does not contain highly suitable foraging habitat.

Western Red Bat. Western red bats may use the cottonwoods or other riparian trees on the east side of the river as roosts, including maternity roosts. This species may forage over SJR and nearby fields.

3.4.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An impact on terrestrial species would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG or USFWS

- Interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.4 (Environmental Commitments, Biological Resources – Terrestrial Species) provides a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

To assess the potential impacts of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative on terrestrial wildlife species with potential to occur in the study area, their habitat requirements and life history requirements (including timing of sensitive life history stages) were compared to the description of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative, including each alternative's construction- and operation-phase activities and incorporated environmental commitments. Project components reviewed included timing, the footprint of each alternative (including access roads, staging areas, and the levee borrow material area), design specifications, and incorporated environmental commitments.

No-Action

Under the No-Action Alternative, dredging and repair of the east side of the river channel would be required more frequently as a result of the Interim and Restoration Flows. Repair of the east side of the river channel would require the use of heavy equipment for 2 to 3 days per occurrence. Such dredging and repairs may adversely affect Pacific pond turtle if heavy equipment inadvertently crushed individual turtles, resulting in injury or mortality. Removal of suitable refugia and basking sites could also indirectly affect Pacific pond turtles by exposing individuals to predation or reducing the availability of these important habitat components. The No-Action Alternative would not likely affect other terrestrial wildlife species, because activities would not include removal of vegetation including trees, and disturbance would not occur near bird nesting habitat or special-status bat roosting habitat.

As a result of the No-Action Alternative's potential to substantially adversely affect Pacific pond turtle and the lack of measures to avoid such impacts, it may have a significant impact on terrestrial wildlife resources.

Proposed Action

Construction.

Impact TER-1: Construction activities could result in temporary adverse impacts on special-status species. Construction activities have the potential to affect the following special-status wildlife species: Pacific pond turtle, white-tailed kite, Swainson's hawk,

western burrowing owl, other nesting migratory birds and raptors (including northern harrier and loggerhead shrike), and western red bat.

Direct impacts on Pacific pond turtles could occur during dewatering and filling if heavy equipment inadvertently crushed turtles, resulting in injury or mortality of individuals. Removal of suitable refugia and basking sites could also indirectly affect Pacific pond turtles by exposing individuals to predation or reducing the availability of locations for thermoregulation. However, the Proposed Action includes environmental commitment TER-1, which would help avoid or minimize the Proposed Action's impacts on this species because a biological monitor would be present during construction and would identify potential impacts and move individual turtles away from harm prior to such activities. Given the protections offered through implementation of environmental commitment TER-1, the potential effect of project ***construction on Pacific pond turtles would represent a less than significant impact.***

Swainson's hawks, western burrowing owl, white-tailed kite (which is a California fully protected species), and other nesting migratory birds may be adversely affected by construction activities if disturbance occurs near active nest sites during the breeding season. Direct impacts may occur as a result of tree removal or disturbance to other vegetation that might provide nesting habitat. Indirect impacts from construction disturbance during the breeding season, caused by factors such as noise (for example, from heavy equipment, vehicles, generators, and human presence) or vibration, could lead to nest abandonment or premature fledging. Although the one documented Swainson's hawk nest is located outside of the Proposed Action footprint, it is close enough that the potential for indirect disturbance due to construction activities occurring to the north or west of the nest is present. In addition, new nesting sites may be established prior to implementation of the Proposed Action. The Proposed Action includes environmental commitments TER-2, TER-3, TER-4, and TER-5, which would help avoid or minimize impacts on nesting bird species. These commitments each include recommendations regarding timing of construction activities to avoid nesting and fledging (for example, construction activities including clearing and grubbing are scheduled to begin in January during the non-nesting season), and monitoring of potential nest locations for project activities occurring within the nesting season. Given the protections offered through implementation of environmental commitments TER-2, TER-3, TER-4, and TER-5, the potential effect of ***project construction on Swainson's hawks, western burrowing owl, white-tailed kite, and other nesting migratory birds would represent a less than significant impact.***

Construction activities have the potential to adversely affect western red bat maternity roosts. Trees within the riparian zone along the east side of the river may be removed, resulting in direct disturbance to potential western red bat maternity roosts. The Proposed Action includes environmental commitment TER-6, which would help avoid or minimize impacts on this species because biologists would survey for roosting bats prior to disturbance and take further action to avoid potential effects, if necessary. Given the protections offered through implementation of environmental commitment TER-6, ***the potential effect of project construction on western red bat would represent a less than significant impact.***

Operation.
Impact TER-2: Result in a substantial adverse effect on any species identified as a candidate, sensitive, or special-status species. The Proposed Action would have an overall beneficial effect on wildlife resources, because the recurring repair of the east side of the river channel – which under baseline conditions temporarily disturbs vegetation on the right-bank floodplain – would no longer be required. Reduced disturbance under the Proposed Action would benefit wildlife species that may use these areas. Operation and maintenance of the transport channel/fish ladder would not affect the overall quality or functioning of aquatic and upland habitats for wildlife species.

Operation and maintenance of the transport channel/fish ladder would not affect special-status wildlife species in the study area. As a result of the protections offered through implementation of the project's environmental commitments and the temporary nature of potential effects on special-status wildlife species, ***the Proposed Action would have an overall less than significant effect on special-status terrestrial wildlife species***.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

The Proposed Action, as well as the Vertical Slot Fish Ladder and Fish Bypass System Alternative, would result in only temporary effects on wildlife resources; and both include environmental commitments that would avoid or minimize effects on wildlife resources. As a result, the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative would not make a considerable contribution to the overall adverse cumulative effects on wildlife resources in the region. The No-Action Alternative could result in impacts on Pacific pond turtle and could contribute to the overall adverse cumulative effects on wildlife resources in the project region.

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3.5 Biological Resources – Vegetation and Wetland Species

3.5.1 Environmental Setting

Threatened, Endangered, and Sensitive Plant Species

Special-status plant species with the potential to occur in the study area were identified through queries of DFG's CNDDB and USFWS and California Native Plant Society (CNPS) databases for Madera and Fresno counties and/or the Oxalis, Poso Farm, Delta Ranch, Santa Rita Bridge, Bliss Ranch, Chowchilla, Dos Palos, Firebaugh NE, Hammonds Ranch, Broadview Farms, Firebaugh, and Mendota Dam 7.5-minute USGS quadrangle maps (DFG 2010a; CNPS 2010; USFWS 2010). Many of the species on the initial list of special-status plants were removed from further consideration based on habitat conditions at the study area, which has an elevation of 131 feet to 141 feet, and does not contain any vernal pools or alkali soils. The refined list of special-status species with the potential to occur in the study area is presented in Appendix H, along with their State and federal listing status. Habitat requirements for and the presence of special-status species were evaluated during early season (April 29, 2010) (see Appendix E) and late-season (September 30, 2011) rare plant surveys that followed federal and State protocols (USFWS 1996b; DFG 2009). Based on those surveys, it was determined that no special-status species occur in the study area (see Appendix H). The lack of these species in the study area is primarily based on the absence of alkali soils, vernal pools, freshwater marsh, and suitable grassland habitat (see Appendix H).

Vegetation Types

Vegetation types in the study area were assessed during April 2010 and April 2011 field surveys that followed State protocols for vegetation mapping and classification (see Appendices E and F) (CNPS Vegetation Committee 2004). Vegetation groups, alliances, and seminatural stand types in the study area are mapped in Figure 3.5-1, summarized in Table 3.5-1, and described in terms of distribution and composition in the sections that follow (mapping units other than vegetation types, such as agriculture and disturbed/developed, that appear in the vegetation map are not described).

Vegetation between the right- and left-bank levees in the study area is predominantly naturalized annual grassland, cottonwood (*Populus fremontii*) and black willow (*Salix gooddingii*) forest, and narrowleaf willow (*Salix exigua*) scrub. A small area of eucalyptus (*Eucalyptus* spp.) trees is on the left bank of the river (see Figure 3.5-1). Outside the right- and left-bank levees (which are unvegetated), the study area is disturbed/developed (for example, a fallow field, barn, and parking area) or in agricultural production (see Figure 3.5-1). The Arroyo Canal levee road is entirely unvegetated as a result of recurring and recent dredge deposits and is classified as developed/disturbed.

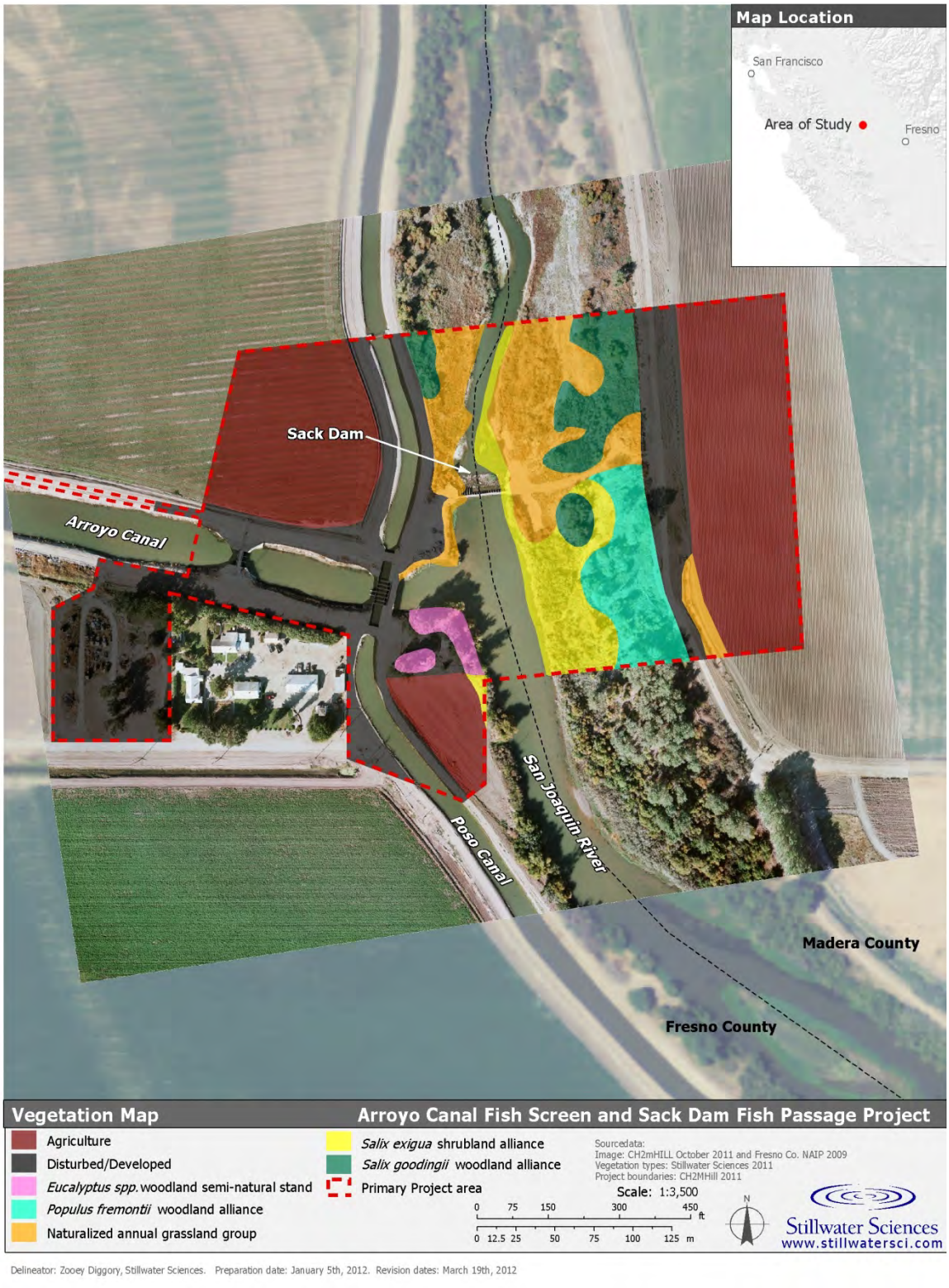

Figure 3.5-1.
Vegetation Types in the Study Area

Table 3.5-1.
Vegetation Types in the Study Area

Vegetation Type	Area (acres)
Agriculture	7.2
Disturbed/Developed	6.6
Eucalyptus spp. Woodland Seminatural Stand	0.3
Mediterranean California Naturalized Annual and Perennial Herbaceous Group (naturalized annual grassland group in Figure 3.5-1)	2.5
Populus fremontii Woodland Alliance	1.2
Salix exigua Shrubland Alliance	1.4
Salix gooddingii Woodland Alliance	1.2
Total	20.4

***Eucalyptus* spp. woodland seminatural stands** are dominated by one or more gum species in the tree canopy (Sawyer et al. 2009). In the study area, Fremont cottonwood (*Populus fremontii*), Goodding's willow (*Salix gooddingii*), and walnut (*Juglans* sp.) are interspersed within the stand. The tree canopy can be intermittent to continuous, with trees generally less than 164 feet tall, and the shrub and herbaceous layers are sparse to intermittent (Sawyer et al. 2009). Two *Eucalyptus* spp. seminatural stands occur around the barn in the disturbed/developed area south of Arroyo Canal (see Figure 3.5-1). Eucalyptus trees, which have been intentionally planted throughout California as windbreaks and ornamental plants, are listed as limited to moderate invasive species in California (California Invasive Plant Council 2007).

The **Mediterranean California naturalized annual and perennial herbaceous group** (naturalized annual grassland group in Figure 3.5-1) includes a number of grass- and forb-dominated herbaceous alliances and associations (Sawyer et al. 2009). In the study area, this group is dominated by shortpod mustard (*Hirschfeldia incana*) and nonnative bromes (*Bromus* spp.). Perennial ryegrass (*Lolium perenne*), poison hemlock (*Conium maculatum*), blessed milkthistle (*Silybum marianum*), and burr chervil (*Anthriscus caucalis*) are common associated species. Emergent shrubs and trees, such as Goodding's willow, common buttonbush (*Cephalanthus occidentalis*), and California rose (*Rosa californica*) are occasionally present at low densities. Mediterranean California naturalized annual and perennial herbaceous group dominates the left- and right-bank floodplain at and downstream of Sack Dam (see Figure 3.5-1).

The ***Populus fremontii* woodland alliance** is dominated by Fremont cottonwood in the tree layer, although a variety of trees may co-dominate (Sawyer et al. 2009). In the study area this includes primarily Goodding's willow. The *Populus fremontii* alliance is identified as a rare natural community on DFG's (2010b) List of California Terrestrial Natural Communities. The *Populus fremontii* woodland alliance can have an open to continuous canopy, typically less than 82 feet tall (Sawyer et al. 2009). In the study area, the shrub layer is generally absent, and the herbaceous layer is dominated by mugwort

(*Artemisia douglasiana*) and nonnative bromes and ryegrass. The right-bank floodplain south of Sack Dam is composed primarily of *Populus fremontii* woodland alliance (see Figure 3.5-1).

The ***Salix exigua* shrubland alliance** is dominated by narrowleaf willow, although a variety of shrubs and emergent trees may co-dominate or be present at low cover (Sawyer et al. 2009). In the study area these can include Northern California black walnut (*Juglans hindsii*), Goodding's willow, and California rose. This alliance usually has a dense, continuous shrub layer, typically less than 23 feet tall (Sawyer et al. 2009). In the study area, the herbaceous layer is dominated by nonnative shortpod mustard and bromes, but transitions to California blackberry (*Rubus ursinus*) at the southern end of the study area boundary. *Salix exigua* shrubland alliance covers the right bank near Sack Dam and is present on the left bank south of Arroyo Canal (see Figure 3.5-1). In particular, this alliance covers the sand and debris berm that is occasionally repaired on the right bank just upstream of Sack Dam to keep flows directed into Arroyo Canal.

The ***Salix gooddingii* woodland alliance** is dominated by Goodding's willow in the tree layer, although a variety of trees may co-dominate (Sawyer et al. 2009). In the study area these include Northern California black walnut, Oregon ash (*Fraxinus latifolia*), and Fremont cottonwood. The *Salix gooddingii* alliance is identified as a rare natural community on DFG's (2010b) List of California Terrestrial Natural Communities. This alliance can have an open to continuous canopy, typically less than 98 feet tall (Sawyer et al. 2009). In the study area, the shrub layer is dominated by California blackberry and saplings of the tree species listed above. Mugwort, rushes (*Juncus* spp.), and nonnative bromes dominate the herbaceous layer. *Salix gooddingii* woodland alliance occurs as a single patch on the right-bank floodplain south of Sack Dam, and along the left- and right-bank levees north of Sack Dam (see Figure 3.5-1).

Wetlands

Waters and wetlands potentially subject to the jurisdiction of USACE and DFG were delineated in the study area during an April 2011 field survey that followed USACE (1987, 2005, and 2008) protocols and Section 1600 of the California Fish and Game Code. Approximately 8.3 acres of the study area is a water of the United States, subject to the jurisdiction of USACE, and water of the State, subject to the jurisdiction of DFG. This area is roughly equivalent to the entire area between the right-bank levee and left bank of SJR and also includes a small portion of Arroyo Canal within the anticipated project disturbance area. The portion of Poso Canal within the anticipated project disturbance area would not be subject to dredge or fill activities. According to the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979), the perennially flooded portion of the river channel is considered lower perennial riverine, and the intermittently flooded portion of the SJR floodplain is considered palustrine forested/scrub-shrub.

Nonnative Invasive Plant Species

Although many nonnative plant species occur in the study area (see vegetation descriptions above), three of particular relevance to the Proposed Action occur in the

study area. Giant reed (*Arundo donax*), as well as the floating aquatic plants parrot feather (*Myriophyllum aquaticum*) and floating primrose (*Ludwigia peploides*), are listed as highly invasive plants in California that are known to spread rapidly in most aquatic and riparian systems (California Invasive Plant Council 2007). In the study area, currently, one large isolated patch of giant reed is in the center of the SJR channel upstream of the study area, and one individual plant of giant reed is on the left bank upstream of the Arroyo Canal entrance (see Figure 3.5-1). At the time of the initial field survey of the study area (April 2010), several small patches of parrot feather were near the Arroyo Canal entrance, and floating primrose lined much of the right bank of SJR (see Appendix E). At the time of the second field survey of the study area (April 2011), flow in the river was overtopping Sack Dam and no ponded areas or aquatic vegetation were visible in the study area (see Appendix F).

3.5.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines and the SJRRP Draft PEIS/R. An impact on vegetation and wetland species would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG or USFWS
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by DFG or USFWS
- Have a substantial adverse effect on federally and/or State-protected wetland as defined by Section 404 of the CWA (including, but not limited to, marsh, vernal pool, and coastal) through direct removal, filling, hydrological interruption, or other means
- Introduce or substantially spread a nonnative invasive plant species
- Conflict with any local policies or ordinances protecting vegetation and wetland resources, such as a tree preservation policy or ordinance

As described in Section 3.5.1, no candidate, sensitive, or special-status plant species are in the study area. Therefore, there would be no effects on special-status plant species under the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative. Thus, this significance criterion is not discussed further in this section.

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.5 (Environmental Commitments, Biological Resources – Vegetation and Wetland Species) presents a complete list of environmental commitments incorporated

into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

As there are no special-status plant species in the study area, the assessment of environmental consequences on vegetation and wetland resources focused on sensitive natural communities, general vegetation types, and federally and State-jurisdictional wetlands. Using a geographic information system (GIS), the vegetation and wetland maps of the study area (see Figure 3.5-1) were overlaid with each alternative's footprint (including access roads, staging areas, and the levee borrow material area) and design specifications to quantify the amount of wetland, riparian, and upland vegetation types that would be affected by each alternative's construction- and operation-phase activities, given the environmental commitments incorporated into the alternatives.

The location and primary modes of introduction and invasion of the nonnative invasive plant species in the study area were compared with each alternative's construction- and operation-phase activities and the environmental commitments incorporated into the project descriptions to evaluate the potential for the introduction and spread of nonnative invasive plant species.

Fresno and Madero county policies and ordinances related to vegetation and wetlands were reviewed to identify conflicts with each alternative's construction- and operation-phase activities (Fresno County 2000a; Madera County 1995a).

No-Action

Although dredging and repair of the east side of the river channel, which temporarily disturbs soil and vegetation, would be required more frequently as a result of the Interim and Restoration Flows, vegetation types in these areas are not sensitive natural communities, and maintenance activities do not directly remove, fill, or hydrologically interrupt a water of the United States. Therefore, the No-Action Alternative would not have a significant impact on sensitive natural communities or federally protected wetlands.

Under the No-Action Alternative, no measures would be taken to prevent the introduction of nonnative invasive plant species into the study area. In addition, recurring repair of the east side of the river channel would contribute to the spread of nonnative invasive plant species through regular soil disturbance, which favors nonnative invasive plant species establishment over that of native riparian plant species. The study area already supports a variety of nonnative invasive plant species, and these species are generally well established upstream and downstream along SJR as well. As a result, the No-Action Alternative could result in the introduction, but not likely the substantial spread, of a nonnative invasive plant species.

Although activities under the No-Action Alternative would occur within a riparian protection zone, exceptions for existing developments are provided in the Madera County and Fresno County general plans, and compensation for habitat modification is not required for nondevelopment actions such as the No-Action Alternative. Therefore, the

No-Action Alternative would not conflict with a local policy or ordinance protecting vegetation and wetland resources.

As a result of the No-Action Alternative's potential to introduce nonnative invasive plant species to the study area, it would have a significant impact on vegetation and wetland resources.

Proposed Action

Construction.

Impact VEG-1: Result in a substantial adverse effect on riparian habitat or a sensitive natural community. The Proposed Action may result in the removal of up to 2.4 acres of *Populus fremontii* and *Salix gooddingii* woodland alliances, which are identified as rare natural communities on DFG's (2010b) List of California Terrestrial Natural Communities. However, the Proposed Action includes environmental commitment VEG-1, which requires development of a restoration plan for disturbed portions of the SJR floodplain within the study area, thereby minimizing the Proposed Action's impact on these natural communities. Because the dominant species in these vegetation types are adapted to disturbance and would regrow quickly following construction, the majority of this effect would only be temporary. Suitable groundwater and floodplain inundation durations would occur to facilitate the natural recruitment and growth of *Populus fremontii* and *Salix gooddingii* woodland alliances, and nearby propagule sources (for example, seeds) would be preserved to allow for the natural regeneration of these natural communities. Given the potential for natural regeneration and the implementation of environmental commitment VEG-1, the temporary effect of project construction on *Populus fremontii* and *Salix gooddingii* woodland alliances ***would represent a less than significant impact.***

Impact VEG-2: Introduce or substantially spread a nonnative invasive plant species. Although the study area already supports a variety of nonnative invasive plant species, and these species are generally well established upstream and downstream along SJR, vehicles and equipment used during the construction of the Proposed Action could introduce or facilitate the spread of nonnative invasive plant species in the study area. Environmental commitments VEG-1 and VEG-3, which are incorporated into the Proposed Action, would prevent the introduction and substantial spread of nonnative invasive plant species during construction of the Proposed Action. ***This impact is less than significant.***

Impact VEG-3: Result in a substantial adverse effect on federally and/or state-protected wetlands. The fish screen, trash rack, transport channel/fish ladder, and Sack Dam replacement installed under the Proposed Action would permanently affect approximately 1.4 acres of federally and State-jurisdictional waters and wetlands, through the placement of concrete, fill, and metal materials within the ordinary high water mark of SJR and Arroyo Canal. The installation of such infrastructure would not, however, affect the quality or functioning of this federally and State-jurisdictional water. In addition, the Proposed Action includes environmental commitment VEG-2, requiring compliance with permit terms associated with Section 404, Section 401, and Section 1602 permits for impacts on waters of the United States and State that cannot be avoided.

This would ensure that the placement of infrastructure within a federally and State-jurisdictional water and wetland would not result in a net loss of wetland functions and values. ***This impact is less than significant.***

Impact VEG-4: Conflict with local policies or ordinances protecting vegetation and wetland resources. Although activities under the Proposed Action would occur within a Fresno and Madera county riparian protection zone, the effects on riparian habitat would only be temporary. Therefore, the Proposed Action would not conflict with a local policy or ordinance protecting vegetation and wetland resources. ***This impact is less than significant.***

Operation. Operation of the Proposed Action would have an overall beneficial effect on vegetation and wetland resources because the recurring repair of the east side of the river channel, which temporarily disturbs vegetation on the right-bank floodplain, that occurs under baseline conditions would no longer be required. Reduced disturbance under the Proposed Action would facilitate the regrowth of *Populus fremontii* and *Salix gooddingii* woodland alliances following construction, favoring the establishment of native plant species over nonnative invasive species, and would promote Fresno and Madera County policies for riparian habitat protection. There would be an overall beneficial effect on riparian habitat and sensitive natural communities as a result of operation of the Proposed Action.

Operation and maintenance of the fish screen, trash rack, transport channel/fish ladder, and Sack Dam replacement would not affect the overall quality or functioning of federally and State-jurisdictional waters and wetlands. There would be no impact on waters and wetlands as a result of operation of the Proposed Action.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be similar to impacts discussed under the Proposed Action, except for the amount of federally and State-protected wetlands affected.

Impact VEG-5: Result in a substantial adverse effect on federally and State-protected wetlands. Similar to the Proposed Action, implementation of the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in permanent impacts on approximately 1.4 acres of federally and State-jurisdictional waters and wetlands through the placement of concrete, fill, and metal materials within the ordinary high water mark of SJR. As with the Proposed Action, the installation of such infrastructure and operation of the Vertical Slot Fish Ladder and Fish Bypass System Alternative would not affect the quality or functioning of this federally and State-jurisdictional water. The Vertical Slot Fish Ladder and Fish Bypass System Alternative also would implement environmental commitment VEG-2, which would further prevent adverse effects of the placement of infrastructure within a federally and State-jurisdictional water and wetland. ***This impact is less than significant.***

Operation. Impacts resulting from operation of the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed

Action. There would be overall beneficial effects on riparian habitat and sensitive natural communities, and no impact on waters and wetlands.

Cumulative Effects

The Proposed Action, as well as the Vertical Slot Fish Ladder and Fish Bypass System Alternative, would result in only temporary effects on vegetation resources; and both include environmental commitments that would avoid or minimize effects on vegetation and wetland resources to less than significant levels. As a result, the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative would not make a considerable contribution to the overall adverse cumulative effects on vegetation and wetland resources in the region. The No-Action Alternative could result in the introduction of nonnative invasive plant species and would contribute to the overall adverse effects on vegetation and wetland resources in the region as a result of nonnative invasive plants.

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3.6 Cultural Resources

Cultural resources are those resources listed or considered eligible for listing in the NRHP; they include prehistoric and historic-era archaeological sites, Traditional Cultural Properties, Sites of Religious and Cultural Significance, engineered structures such as dams and irrigation systems, and architectural properties such as buildings and bridges. This section outlines the environmental and regulatory settings for cultural resources, as well as the environmental consequences and mitigations pertaining to cultural resources resulting from implementation of the Proposed Action, the Vertical Slot Fish Ladder and Fish Bypass System Alternative, or the No-Action Alternative consistent with NEPA and CEQA Guidelines.

3.6.1 Environmental Setting

The project vicinity is along SJR and the Arroyo Canal, and with the exception of the floodplains adjacent to the river, the surrounding areas are agricultural. Prior to European contact, agricultural modifications, reclamation, and historical disturbance, the study area consisted of a riparian corridor rich in resources exploited by the Native Americans that lived in the region.

The APE for the purposes of this section encompasses all activity areas associated with the construction and maintenance of the Proposed Action, including staging areas and access roads. The maximum depth of excavation is associated with the abutments for the new Poso Canal bridge and the transport channel/fish ladder. Removal of borrow material from the right or north Arroyo Canal levee would entail excavation of 1 to 6 feet of sediment from the top of the levee.

Cultural Setting

Prehistoric Context. The closest available prehistoric chronology for the study area comes from the west side of the San Joaquin Valley as a result of the excavations at several sites during archaeological efforts for reservoir construction of the San Luis, Los Banos, and Little Panoches Reservoirs. The chronology is most clearly presented by Olsen and Payen (1969) and Moratto (1984).

Most Pleistocene- and Holocene-epoch archaeological sites are deeply buried in accumulated gravels and silts or have eroded away. The earliest sites in the San Joaquin Valley are believed to be the Farmington Complex sites in San Joaquin and Stanislaus counties (Riddell 1949; Treganza 1952), the Tranquility site in Fresno County (Riddell 1949; Treganza 1952), and the Witt site in Kings County (Riddell and Olsen 1969; Wallace 1991).

The Positas Complex (5200 to 4600 before present [B.P.]) is characterized by small, shaped mortars; cylindrical pestles; milling stones; perforated flat cobbles; small flake scrapers; handstones; and spire-lopped Olivella beads (Mikkelsen and Hildebrandt 1990).

The Pacheco Complex (4600 to 1600 B.P.) is divided in two time periods. Pacheco Complex A (3600 to 1600 B.P.) exhibits spire-ground Olivella beads, perforated canine teeth, bone awls, whistles, grass saws, large stemmed and side-notched points, flexed burials, millingstones, mortars, and pestles. Pacheco Complex B (4600 to 3600 B.P.) is characterized by foliate bifaces, rectangular shell ornaments, flexed burials, and thick rectangular Olivella beads (Mikkelsen and Hildebrandt 1990; Olsen and Payen 1969).

The Gonzaga Complex (1600 to 1000 B.P.) is characterized by extended and flexed burials; bowl mortars; shaped pestles; squared and tapered-stem points; few bone awls; distinctive shell ornaments; and thin rectangular, split-punched, and oval Olivella beads (Mikkelsen and Hildebrandt 1990; Olsen and Payen 1969).

The Panoche Complex (400 to 200 B.P.) is recognized by large circular structures (pits), flexed burials and primary and secondary cremations, varied mortars and pestles, bone awls, whistles, small side-notched points, clamshell disk beads, and other bead types. The Panoche Complex appears to represent Yokuts occupation of the valley (Mikkelsen and Hildebrandt 1990; Olsen and Payen 1969).

Ethnographic Context. The aboriginal inhabitants of the study area are known as the Northern Valley Yokuts. "Yokuts" is a term applied to a large and diverse number of peoples inhabiting the San Joaquin Valley and Sierra Nevada foothills of central California. The Yokuts cultures include three primary divisions, corresponding to gross environmental zones: the Southern San Joaquin Valley Yokuts, the Foothill Yokuts, and the Northern San Joaquin Valley Yokuts (Kroeber 1976).

The Northern Valley Yokuts were seasonally mobile hunter-gathers with semipermanent villages, and relied heavily on acorns, processed into a thick soup, as a food staple, along with salmon and other fish, grass seeds and tule roots (which were processed into meal), and probably water fowl, tule elk, and pronghorn (Wallace 1978).

Principal settlements were located on the tops of low mounds, on or near the banks of larger watercourses. Settlements were composed of single-family dwellings, sweathouses, and ceremonial assembly chambers. Dwellings were small and lightly constructed, semi-subterranean and oval. The public structures were large and earth covered. Sedentism was fostered by the abundance of riverine resources in the area (Wallace 1978).

The Yokuts first came into contact with Europeans when Spanish explorers visited the area in the late 1700s, possibly followed by expeditions to recover Native Americans who had escaped from the missions. The loss of individuals to the missions, the influence of runaway neophytes, various epidemics in the 1800s, and the arrival of settlers and miners contributed to the disintegration of Yokuts culture (Wallace 1978). Although nearly obliterated, the descendants of the Northern Valley Yokuts still live in Fresno and Madera counties today and continue to rebuild their cultural identity.

Historic Context. The historic context has been described in detail in several documents prepared for or in relation to the Proposed Action (see Byrd et al. 2009). The following is a summary of the agricultural development of the region as it applies directly to the Proposed Action.

Farms built along SJR in the late 1840s and 1850s took advantage of the area's good soil, abundant water, and mild climate. Reclaiming that land from its natural state and converting it to productive agricultural uses began in the 1850s. Farmers used the river for irrigation and as a means for transporting crops to markets, but river flows were unpredictable; there was either too much water or not enough. Reclamation – a process that includes draining of swamps and marshes, building levees, and constructing water conveyance systems – would become the most significant force altering the Central Valley's ecology (Igler 2001).

In the late 1800s and early 1900s, private irrigation developers in the Central Valley would purchase large amounts of land and would divide them into "colonies" that were planned irrigation communities. Miller and Lux had land in the area around Arroyo Canal where the Proposed Action is located. The Proposed Action is located within the Miller and Lux Company, a large-scale cattle ranching operation that owned several subsidiary businesses, including irrigation systems. The Miller and Lux irrigation company provided water for thousands of acres of land in Fresno, Merced, and Stanislaus counties. As a public utility company, between 1871 and 1878, the company built 67 miles of canal between the west bank of SJR near its confluence with Fresno Slough to its terminus at Orestimba Creek (Byrd et al. 2009).

Prior to 1929, Sack Dam consisted of a temporary diversion structure made of sacks filled with sand and soil. In 1929, the San Luis Canal Company built a permanent dam made of concrete and wood as a replacement for the diversion canal. Today, HMRD has jurisdiction over Sack Dam and is in charge of any modifications, improvements, and maintenance of the dam (Orfila 2010).

3.6.2 Environmental Consequences

Significance Criteria

CEQA defines three ways that a cultural resource may qualify as a historical resource for the purposes of CEQA review:

- The resource is listed in or determined eligible for listing in the California Register of Historical Resources (CRHR).
- The resource is included in a local register of historical resources, as defined in Public Resources Code (PRC) 5020.1 (k), or is identified as significant in a historical resource survey meeting the requirements of PRC 5024.1 (g) unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
- The lead agency determines the resource to be significant as supported by substantial evidence in light of the whole record (14 California Code of Regulations 15064.5[a]).

The CEQA statutes define a historical resource as "a resource listed or eligible for listing in the California Register of Historical Resources (CRHR)" (PRC 5024.1). A historical

resource may be eligible for inclusion in the CRHR if it meets any of the following criteria:

- It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- It is associated with the lives of persons important in our past.
- It embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values.
- It has yielded, or may be likely to yield, information important in prehistory or history.

In addition, CEQA distinguishes between two classes of archaeological resources: archaeological sites that meet the definition of a historical resource as defined above, and "unique archaeological resources." An archaeological resource is considered "unique" if it meets the following criteria:

- It is directly associated with an event or person of recognized significance in California or American history or recognized scientific importance in prehistory.
- It can provide information that is of demonstrable public interest and is useful in addressing scientifically consequential and reasonable research questions.
- It has a special or particular quality such as oldest, best example, largest, or last surviving example of its kind (PRC 21083.2).

An impact on cultural resources would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Substantial adverse change in the significance of a historical resource
- Substantial adverse change in the significance of any archaeological resources
- Disturbance of any human remains

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.6 (Environmental Commitments, Cultural Resources) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

The cultural resources inventory efforts for the study area consisted of conducting a records search at the California Historical Resources Information System, reviewing existing literature and conducting archival research, conducting a pedestrian survey of the

study area, monitoring geotechnical investigations, and contacting the NAHC and Native American representatives.

Records Search and Literature Review. A records search was requested from the Southern San Joaquin Valley Information Center of the California Historical Resources Information System at California State University, Bakersfield, on April 28, 2011. The records search was received on May 18, 2011, and included information from the State's database of previous studies. The search documented cultural resources, as well as pertinent historical inventories and historic maps, for the APE and a 0.25-mile radius around the APE. The records search indicated that no previous studies have been conducted within the APE, and one study has been completed within a 0.25-mile radius of the APE. The records search also indicated that no known or recorded cultural resources are located within the APE or 0.25-mile radius of the APE.

ICF reviewed reports provided by Reclamation, including a study for the Sack Dam Gates Installation Project (Bruce 2010), and sensitivity study and research design for the SJRRP (Byrd et al. 2009). The APE for the 2010 study included Sack Dam and resulted in the recordation and evaluation of this resource. Sack Dam was recommended not eligible for listing in the NRHP, and SHPO concurred with this recommendation. The Byrd et al. (2009) sensitivity study includes a geoarchaeological assessment that addresses the potential for buried archaeological resources to occur in the program area, including the present APE. The analysis was based on the distribution of Quaternary-aged landforms, reasoning that landforms of younger (more recent) age have generally greater potential to conceal older, buried archaeological materials. The present APE is situated on landforms that are mapped as historical and modern (150 to 0 calibrated B.P.) and latest Holocene (2000 to 150 calibrated B.P.) in age. The area surrounding Sack Dam and a portion of the APE along Arroyo Canal are on sediments considered highly sensitive for the presence of buried archaeological resources. The stretch of APE along Arroyo Canal from 0.25 mile downstream of Sack Dam to 0.5 mile downstream (west) of the Jerrold Avenue crossing is mapped as having low sensitivity, but very high sensitivity for buried archaeological resources west of this point (Byrd et al. 2009, Figure 9; Meyer et al. 2009, Figure 29.).

Correspondence with Native Americans. A search of the NAHC's sacred lands database and a list of Native American representatives for Madera and Fresno counties were requested on December 5, 2011. No answer was received as of January, and on January 4, 2012 a new request was sent to NAHC. On January 5 and 10, 2012, NAHC responded, stating that no known Native American resources or sacred sites were located within the APE. NAHC also provided a list of Native American representatives who might have information about the APE or be interested in the project. On January 16, 2012, ICF sent letters describing the project with attached maps illustrating the APE to all of the Native American representatives and requesting their input and concerns. As of the date of this writing, one response was received from Table Mountain Rancheria. Mr. Bob Pennell, Cultural Resources Director for Table Mountain Rancheria, sent a response indicating that the proposed undertaking is beyond their area of interest.

Other Correspondence. On January 12, 2012, ICF initiated correspondence with local historical societies and museums, including the Fresno County Historical Society and the

Madera County Historical Society. ICF's intent behind this effort was to obtain any information these organizations might have in their collections pertaining to the built-environment resources within the APE (for example, historic photographs, maps, biographical histories, and manuscripts). Outgoing correspondence included a letter describing the project and a map depicting the APE. In addition, ICF followed up on written correspondence with phone calls on April 24, 2012, to both organizations, reached automated voicemail boxes, and left detailed messages conveying the research query and requesting a return phone call. As of the date of this writing, no responses have been received.

Archaeological Resource Survey Methods. On April 15, 2011, an ICF archaeologist, Andrea Nardin, conducted a pedestrian survey of all accessible portions of the APE. Staging areas within cultivated agricultural fields west of the SJR, and south of the Arroyo Canal, were not surveyed because of a lack of access. The areas that were surveyed were examined using transects spaced no more than 10 meters apart. Visibility was generally poor except along access and levee roads, which did not offer an opportunity to view undisturbed ground. Where possible, areas of open soil, excavation, or erosion were examined carefully for evidence of cultural resources. This inventory did not result in the discovery or documentation of any archaeological resources.

Ms. Nardin examined geotechnical trenches (termed "test pits") on November 3, 2011, to characterize the depositional sequence and potential for buried archaeological sites in the APE. Four test pits were excavated in the eastern portion of the APE, which consists of the leveed SJR floodplain, and four test pits were excavated along the north or right levee of the Arroyo Canal. Test pits were excavated between 30 inches wide and 10 feet long to between 18 inches wide and 10 feet long. Test pits were mechanically excavated 4 to 9 feet deep. The stratigraphy of the soil demonstrated continuous floods with a mixture of depositional layers, indicating highly disturbed context. Additionally, a total of 10 soil borings were drilled between November 14 and November 18, 2011. Borings were not monitored because little soil is visible in this process. No archaeological materials were noted in the test pit sidewalls.

The geotechnical excavations demonstrated that the APE is composed of floodplain deposits. During the monitoring of the test pits, it was very easy to see the effect of the floods on the soil. The stratigraphy of the APE is discussed in two sections below, the first focusing on the SJR floodplain in the eastern part of the APE (Test Pits 1 through 4), the second on the remaining test pits along Arroyo Canal.

Test Pits 1 through 4 revealed a floodplain depositional sequence of fine- to medium-grained sand or poorly graded sand from the ground surface to depths of 80 centimeters (cm) to 120 cm below ground surface. The surface landform is mapped as Columbia fine sandy loam. These sediments are light in color and loose. Roots were present in the upper 50 cm of Test Pits 1 and 2, and the four floodplain trenches generally exhibited siltation with increasing depth. Test Pit 2 revealed a 10-cm-thick sandy silt stratum at 120 cm to 130 cm below ground surface. This stratum is gray and contains about 30 percent fine sand, which is consistent with a gray (10 YR 6/1) silty clay loam Ab horizon documented in Columbia fine sandy loam at depths of 140 cm to 150 cm below ground surface. The sandy silt stratum is underlain by poorly graded sand and silt to the bottom of the trench.

These two strata likely represent a buried landform. Trenches 1, 3, and 4 exhibited similar pulses of finer textured sediments at depths of 90 to 100 cm, 100 to 110 cm, and 80 to 90 cm, respectively, representing an interval dominated by overbank deposition. The relative thinness of these deposits and their mantle of overlying coarse sediments suggest that preservation of archaeological materials—if present anywhere in the APE—may be poor. Nevertheless, at depths varying from 80 cm to 120 cm, the APE east of SJR harbors a buried land surface that might have been exposed long enough to foster human occupation.

Test Pits 5 through 8 were all excavated into Bolfar loam. The trenches reached depths of 220 cm to 280 cm and were dug in the right or north Arroyo Canal levee. Like Test Pits 1 through 4, the upper stratum of the test pits consisted of gray-brown or light brown silty sand, sand, or silty clayey sand. Test Pit 5 exhibited this sort of profile throughout the trench. Test Pits 6 and 8 consisted of silty clayey sand and clayey sand, respectively. No evidence for paleosols was observed. Test Pit 7 revealed an apparent paleosol, however, beginning at 100 cm below ground surface and extending to the bottom of the trench (170 cm). This layer is a dark, friable silty loam similar to a buried, gleyed A horizon that was identified about 0.25 mile northeastwest of Test Pit 7 (Arroues 2006).

Historic Built-Environment Survey Methods. On April 15, 2011, ICF architectural historian David Lemon conducted an inventory of all buildings, structures, and linear features 45 years old or older within the APE. The resources were inspected, photographed, and documented using written notes.

Cultural Inventory Results. Historical research and the pedestrian survey of the APE resulted in identification of three historic era built-environment resources (the Poso Canal segment and flume, the Arroyo Canal segment, and the storage building) 45 years old or older. These resources were recorded during the survey and are being evaluated for listing in the NRHP and CRHR. The storage building located within the APE does not appear to be eligible for listing because it lacks integrity and does not meet any of the NRHP criteria.

Sack Dam is also located within the APE. In December 2010, the SHPO concurred with Reclamation's determination that Sack Dam is not eligible for listing in the NRHP or the CRHR. Therefore, no known historic properties are present within the APE.

No-Action

Under the No-Action Alternative, existing site features would remain and there would not be any vegetation removal, construction, or new site features. In addition, ongoing maintenance and repair activities would continue, so there would be no impact on cultural resources.

Proposed Action

Construction.

Impact CUL-1: Impacts on archaeological resources in the APE. No known archaeological resources are within the APE. However, portions of the APE have not been examined for archaeological resources due to lack of access, including the potential

staging areas west of SJR and south of the Arroyo Canal. Should archaeological resources be located within that area, and should they be eligible for listing in the NRHP, construction of the Proposed Action may lead to disturbance or destruction of those resources, which would be an adverse effect. However, implementation of environmental commitment CUL-1, which has been incorporated into the Proposed Action, would minimize the potential for impacts on archaeological resources with surface components because the area would be subjected to pedestrian survey and any resources that were discovered would be evaluated and appropriately mitigated if necessary. ***This impact is less than significant.***

Impact CUL-2: Inadvertent discovery of archaeological resources or site. There is a potential for earth-moving activities associated with the Proposed Action to uncover buried archaeological resources. It is not expected that in-river construction would encounter archaeological resources, because disturbance would largely be limited to sediments that have been recently deposited and constantly moving. The borrow material on the north levee would be expected to be previously disturbed. Additionally, the recent sediments along the river channel have a low potential to contain archaeological resources. Although the likelihood is low, there is still potential to encounter unanticipated archaeological resources during construction activities because examination of the geotechnical trenches and comparison of the resulting data with county soil surveys and Byrd et al. (2009) suggest that much of the APE contains a buried land surface at approximately 3 feet below present grade. This land surface was potentially stable long enough to support human occupation and, therefore, could contain archaeological deposits that are not evident on the current ground surface. Although no archaeological materials were observed in the eight geotechnical trenches, they constitute a small sample of proposed project excavation. Moreover, the trenches did not sample deeper than 10 feet below ground surface, leaving open the possibility that conditions favorable to the deposition and preservation of archaeological materials are present between 10 and 20 feet below ground surface.

However, implementation of environmental commitment CUL-2, which has been incorporated into the Proposed Action, would ensure that work stops if cultural resources are encountered during earthmoving activities and that a recovery plan is implemented. Environmental commitment CUL-2 would minimize the potential for damage to significant archaeological resources during earthmoving activities, because inadvertent discoveries would be evaluated and, if eligible, treated appropriately. Environmental commitment CUL-2 also recognizes that additional measures to protect potential buried archaeological resources may be determined during the Section 106 consultation process between Reclamation and SHPO. ***This impact is less than significant.***

Impact CUL-3: Inadvertent discovery of undiscovered prehistoric or historic human remains. Interred human remains are not known to be located within or adjacent to the study area and, thus, are not anticipated to be found. However, it is possible that construction activities associated with the Proposed Action could result in the inadvertent discovery of buried human remains. Implementation of environmental commitment CUL-3, which has been incorporated into the Proposed Action, would ensure compliance with State and federal laws pertaining to the discovery of human remains. ***This impact is less than significant.***

Impact CUL-4: Impacts on historic properties. The three architectural resources within the APE, including the Arroyo Canal, the Poso Canal and Flume, and the storage building, were recorded during the survey and are being evaluated for listing in the NRHP and CRHR. The storage building located within the APE does not appear eligible for listing in the NRHP or California Register of Historic Places.

Regardless of their eligibility, it is anticipated that the Proposed Action would have no adverse effect on the conveyance system segments and and associated structures, because the Proposed Action, which includes components such as replacement of the bridge over Poso Canal, installation of the fish screen cofferdam, and the fish ladder/transport channel would not modify these historic resources to the extent that they would no longer continue to function as they have since their original construction—as structures that convey and distribute water.

Environmental commitment CUL-4 would require completion of the Section 106 process prior to the implementation of the ground disturbing actions that have the potential to have an impact on historical and/or archaeological resources. Section 106 consultation may result in additional studies and/or monitoring avoidance measures, or the execution of a Memorandum of Agreement to resolve adverse effects as outlined in the regulations at 36 CFR Part 800.6. ***This impact is less than significant.***

Operation. Operational activities for the Proposed Action would require routine maintenance, as necessary, and would generally be conducted during the low-demand period in December and January. These activities are consistent with existing activities; therefore, there would be no impacts on cultural resources resulting from the Proposed Action.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

As described in the SJRRP Draft PEIS/R, cumulative impacts on cultural resources could occur within the project area. Although the projects comply with CEQA and Section 106 and mitigate losses of cultural resources, usually through documentation or data recovery, the resources are still lost. There is no way to move or re-create these resources. Loss of archaeological resources through inadvertent discover and accidental destruction and loss of archaeological and architectural resources through implementation of projects would add to the historical trend in losses of these resources. However, although both the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative have the potential to result in impacts on cultural resources, environmental commitments incorporated into the Proposed Action reduce that potential to below a level of significance. Additionally, there are no adverse effects to historic properties. Therefore,

there is little potential for the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative to contribute to a cumulative impact on cultural resources.

3.7 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994), requires agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities, as well as the equity of the distribution of the benefits and risks of their decisions. Environmental justice addresses the fair treatment of people of all races and income levels with respect to actions affecting the environment. Fair treatment implies that no person or group of people should bear a disproportionate share of negative impacts resulting from an environmental action. To comply with the environmental justice policy established by the Secretary of the Interior, U.S. Department of the Interior agencies are to identify and evaluate any direct or indirect anticipated effects (from the Proposed Action or decision) on minority and low-income populations and communities, including the equity of the distribution of the benefits and risks. This section examines the anticipated impacts associated with the alternatives with respect to potentially affected minority and economically disadvantaged groups.

3.7.1 Environmental Setting

The following subsections describe the race, ethnicity, and income trends for Fresno, Madera, and Merced counties. Although the Proposed Action is located within Fresno and Madera counties, Merced County is within the geographic scope of the study area and may experience impacts associated with the Proposed Action; therefore, Merced County is also included in this analysis.

Race and Ethnicity Trends

Fresno County. The majority of the population living in Fresno County is white; however, persons of Hispanic or Latino origin comprise more than 50 percent of the total population. Table 3.7-1 presents the race and ethnic percentages for Fresno County and the City of Firebaugh, as compared to the State.

Madera County. The majority of the population living in Madera County is white; however, persons of Hispanic or Latino origin comprise approximately 54 percent of the total population. Table 3.7-1 presents the race and ethnic percentages for Madera County and the City of Madera, as compared to the State.

Merced County. The majority of the population living in Merced County is white. Persons of Hispanic or Latino origin comprise more than 50 percent of the population. Table 3.7-1 presents the race and ethnic percentages for Merced County and the City of Los Banos, as compared to the State.

Table 3.7-1.
Race and Ethnic Population Percentages – Census 2010

Location	White Persons[1]	Black Persons[1]	American Indian and Alaska Native[1]	Asian[1]	Native Hawaiian or Other Pacific Islander[1]	Persons Reporting Two or More Races	Persons of Hispanic or Latino Races[2]	White Persons, not Hispanic
Fresno County	55.4	5.3	1.7	9.6	0.2	4.5	50.3	32.7
Firebaugh	62.5	0.9	1.5	0.5	0.0	3.1	91.2	7.5
Madera County	62.6	3.7	2.7	1.9	0.1	4.2	53.7	38.0
City of Madera	49.9	3.4	3.1	2.2	0.1	4.4	76.7	16.9
Merced County	58	3.9	1.4	7.4	0.2	4.7	54.9	31.9
Los Banos	58	3.8	1.4	3.2	0.4	5.1	64.9	26.5
California	57.6	6.2	1.0	13.0	0.4	4.9	37.6	40.1

Source: U.S. Census Bureau 2011.
Notes:
[1]Includes persons reporting only one race.
[2]Hispanics may be of any race, so also are included in applicable race categories.

Income Trends

In 2009, the median household income for Fresno and Madera counties was $45,219 and $42,716 (U.S. Census Bureau 2011), respectively. The State's median household income was $58,925. In 2009, Fresno County reported 21.5 percent and Madera County reported 20.6 percent of their populations living below the poverty level. The State reported 14.2 percent of its population living below the poverty level.

3.7.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An environmental justice impact would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in the following in the study area:

- Disproportionately high, adverse impact on minority and low-income populations if such an impact occurs with greater frequency for these populations than for the general population as a whole

Environmental Commitments Incorporated into the Proposed Action

No environmental commitments associated with environmental justice have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

No-Action

Under the No-Action Alternative, the Proposed Action would not be constructed. There would be no resulting impacts on minority or low-income groups resulting from the No-Action Alternative.

Proposed Action

Construction. The Proposed Action would include construction activities that would result in the increased need for laborers. Potential impacts on minority and low-income populations resulting from implementation of the Proposed Action have been reviewed, and no population, including minority or low-income populations, would bear a disproportionate environmental or human-health effect as a result of the Proposed Action. ***There would be no environmental justice effects resulting from construction of the Proposed Action***.

Operation. Operational activities for the Proposed Action would require routine maintenance, as necessary, and would generally be conducted during the low-demand period in December and January. These activities are consistent with existing activities; therefore, ***there would be no impacts on environmental justice resulting from the Proposed Action***.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

Because the Proposed Action would have no impacts on environmental justice, there would be no cumulative environmental justice effects.

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3.8 Geology and Soils

3.8.1 Environmental Setting

Geologic and mineral resources in the study area were evaluated through a review of existing information and a June 2010 field survey by Stillwater Sciences (see Appendix E).

Soils

The valley floor of the Central Valley Province, in which the study area is situated, is composed of unconsolidated to semi-consolidated, continental alluvium that has deposited continuously during the Quaternary Period (last 2.6 million years) (CGS 2010a). The Sierra Nevada and Coast ranges are the source of these sediments; SJR and its tributaries together serve as the conduits through which these sediments are transported downstream to the valley floor. The texture of soils along the valley floor and streambanks in the vicinity of the study area has been classified primarily as a non-expansive, sandy loam without clay (valley basin soils, imperfectly drained) that possesses moderate erosion potential (Reclamation and DWR 2011). In general, a "sandy loam" soil classification describes a soil material that is composed of more than one-half sand and less than one-half silt and has low to no internal cohesion, or strength. A review of mapped soils in the study area confirms that soils present on the valley floor (such as agriculture fields) outside of the flood control levees and on the floodplain and river banks inside of the levees are predominantly composed of fine sandy loam (Natural Resources Conservation Service 2010) (see Table 3.8-1). Field observations of soil exposures on the river floodplain inside of the levees further confirmed that the dominant soil texture present in the study area is a sandy loam with some organics (see Appendix E).

Mineral Resources

The vicinity of the study area has limited mineral resources that are situated well downstream of the primary aggregate extraction areas located in Reach 1 (McBain & Trush, Inc. 2002). Although gold was historically mined from the SJR bed, there are no current gold extraction operations remaining on any part of the river (Reclamation and DWR 2011).

Geologic Hazards

Seismicity and Neotectonics. Minor tectonic activity occurs in the San Joaquin Valley as part of the overall motion of the microplate that comprises the Sierra Nevada mountains and the Central Valley, which accommodates motion between the North American Plate to the east and the Pacific Plate to the west, principally along the San Andreas Fault (Reclamation and DWR 2011). Right-lateral movement of this microplate relative to the North American Plate has been estimated at 0.4 inches to 0.6 inches per year, while its right-lateral motion compared to the Pacific Plate to the west is nearly four

times higher, at 1.5 inches to 1.6 inches per year (Wakabayashi and Sawyer 2001, as cited in Reclamation and DWR 2011).

Table 3.8-1.
Soil Types in the Study Area

Mapping Area[1]	Map Unit Symbol	Map Unit Name
Fresno County (CA653) – West Side of the Study Area	320	Elnido sandy loam, drained – 0 to 1% slopes
	941	Bisgani-Elnido association – 0 to 1% slopes
Madera County (CA651) – East Side of the Study Area	CmdA	Columbia fine sandy loam, moderately deep, and deep over hardpan – 0 to 1% slopes
	CmtA	Columbia fine sandy loam, moderately deep, and deep over temple soils – 0 to 1% slopes
	CoA	Columbia loamy sand – 0 to 1% slopes
	CotA	Columbia loamy sand, over temple soils – 0 to 1% slopes
	CrB	Columbia soils, channeled – to 8% slopes
	FcbA	Foster loams, moderately deep, and deep over temple soils, moderately saline-alkali – 0 to 1% slopes
	Rh	Riverwash

Source: Natural Resources Conservation Service 2010.

Note:
[1] Within the study area, SJR forms the boundary between Fresno and Madera counties.

Several mapped active and potentially active faults and fault zones are located within 100 miles of the study area. These identified faults lie along the valley margins and mountain foothills, and very few faults are present on the valley floor. In proximity to the study area, the San Andreas Fault Zone lies approximately 46 miles to the southwest within the Coast Range (CGS 2010b). Active faults (Bryant and Hart 2007) are defined as faults along which seismically induced (tectonic) displacement has occurred in the past 11,000 years (the Holocene epoch). The California Division of Safety of Dams criterion for active faults (Fraser 2001) is noted displacement within the last 35,000 years. Potentially active faults are defined as faults along which tectonic displacement has occurred during the Pleistocene epoch[5] (Bryant and Hart 2007), or between 11,000 years and 2.6 million years B.P. Inactive faults are defined as faults along which tectonic displacement has not occurred since before this time (that is, before the Quaternary period).

The Alquist-Priolo Earthquake Zoning Act (Bryant and Hart 2007) establishes zones around "sufficiently active and well-defined" faults in California wherein site-specific

[5] The beginning of the Pleistocene epoch was officially changed in 2009 from 1.6 to 2.6 million years B.P. (Walker and Geissman 2009). The California Geological Survey's Special Publications 42 (Bryant and Hart 2007), from which the definitions of "potentially active faults" and "inactive faults" originate, predates this amendment and, therefore, defines the Pleistocene epoch as occurring between 11,000 years and 1.6 million years B.P.

fault location studies are required to mitigate fault surface rupture hazards prior to construction intended for human occupancy. There are no "zoned" faults within the vicinity of the study area. The closest zoned faults to the study area are the Ortigalita Fault, located 25 miles southwest; the Calaveras Fault, located 50 miles west; the aforementioned San Andreas Fault; the Nunez Fault, located 50 miles south; and the Greenville Fault, located 60 miles northwest.

Valley Deformation and Subsidence. The paucity of active and potentially active faults within the San Joaquin Valley indicates that deformation is minimal relative to deformation in the bordering mountain ranges. Lettis and Unruh (1991) reported that the valley sediments are deformed into a broad, asymmetrical trough with its axis positioned approximately 12 miles to 19 miles west of SJR. Subsidence in the valley is active and has been estimated to be at least 0.008 inch to 0.016 inch per year (Lettis and Unruh 1991). In total, approximately half of the San Joaquin Valley has subsided at least 1 foot over the past century, with the maximum having occurred near Mendota (McBain & Trush, Inc. 2002). Subsidence has been attributed to both tectonic activity (such as Coast Range thrust motion) and human induced impacts, chiefly from groundwater pumping for irrigation (hydrocompaction).

Groundshaking and Liquefaction. The hazard potential from earthquake groundshaking is low throughout much of the central portion of the San Joaquin Valley. Review of a groundshaking hazard map published by the CGS (Branum et al. 2008) reveals that there have been no historical earthquakes measuring greater than Magnitude 5 recorded in the vicinity (within 25 miles) of the study area. Accordingly, risks of liquefaction—the process by which saturated, unconsolidated sediments (or soils) are transformed into a semi-fluid substance during seismic events—in the vicinity of the study area are considered to be low because of the low risk of earthquake and groundshaking hazard risk (Reclamation and DWR 2011). However, liquefaction risks do exist and should be evaluated for the proposed facilities, because unconsolidated sediments and shallow groundwater (or irrigated surface soils) occur throughout the valley.

Erosion. In general, soil characteristics that influence erosion potential are soil texture and structure, particle size, permeability, infiltration rate, and the presence of organic or other cementing materials (Reclamation and DWR 2011). Erosion potential can be further influenced by natural and anthropogenic factors, including topography, vegetation, precipitation, runoff, and human disturbance. On the floor of the low-lying, relatively flat SJR valley, erosion potential is generally limited to fluvial action (bank erosion), agriculture practices (such as soil loss from farming activities), and infrastructure construction (such as road building and development) (Reclamation and DWR 2011). Erosion and deposition dynamics are discussed further in the Geomorphology section below.

Geomorphology

Geomorphology is the study of landforms and the processes that modify them over time, encompassing spatial and temporal scales that range from the instantaneous motion of individual soil or sediment particles in rivers during floods to the uplift of entire

mountain ranges over millions of years. Geomorphology of SJR within the study area is strongly linked to hydrology, soil conditions, water resources, and land use activities. In turn, geomorphic conditions and their frequency of change are together a primary control on aquatic and terrestrial habitats. Geomorphic conditions in the study area were evaluated as part of a literature review and field survey effort in support of this EA/IS (see Appendix E). The remainder of this subsection abbreviates that evaluation.

The SJR channel in the vicinity of the study area is a meandering, sand-bedded, single-thread channel. The channel upstream of Sack Dam (within Reach 3) is moderately confined; historically by natural floodplain levees and splays but currently confined on both banks by man-made structures, including canal embankments and flood protection levees. Downstream of Sack Dam (within Reach 4A), the same man-made structures (such as levees and Poso Canal) border the river, but the active river channel is significantly narrower than above the dam due to the reduction in base flow as water above the dam is diverted into Arroyo Canal. The active channel here is bordered by a narrow floodplain with dense vegetation that is also contained within the flood control levees. The levees were independently constructed and are not part of the San Joaquin River Flood Control Project (see Figure 11-3 in Reclamation and DWR 2011).

The wetted channel upstream of Sack Dam is bordered by a poorly defined margin that is densely vegetated with riparian trees, shrubs, and aquatic plants. Tree and shrub roots within the sandy loam streambanks provide added strength to these otherwise cohesionless bank materials. Large woody debris is present in the study area and has the potential to influence channel morphology by focusing flow either towards or away from riverbanks and the channel bed. Recruitment of new large woody debris is influenced in part by localized hydraulics that act to erode vegetated banks, thereby sending tree materials into the river channel that may become lodged in the wetted channel, at least temporarily. A large mid-channel sand bar that is densely vegetated is situated approximately 1,400 feet upstream of Sack Dam. Review of the bathymetric data determined that there are no distinguishable bed forms, such as bars or pools (besides the mid-channel island bar), and that the bed morphology is generally plane-bedded, or flat. The dominant bed substrate throughout this reach is coarse sand.

In Reach 4A downstream of Sack Dam, the active channel is considerably narrower, confined between cut banks exhibiting active bank erosion processes (such as block failure, toe scour), and host to a few bar-pool-riffle features. The channel in this reach has a relatively greater potential to meander within the confines of the flood protection levees; however, consideration of the low flows conveyed through this reach and of general channel morphology visible in aerial photographs suggests that lateral change in the river's planform geometry is slow to non-existent, at least on a decadal time frame. Throughout the entire length of Reach 4A, the active channel is bordered by steep, cut banks that are composed of a sandy loam with organics and support a reasonably dense stand of riparian trees and shrubs, albeit less dense than above the dam. The density of exposed roots on the bank surfaces is high, which serves to provide cohesion to the sandy, generally cohesionless bank materials. Vegetation in this reach has undoubtedly encroached on the floodplain toward the narrower active channel, but there is evidence of episodic scouring of vegetation on the streambanks and floodplain. Pieces and/or clusters of large woody debris are concentrated in the downstream portion adjacent to the riparian

forest. The point bars noted in this reach function as sediment-storage zones that have the potential to continue growing laterally and/or vertically or to be scoured during large sediment-transporting events. The reduction of flow, particularly peak flows, in this reach has undoubtedly contributed to the stability of these bars over the last several decades (see below), in that the magnitude and frequency of sediment-transporting events has been much reduced over the past several decades (Reclamation and DWR 2011).

The current sediment-transport regime in the vicinity of the study area primarily deposits the majority of its bedload upstream of Sack Dam in Reach 3 with minimal flux into Arroyo Canal (McBain & Trush, Inc. 2002). Sediment stored upstream of Sack Dam then periodically flushes to downstream reaches (for example, Reach 4A) during flood flows on the order of a few times every 15 to 20 years (Hurley 2010 pers. comm.). Because the flow is much more confined downstream of Sack Dam in Reach 4A because of levee construction, sediment-transport capacity is likely greater than under historical conditions (such as prior to levees) (Reclamation and DWR 2011, Appendix N, Part 2). A reach-scale assessment of baseline sediment-transport capacity and incipient motion in reaches 3 and 4A, inclusive of river posts 205 to 182 and 182 to 174, respectively, was recently conducted by Reclamation and is summarized in Reclamation and DWR (2011, Appendix N, Part 4). The results of this analysis, as determined through the use of various hydraulic and sediment-transport models, concluded that erosion tends to occur in riffles and deposition in pools when simulated under the Pre-Restoration Flows. Net erosion of sand and gravel sediments was predicted in the downstream extent of Reach 3 (upstream of Sack Dam within the study area) and in the upstream extent of Reach 4A (downstream of Sack Dam within the study area); although, notable deposition was predicted at some of the modeled cross sections in these reach segments, particularly in Reach 4A.

3.8.2 Environmental Consequences

Significance Criteria

Thresholds of significance were based on Appendix G of the CEQA Guidelines. An impact on geology and soils would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to California Geological Survey Special Publication 42 (Bryant and Hart 2007).
    - Strong seismic ground shaking.
    - Seismic-related ground failure, including liquefaction.
    - Landslides.

- Result in substantial soil erosion or the loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse.
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of wastewater.

As described in Section 3.8.1, the lack of faults and/or recent seismic activity, and expansive soils within the study area where construction would occur and the lack of features that would contribute to subsidence or landslides reduces the potential for most of the impact mechanisms listed above. Impacts associated with these types of geologic hazards would be less than significant. The following sections describe potential for the Proposed Action and its alternatives to result in substantial soil erosion. Significance was evaluated relative to existing, or present-day, conditions. Neither the Proposed Action nor any of its alternatives would include the use of septic tanks or alternative wastewater disposal systems.

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.8 (Environmental Commitments, Geology and Soils) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

To assess the potential environmental consequences of the Proposed Action and its alternatives on geology and soils in the study area, the existing conditions were qualitatively compared to the description of the Proposed Action and its alternatives, including each alternative's construction- and operation-phase activities, and incorporated environmental commitments. Project components reviewed included timing, footprint (including access roads, staging areas, and the levee borrow material area), and preliminary design drawings. Restoration Flows to be implemented under the SJRRP and their potential to induce environmental consequences to geology and soils resources under the Proposed Action and its alternatives were reviewed based on content presented in Reclamation and DWR (2011; Section 10 and Appendix N).

Federal, State, and county policies and ordinances related to geology and soils resources were reviewed to identify conflicts with each alternative's construction- and operation-phase activities. These policies and ordinances included CWA sections 401, 402, and 404; Federal Flood Insurance program regulations; Alquist-Priolo Earthquake Fault Zoning Act; California Building Standards Code; and general plans from Fresno and Madera counties.

No-Action

Under the No-Action Alternative, current operations at the existing Sack Dam and associated facilities would continue during implementation of Interim and Restoration Flows. Routine dredging, which temporarily disturbs the bed of SJR (a water of the United States and State), and repair of the east side of the river channel and floodplain, which temporarily disturbs soil and vegetation, would be required more frequently as a result of the Interim and Restoration Flows. Maintenance activities would adapt to provide continual operation of Sack Dam and associated facilities; however, no measures would be taken to prevent the increase in soil erosion from the riverbanks and/or adjacent floodplain (inside of the levees), and channel-bed sediment scouring in the project vicinity that would be expected to occur under the higher flow velocities of the Interim and Restoration Flows (Reclamation and DWR 2011, Appendix N, Part 2).

As a result of the No-Action Alternative's potential to increase channel erosion in the study area, there would be a significant impact on geology and soil resources.

Proposed Action

Construction.

Impact GEO-1: Soil erosion or loss of topsoil during construction. The Proposed Action would involve substantial earth moving and in-water work to completely remove the existing Sack Dam, regrade approximately 100 feet of river channel between the existing and new dams, and construct the new Sack Dam and associated facilities. Construction activities would entail installation of temporary features, including a cofferdam, low-water crossings, staging areas, and possibly a diversion channel to route Interim and Restoration Flows around dam construction. Proposed Action construction would also entail the permanent placement of fill material in a water of the United States and State, including the new dam, access road and embankment on the east floodplain, work bench between the new Sack Dam and Poso Canal, and streambank revetments along 25 feet to 100 feet upstream and downstream of the new Sack Dam. Excavation, grading, placement of fill materials, and other construction activities within and adjacent to the wetted river channel during construction may result in moderate ground disturbance and temporary minor alterations to local drainage patterns in the study area. These ground-disturbing activities could result in localized soil erosion, sedimentation, and inadvertent permanent soil loss within the study area. The placement of fill material and installation of infrastructure would not, however, affect the quality or functioning of this federally and State-jurisdictional water with the implementation of environmental commitment WR-1. During construction, BMPs and environmental commitment GEO-1, which has been incorporated into the Proposed Action, would prevent the effects of soil loss during construction of the Proposed Action. ***This impact is less than significant.***

Operation.

Impact GEO-2: Soil erosion or loss of topsoil from project operation. Operation of the Proposed Action would have an overall beneficial effect on geology and soil resources immediately adjacent to the new Sack Dam, access road and embankment on the east floodplain, work bench next to the approach channel, and bed and bank revetment as these hardened features would inhibit streambank erosion from occurring under normal

conditions. These features would, however, have the potential to exacerbate soil loss via bed and bank erosion upstream and downstream of these hardened features. Upstream of the dam, water impoundment would be slightly greater than under existing conditions because screening the Arroyo Canal to prevent entrainment of anadromous fish imposes additional hydraulic losses on the diversion facility. Both upstream and downstream of the dam and associated infrastructure, higher-energy flows associated with the Interim and Restoration Flows could potentially be focused towards portions of the river bank (inside and outside the project influence area) that lack revetment, which would lead to increased bed and bank erosion. Over time, it is expected that any channel adjustments occurring as a result of the Interim and Restoration Flows would achieve an equilibrium state. Routine maintenance of the channel and floodplain area immediately adjacent to the new Sack Dam and associated facilities would continue during Proposed Action operations. ***This impact is less than significant.***

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

The impacts associated with the Proposed Action would be reduced to a less than significant level related to localized erosion and sedimentation. Therefore, the Proposed Action would not cause a cumulatively considerable contribution to the overall significant cumulative impact on SJR erosion and sedimentation.

3.9 Growth-Inducing

This section describes the potential for the Proposed Action to induce or accommodate growth. Growth-inducing impacts of the entire SJRRP were evaluated in Section 27.4 of the SJRRP Draft PEIS/R, and that discussion is summarized below (Reclamation and DWR 2011).

3.9.1 Environmental Setting

NEPA requires consideration of the indirect effects of a project, which are often the result of growth inducement. CEQA requires discussion of how a project may induce growth (California Code of Regulations Section 15126.2(d)).

3.9.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. A growth-inducing impact would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Remove obstacles to population or economic growth
- Require the construction of additional community service facilities that could cause significant environmental effects
- Encourage and facilitates other activities that would significantly affect the environment, either individually or cumulatively

Environmental Commitments

No growth-inducing environmental commitments have been identified for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

The potential for growth inducement was evaluated by considering whether the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would create new employment opportunities, involve the construction of substantial new housing, stimulate economic activity, or remove an obstacle to growth.

No-Action

The No-Action Alternative would not require any construction. Additionally, ongoing maintenance and repair activities would not create new employment, so ***there would be no impact associated with growth inducement***.

Proposed Action

Construction. Construction would result in a temporary demand for workers and related support services. However, the construction sector in the Central Valley has been hard hit by the recession (Reclamation and DWR 2011), and with an unemployment rate of 15.7 percent in Fresno County and 14.3 percent in Madera County in November 2011 (California Development Department [EDD] 2011a, b), demand for construction labor is expected to be met by the local labor pool. Therefore, the Proposed Action is not expected to result in a demand for new housing. ***The Proposed Action is not expected to have growth-inducing impacts***.

Operation. The Proposed Action would not expand any existing utilities (such as water supply, wastewater conveyance or treatment, or stormwater) and would not provide new transportation facilities. Therefore, the Proposed Action would not remove an obstacle to growth.

The Proposed Action would include fish passage improvements, which would contribute to enhanced recreational opportunities for fishing on the SJR. However, it is not expected that new recreational opportunities would be of a significant magnitude to drive economic growth or produce demand for new housing above that anticipated by the Fresno County and Madera County General Plans. ***The Proposed Action is not expected to have growth-inducing impacts***.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

3.10 Global Climate Change

3.10.1 Environmental Setting

Overview of Climate Change

Global climate change is caused in large part by anthropogenic (man-made) emissions of GHGs released into the atmosphere through the combustion of fossil fuels and by other activities such as deforestation and land-use change. Unlike criteria air pollutants, which are discussed in Section 3.2, Air Quality, GHGs tend to persist in the atmosphere where they can trap infrared radiation emitted from the Earth's surface. This phenomenon, known as the "greenhouse effect," is necessary to keep the Earth's temperature warm enough for successful habitation by humans. Emissions of GHGs in excess of natural ambient concentrations, however, are responsible for the enhancement of the greenhouse effect. This trend of warming of the Earth's natural climate is termed "global warming."

The Intergovernmental Panel on Climate Change (IPCC) has been established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC estimates that the average global temperature rise between the years 2000 and 2100 could range from 1.1 degrees Celsius (°C), with no increase in GHG emissions above year 2000 levels, to 6.4°C, with substantial increase in GHG emissions (IPCC 2007). Large increases in global temperatures could have massive deleterious impacts on the natural and human environment.

Principle Greenhouse Gas

The principle GHGs contributing to global warming are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluoridated compounds. Because construction equipment and heavy-duty trucks primarily generate GHG emissions consisting of CO_2 CH_4, and N_2O, the following discussion focuses on these pollutants.

CO_2 is the most important anthropogenic GHG, followed by CH_4 and N_2O. It is estimated that CO_2 accounts for more than 75 percent of all anthropogenic GHG emissions. Three quarters of anthropogenic CO_2 emissions are the result of fossil fuel burning (and to a very small extent, cement production), and approximately one quarter of emissions are the result of land-use change (IPCC 2007). CH_4 is the second largest contributor of anthropogenic GHG emissions and is the result of growing rice, raising cattle, fuel combustion, and mining coal (NMFS 2005b). N_2O, while not as abundant as CO_2 or CH_4, is a powerful GHG. Sources of N_2O include agricultural processes, nylon production, fuel-fired power plants, nitric acid production, and fuel combustion.

To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method to compare GHG emissions is the global warming potential (GWP) methodology defined in the IPCC reference documents (IPCC 1996 and 2001). The IPCC defines the GWP of various

GHG emissions on a normalized scale that recasts GHG emissions in terms of CO_2 equivalents (CO_2e), which compares the gas in question to that of the same mass of CO_2 (CO_2 has a GWP of 1 by definition).

Table 3.10-1 lists the global warming potential of CO_2, CH_4, and N_2O; their lifetimes; and abundances in the atmosphere in parts per million and parts per trillion.

Table 3.10-1.
Lifetimes and Global Warming Potentials

GHG	Global Warming Potential (100 years)	Lifetime (years)	2005 Atmospheric Abundance
Carbon Dioxide (ppm)	1	50 to 200	379
Methane (ppt)	21	9 to 15	1.7
Nitrous Oxide (ppt)	310	120	0.32

Sources: IPCC 1996, 2001, 2007.
Key:
ppm = parts per million
ppt = parts per trillion

State Greenhouse Gas Emissions Inventories

California GHG emissions in 2008 totaled approximately 477.7 million metric tons (MTs) of CO_2e. CARB found that transportation represents 37 percent of the State's GHG emissions, followed by electricity generation (both in state and out of state) at 24 percent and industrial sources at 19 percent. Commercial and residential fuel use (primarily for heating) accounted for 9 percent of GHG emissions (CARB 2010).

Climate Change Effects on State Climate Trends

Climate change is a complex phenomenon that has the potential to alter local climatic patterns and meteorology. Although modeling indicates that climate change will result in sea level rise, changes in regional climate and rainfall, and other things, a high degree of scientific uncertainty still exists with regard to characterizing future climate characteristics and predicting how various ecological and social systems will react to any changes in the existing climate at the local level. Regardless of this uncertainty, it is widely understood that some form of climate change is expected to occur in the future.

Several recent studies have attempted to characterize future climatic scenarios for the state. While specific estimates and statistics on the severity of changes vary, sources agree that the San Joaquin Valley and the Delta will witness warmer temperatures, increased heat waves, and changes in rainfall patterns. In addition, reduced snow pack and stream flow in the Sierra Nevada could lead to changes in water supply into the Delta region. Specifically, the California Energy Commission estimates that average annual temperatures in the State will increase by approximately 1°C to 3°C between 2010 and mid-century, according to the model for the Sacramento region. Climatic models also predict that between 2035 and 2064, the number of heat wave days modeled for the Sacramento region will increase by more than 100, relative to the previous 30-year period between 2005 and 2034. Annual precipitation is expected to witness a declining trend,

but remain highly variable, suggesting that the valley will be vulnerable to increased drought. Warmer temperatures and increased precipitation in the form of rain are expected to result in decreased snowpack in the Sierra Nevada. Such effects will translate into earlier snowmelt and increased potential for flooding as a result of insufficient reservoir capacity to retain earlier snowmelt (IPCC 2007; California Natural Resources Agency 2009; California Energy Commission 2009).

Sea level rise during the next 50 years is expected to increase dramatically over historical rates. The California Energy Commission predicts that by 2050, sea level rise, relative to the 2000 level, will range from 30 centimeters to 45 centimeters. Coastal sea level rise could result in saltwater intrusion to the Delta and associated biological impacts in the San Joaquin Valley. Changes in soil moisture and increased risk of wildfires also may dominate future climatic conditions in the project area (IPCC 2007; California Natural Resources Agency 2009; California Energy Commission 2009).

Regulatory Setting

Federal. Although climate change and GHG reduction is a concern at the federal level, at this time, no legislation or regulations have been enacted specifically addressing GHG emissions reductions and climate change. The future of GHG regulations at the federal level is still uncertain. The federal policies below are related to climate change and may apply to implementation of the Proposed Action.

Endangerment Finding. On December 7, 2009, USEPA signed the Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the CAA. Under the Endangerment Finding, USEPA finds that the current and projected concentrations of the six key well-mixed GHGs – CO_2, CH_4, N_2O, perfluorinated carbons, sulfur hexafluoride, and hydrofluorocarbons – in the atmosphere threaten the public health and welfare of current and future generations. Under the Cause or Contribute Finding, USEPA finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare.

These findings do not themselves impose any requirements on industry or other entities. However, this action is a prerequisite to finalizing the USEPA's proposed new corporate average fuel economy standards for light-duty vehicles, which USEPA proposed in a joint proposal including the Department of Transportation's proposed corporate average fuel economy standards on September 15, 2009.

President's Council on Environmental Quality Draft Guidance (2010). On February 18, 2010, the Council on Environmental Quality (CEQ) issued draft NEPA guidance on the consideration of the effects of climate change and GHG emissions. This guidance advises federal agencies that they should consider opportunities to reduce GHG emissions caused by federal actions, adapt their actions to climate change impacts throughout the NEPA process, and address these issues in their agency NEPA procedures. Where applicable, the scope of the NEPA analysis should cover the GHG emissions effects of a Proposed Action and alternative actions and the relationship of climate change effects on a Proposed Action or alternatives.

The draft guidance suggests that the effects of projects directly emitting GHGs in excess of 25,000 tons annually be considered in a qualitative and quantitative manner. The CEQ does not propose this reference as a threshold for determining significance, but as "a minimum standard for reporting emissions under the CAA." The draft guidance also recommends that the cumulative effects of climate change on the Proposed Action be evaluated. The draft guidance is still undergoing public comments and will not be effective until issued in final form (CEQ 2010).

State. A variety of legislation has been enacted in California related to climate change, much of which sets aggressive goals for GHG reductions within the state. The following key legislation is applicable to the Proposed Action.

Executive Order S-3-05. Under Executive Order S-3-05, State agencies were ordered to reduce California's GHG emissions to (1) 2000 levels by 2010, (2) 1990 levels by 2020, and (3) 80 percent below 1990 levels by 2050.

Assembly Bill 32, Global Warming Solutions Act of 2006. Assembly Bill (AB) 32 sets the same overall GHG emissions reduction goals as Executive Order S-3-05, while further mandating that CARB create a plan that includes market mechanisms and implement rules to achieve "real, quantifiable, cost-effective reductions" of GHGs. AB 32 further directs State agencies and the State Climate Action Team to identify discrete early action GHG reduction measures. These actions were adopted in early 2010 and relate to truck efficiency, port electrification, tire inflation, and reduction of perfluorinated carbons, propellants, and sulfur hexafluoride.

Climate Change Scoping Plan. The Climate Change Scoping Plan, approved by CARB in 2008 to fulfill AB 32, is the State's roadmap to reach GHG emissions reduction goals. The plan outlines a number of key strategies to reduce GHG emissions from business-as-usual emissions projected for 2020 back to 1990 levels.

In March 2011, a San Francisco Superior Court enjoined the implementation of CARB's Scoping Plan, finding the alternatives analysis and public review process violated both CEQA and CARB's certified regulatory program (*Association of Irritated Residents, et al. v. California Air Resources Board*). In response to this litigation, CARB adopted a *Final Supplement to the AB32 Scoping Plan Functional Equivalent Document* on August 24, 2011. CARB staff re-evaluated the statewide GHG baseline in light of the economic downturn and updated the projected 2020 emissions to 507 million MTs CO_2e. Two reduction measures (Pavley I and the Renewable Portfolio Standard) not previously included in the 2008 Scoping Plan baseline were incorporated into the updated baseline. According to the *Final Supplement*, the majority of additional measures in the Climate Change Scoping Plan have been adopted (as of 2012) and are currently in place (CARB 2011).

CEQA Guidelines. The 2011 CEQA Guidelines included a new section (Section 15064.4) that specifically addresses the significance of GHG emissions. Section 15064.4 calls for a good-faith effort to describe, calculate, or estimate GHG emissions. Section 15064.4 further states that the significance of GHG impacts should include consideration of the extent to which the project would increase or reduce GHG emissions, exceed a locally applicable threshold of significance, and comply with regulations or requirements adopted

to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. The revisions also state that a project may be found to have a less than significant impact if it complies with an adopted plan that includes specific measures to sufficiently reduce GHG emissions (Section 15064(h)(3)). However, the revised guidelines do not require or recommend a specific analysis methodology or provide quantitative criteria for determining the significance of GHG emissions.

Local. In December 2009, the SJVAPCD formally adopted the region's first GHG thresholds for determining significant climate change impacts in the SJVAPCD. The guidance is intended to streamline CEQA review by quantifying emissions reductions that would be achieved through the implementation of best performance standards (BPSs). The BPS are developed by the SJVAPCD and are based on current technologies, operating principles, and energy efficiency tactics. According to the December 2009 report, stationary source projects failing to implement BPS or demonstrate a 29 percent reduction in GHG emissions relative to business-as-usual conditions are considered to have a significant impact on climate change. The GHG thresholds only apply to stationary source projects that would result in increased GHG emissions, for which the SJVAPCD is the lead agency (SJVAPCD 2009b). While the thresholds adopted by the SJVAPCD were developed for internal use for projects in which the SJVAPCD is the lead agency, they serve as the basis for guidance issued by the SJVAPCD for other agencies establishing their own processes for determining significance related to climate change. The thresholds were published in *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* (SJVAPCD 2009c).

SJVAPCD currently does not recommend a construction GHG emission threshold or mitigation measures to control and reduce GHG emissions.

3.10.2 Environmental Consequences

Significance Criteria

The effect of the Proposed Action on global climate change is evaluated according to the significance criteria outlined in the SJRRP Draft PEIS/R (Reclamation and DWR 2011), which are based on the CEQA Guidelines, Appendix G.

Based on the SJRRP Draft PEIS/R, the following significance criteria are used to determine the significance of GHG emissions from the project alternatives:

- Whether the project has the potential to conflict with or is inconsistent with plans to reduce or mitigate GHGs
- Whether the relative amounts of GHG emissions over the life of the project are small compared to the amount of GHG emissions for major facilities that are required to report GHG emissions (25,000 MTs of CO_2e per year)
- Whether the project has the potential to contribute to a lower carbon future

Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors), which are primarily pollutants of regional and local concern. Given their long atmospheric lifetimes (see Table 3.10-1), GHGs emitted by

countless sources worldwide accumulate in the atmosphere. No single emitter of GHGs is large enough to trigger global climate change on its own, and climate change impacts are considered less than significant at the project level. Rather, climate change is the result of the individual contributions of countless sources past, present, and future. Therefore, GHG impacts are inherently cumulative and are evaluated as such in this analysis.

In addition, under NEPA, the effect of the project on global climate change is evaluated using the CEQ guidance from February 18, 2010, which suggests that federal agencies should quantify GHG emissions, consider opportunities to reduce GHG emissions caused by proposed federal actions and adapt their actions to climate change impacts throughout the NEPA process and to address these issues in their agency NEPA procedures.

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.10 (Environmental Commitments, Global Climate Change) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

GHG emissions would be generated from construction, maintenance, and operation of the Proposed Action. During project construction in years 2013 and 2014, GHG emissions would be generated from off-road equipment operation, truck hauling and deliveries, and worker commuting. After the Proposed Action is constructed, maintenance of project facilities would be performed periodically. Maintenance work would be less extensive than construction activities and takes place over a few days per year. Project operation would result in increased electricity consumption by onsite electrical equipment, including screen cleaners, trash-rack cleaner, sediment jetting system, sack dam gates, and lighting. In the event of unexpected power outage, diesel-powered emergency generators would be used to supply electricity for project facilities.

The primary GHG emissions generated from both construction and operation sources, as listed below, would be CO_2, CH_4, and N_2O. GHG emissions are estimated based on construction modeling data provided by CH2M HILL (see Appendix C), which included criteria pollutants (evaluated in the Section 3.2, Air Quality) and the CO_2 emissions generated from off-road and on-road equipment. The following describes models, tools, and assumptions used to calculate the GHG emissions from construction and operation sources:

- **Off-Road Equipment –** CO_2 emissions generated from off-road construction equipment were estimated using the URBEMIS2007 emissions model, following the same assumptions described in Section 3.2, Air Quality. URBEMIS does not quantify CH_4 and N_2O emissions from off-road equipment. Emissions of CH_4 and N_2O from off-road diesel-powered equipment were determined by scaling the estimated CO_2 emissions by the CH_4/CO_2 ratio (0.58 gram/10.15 kilogram) and N_2O/CO_2 ratio (0.26 gram/10.15 kilogram). The ratios are calculated from CO_2, CH_4, and N_2O emissions expected per gallon of diesel fuel according to the General

Reporting Protocol Version 3.1 published by California Climate Action Registry (2009a).

- **On-Road Vehicles –** CO_2 emissions generated from on-road vehicle trips were estimated using the EMFAC2007 emissions model, following the same assumptions described in Section 3.2, Air Quality. EMFAC does not quantify CH_4 and N_2O emissions from vehicle trips. Emissions of CH_4 and N_2O from on-road diesel-powered haul trucks and delivery trucks were estimated using emission factors published in the General Reporting Protocol Version 3.1 (California Climate Action Registry 2009b). GHG emissions from gasoline-powered employee commute trips were determined by dividing the CO_2 emissions by 0.95. This statistic is based on USEPA's estimate that CO_2 accounts for 95 percent of on-road emissions, while CH_4, N_2O, and other GHG emissions account for the remaining 5 percent (USEPA 2011a).

- **Electricity Consumption –** The electricity in the project area is provided by the Pacific Gas and Electric Company (PG&E); therefore, CO_2 emissions generated from electricity consumption at the project facilities are estimated using the emission factor in the 2008 PG&E Annual Emissions Report prepared for the California Climate Action Registry (2010). CH_4 and N_2O emissions generated from electricity consumption at the project facilities are estimated using the emission factors published by the USEPA (2011b). The onsite electricity consumption was estimated to be 40,150 kilowatt-hours per year for the Proposed Action.

- **Emergency Generators –** CO_2, CH_4, and N_2O emissions generated from the operation of emergency generators are estimated using the 2012 emission factors published in the General Reporting Protocol (The Climate Registry 2012), following the same operation assumptions described in Section 3.2, Air Quality. It is assumed that the emergency generators would be operated 50 hours per year.

No-Action

Under the No-Action Alternative, there would be no construction-related emissions from project improvements. Current operation and maintenance activities would continue; operations emissions would be similar to the existing condition. Therefore, there would be no effect on climate change attributable to the implementation of the No-Action Alternative.

Proposed Action

Construction.

Impact CC-1: Have the potential to conflict or be inconsistent with plans to reduce or mitigate GHGs. As shown in Table 3.10-2, the Proposed Action would generate short-term GHG emissions well below the threshold of 25,000 MTs of CO_2e per year from construction activities and generate very low GHG emissions from operation and maintenance of the project facilities. Therefore, the Proposed Action is not expected to conflict or be inconsistent with the State goals listed in AB 32 or in any preceding State

policies and plans adopted to reduce GHG emissions. ***This impact is less than significant.***

Table 3.10-2.
Estimated Greenhouse Gas Emissions from Construction

Emission Sources	CO_2 (MT/year)	CH_4 (MT CO_2e/year)	N_2O (MT CO_2e/year)	Total GHGs (MT CO_2e/year)
2013 Construction				
Off-Road Construction Equipment	473.43	0.57	3.76	477.8
On-Road Haul Trucks/ Working Vehicles	73.11	0.004	0.06	73.2
On-Road Worker Commute	21.77	1.15		22.9
			2013 Total Emissions	**573.9**
			Exceed Significance Threshold of 25,000 MT CO_2e/year?	No
2014 Construction				
Off-Road Construction Equipment	316.96	0.38	2.52	319.9
On-Road Haul Trucks/ Working Vehicles	57.60	0.003	0.05	57.6
On-Road Worker Commute	17.11	0.90		18.0
			2014 Total Emissions	**395.5**
			Exceed Significance Threshold of 25,000 MT CO_2e/year?	No

Key:
CH_4 = methane
CO_2 = carbon dioxide
CO_2e/year = carbon dioxide equivalent per year
GHG = greenhouse gas
MT = metric tons
MT/year = metric ton per year
N_2O = nitrous oxide

Impact CC-2: Result in GHG emissions that would be large in comparison to the amount of GHG emissions for major facilities that are required to report GHG emissions. Table 3.10-2 summarizes the annual GHG emissions generated from project construction activities. Construction emissions are primarily the result of diesel-powered construction equipment and heavy-duty haul trucks. These emissions are considered short-term, because they cease once construction is complete. As shown in the table, construction of the Proposed Action would result in GHG emissions ranging from 396 to 574 MT of CO_2e per year, which is well below the significance threshold of 25,000 MT; ***therefore, this impact is less than significant.***

However, although the SJVAPCD has not published a guideline to control GHG emissions during construction, the environmental commitment CC-1 has been incorporated into the Proposed Action, which would further reduce GHG emissions.

Operation. Table 3.10-3 summarizes the annual GHG emissions generated from operation and maintenance of the Proposed Action, which are primarily the result of electricity usage. As shown in the table, operation of the Proposed Action would result in GHG emissions of 19 MT CO_2e per year; this is equivalent to adding four typical passenger vehicles per year to the road (USEPA 2011c). Because project operation would generate very low GHG emissions, ***this impact is less than significant.***

Table 3.10-3.
Estimated Greenhouse Gas Emissions from Operation and Maintenance

Emission Sources	CO_2 (MT/year)	CH_4 (MT CO_2e/year)	N_2O (MT CO_2e/year)	Total GHGs (MT CO_2e/year)
Off-Road Construction Equipment	3.31	0.004	0.03	3.34
On-Road Vehicles	0.14	0.00001	0.0001	0.14
Emergency Generators	3.83	0.003	0.01	3.84
Electricity Consumption	11.68	0.01	0.04	11.73
2013 Total Emissions				**19.0**
Exceed Significance Threshold of 25,000 MT CO_2e/year?				No

Key:
CH_4 = methane
CO_2 = carbon dioxide
CO_2e/year = carbon dioxide equivalent per year
GHG = greenhouse gas
MT = metric tons
MT/year = metric ton per year
N_2O = nitrous oxide

Impact CC-3: Have the potential to contribute to a lower carbon future. As indicated in Tables 3.10-2 and 3.10-3, the Proposed Action would result in maximum total construction and operation GHG emissions amounting to 592.9 MT CO_2e (573.9 CO_2e from construction activities and 19.0 CO_2e from operation activities). These emissions would be negligible (2 percent) in comparison to the amount of GHG emissions for major facilities that are required to report GHG emissions, 25,000 MT CO_2e. Further, the Proposed Action would generate short-term GHG emissions well below the significance threshold during construction and operation. Implementation of environmental commitment CC-1 would reduce GHG emissions during construction. ***This impact is less than significant.***

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

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3.11 Hazardous Materials and Public Health Hazards

3.11.1 Environmental Setting

This section discusses potential hazards and hazardous materials as well as the public health hazard concerns associated with the Proposed Action, Vertical Slot Fish Ladder and Fish Bypass System Alternative, and No-Action Alternative.

Hazardous Materials

Areas currently or historically used for agricultural purposes are likely to have received pesticide, herbicide, and fertilizer applications. Therefore, it should be assumed that the study area is potentially contaminated with residual agricultural chemicals.

No active hazardous waste sites were identified within 1,500 feet of the study area on the California Department of Toxic Substances Control's Cortese List, State Water Resources Control Board's Geotracker, and USEPA's Enviromapper databases (Reclamation and DWR 2011).

Public Health Hazards

West Nile Virus. WNV is a mosquito-borne disease that can cause severe illness in a small proportion of the people who are exposed to the virus. A detailed description of the virus is provided in the SJRRP Draft PEIS/R (Reclamation and DWR 2011). WNV primarily affects birds, which can be carriers of the disease, but is known to infect humans. Although up to 80 percent of people infected by WNV exhibit no symptoms, the virus can cause West Nile fever, meningitis, or encephalitis (Centers for Disease Control 2011b). WNV has been reported in the study area, and SJR and Arroyo canal provide habitat for each portion of the mosquito life cycle. As of December 14, 2011, 9 cases of WNV had been reported in Fresno County and 2 cases in Madera County in 2011 (USGS 2011).

Valley Fever. Valley Fever is an infection that is caused by the inhalation of fungal spores in dust of semiarid areas in the southwestern United States (Centers for Disease Control 2011a). The Centers for Disease Control considers Valley Fever to be endemic in California, and it is particularly prevalent in the San Joaquin Valley. As of November 2011, there had been 371 cases of Valley Fever reported in Fresno County and 42 cases reported in Madera County in 2011 (California Department of Public Health 2011).

Oil and Gas Wells. The SJRRP Draft PEIS/R identified potential safety hazards associated with the potential to disrupt active, idle, or abandoned oil or gas production wells (Reclamation and DWR 2011). The closest recorded abandoned well is more than 1 mile from the study area (CDC Division of Oil, Gas, and Geothermal Resources 2011), but exploratory wells are granted confidentiality for up to 2 years, so additional wells may be present in the area.

Wildland Fire. Wildland fires are a risk in many areas of California. According to the SJRRP Draft PEIS/R (Reclamation and DWR 2011), the study area is in a Local Responsibility Area and is an unzoned Fire Hazard Severity Zone (California Department of Forestry and Fire Protection 2011).

Aircraft Safety. There are no airports within 2 miles of the study area. The closest airstrip is at the Triangle T Ranch, about 3 miles east of SJR.

3.11.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An impact on public health would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school
- Be located on a site that is included on a list of hazardous materials sites, compiled pursuant to Government Code Section 65962.5, and as a result, create a significant hazard to the public or environment
- Result in a safety hazards for people residing or working in the study area, through the following:
    - Exposure to naturally occurring asbestos
    - Disruption of abandoned wells
    - Creation of a hazard to aircraft safety
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan
- Expose people or structures to a substantial risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildland
- Expose people to new or increased risk from disease vectors

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.11 (Environmental Commitments, Hazardous Materials and Public Health Hazards) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

The general types of hazardous materials and activities foreseeable during project construction, operation, and maintenance and the primary ways that these hazardous materials could expose individuals or the environment to health and safety risks were identified.

Existing conditions of the project site and adjacent properties, historical uses, and known contamination, as reported in regulatory agency databases, were evaluated to determine potential impacts on the environment and public health from hazards and hazardous materials. In determining the level of significance, the analysis assumes that development and construction activities would comply with relevant federal, State, and local regulations.

The potential for impacts relating to the spread of infectious disease during construction was assessed by reviewing databases maintained by the Centers for Disease Control and evaluating the proximity of current outbreaks in relation to the study area. Wildland fire hazards were evaluated according to mapping prepared by California Department of Forestry and Fire Protection.

No-Action

Under the No-Action Alternative, HMRD would continue to implement its current water management program and would not replace Sack Dam or construct the proposed improvements. Because the No-Action Alternative would not require any new construction, there would be no impact associated with exposure to hazards or hazardous materials.

Under the No-Action Alternative, ongoing operation and maintenance activities of the existing infrastructure would continue, including channel repairs and dredging after high-flow events.

Operation and maintenance associated with the No-Action Alternative could require the storage and use of hazardous materials, generate hazardous and nonhazardous waste materials, and require the transport of hazardous and nonhazardous waste materials. These activities are already occurring, and are conducted in accordance with existing health and safety regulations. Therefore, the No-Action Alternative is not expected to result in new exposure to hazards or hazardous materials. Additionally, maintenance activities are not expected to result in new exposure to public health hazards or hazardous materials.

Proposed Action

Construction. The project site is not located within 0.25 mile of an existing or proposed school; therefore, no impact would result.

The project site is not known to be included on a list of hazardous materials sites, compiled pursuant to Government Code Section 65962.5; therefore, no impact would result.

The project site is not located within an airstrip or airfield; therefore, no impact would result.

Impact HM/PH-1: Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. At typical construction sites, onsite materials that could be considered hazardous include fuels, motor oil, grease, various lubricants, solvents, soldering equipment, and glues. Fuel replenishment would be required daily for most of the heavy equipment. Spills have the potential to occur during the storage or use of these materials, or during onsite refueling. Additionally, excavation may expose buried hazardous materials resulting from prior use of the site or adjacent property. Implementation of the Proposed Action would have the potential to expose construction workers and others, or the environment to hazardous materials. Implementation of environmental commitments HM/PH-1, HM/PH-2, and HM/PH-3, which have been incorporated into the Proposed Action, would reduce potential impacts associated with hazardous materials. ***This impact is less than significant.***

Impact HM/PH-2: Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Construction would require regular transportation of limited quantities of hazardous materials to the project site and hazardous waste materials to the selected recycling or disposal facility. An accident involving a waste transport vehicle could result in a spill of the vehicle's fuel. The worst-case scenario for a chemical release would be a vehicle accident involving a fully loaded truck transporting hazardous waste. Implementation of environmental commitment HM/PH-4, which has been incorporated into the Proposed Action, would reduce potential impacts associated with hazardous materials. ***This impact is less than significant.***

Impact HM/PH-3: Creation of a substantial hazard from idle and abandoned wells. A search of the CDC Division of Oil, Gas, and Geothermal Resources database did not identify any abandoned well in the area proposed for construction of facilities (CDC Division of Oil, Gas, and Geothermal Resources 2011). However, it is possible that unknown idle or abandoned wells could occur in the vicinity of the construction area. If construction activities were to encounter idle or abandoned wells there is a potential hazard to construction workers. Environmental commitment HM/PH-5 would ensure that hazards from idle and abandoned wells are minimized. ***This impact is less than significant after mitigation.***

Impact HM/PH-4: Expose people or structures to a substantial risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildland. Construction activities could occur in proximity to areas containing dried vegetation or other materials that could serve as fire fuel. However, the construction area has not been identified as having a "high" or "very high" fire hazard rating (California Department of Forestry and Fire Protection 2011). Any construction equipment that normally includes a spark arrester would be

equipped with an arrester in good working order, as required by California Public Resources Code, Section 4442. ***Therefore, this impact is less than significant.***

Impact HM/PH-5: Expose people to new or increased risk from disease vectors. Construction activities would include earth-moving, which can potentially release spores that can cause Valley Fever. Construction workers could also potentially be exposed to WNV, because SJR provides habitat for mosquitoes, which can transmit WNV. Implementation of environmental commitment HM/PH-6 would ensure workplace precautions against WNV and Valley Fever. ***This impact is less than significant.***

Operation.

Impact HM/PH-6: Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. During project operation and some maintenance activities, heavy equipment and vehicles would be present in the study area. Most of this equipment requires a number of petroleum products such as fuel, hydraulic fluids, and lubricants for effective operation. Fuel replenishment would be required daily for most of the heavy equipment. Lubricant and hydraulic fluid changes and replenishments would be required less frequently. Spills have the potential to occur during the storage or use of these materials, or during onsite refueling. Implementation of environmental commitments HM/PH-4, which has been incorporated into the Proposed Action would reduce potential impacts associated with hazardous materials. ***This impact is less than significant.***

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

The Proposed Action has a limited potential to disrupt idle or abandoned gas wells during earth-moving activities. Because the impacts associated with the Proposed Action would be reduced to a less than significant level, there would be no cumulatively considerable incremental contribution to this hazard.

Additionally, because other project-related hazards and public health impacts would be less than significant and there are no other known similar projects that could cumulatively cause hazard or hazardous material impacts, the Proposed Action would not constitute a considerable contribution to cumulative impacts.

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3.12 American Indian Trust Assets

3.12.1 Environmental Setting

American ITAs are legal interests in property held in trust by the United States for federally recognized American Indian Tribes (Tribes) or individual American Indians. An Indian trust has three components: (1) the trustee, (2) the beneficiary, and (3) the ITA. ITAs can include land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, and in-stream flows associated with trust land. Beneficiaries of the Indian trust relationship are federally recognized Tribes with trust land; the United States is the trustee. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the United States. The characterization and application of the United States trust relationship have been defined by case law that interprets congressional acts, executive orders, and historical treaty provisions.

Consistent with President William J. Clinton's 1994 memorandum, "Government-to-Government Relations with Native American Tribal Governments," Reclamation assesses the effect of its programs on tribal trust resources and federally recognized tribal governments. Reclamation is tasked with actively engaging federally recognized tribal governments and consulting with such tribes on a government-to-government level (59 Federal Register 1994) when its actions affect ITAs. The U.S. Department of the Interior Departmental Manual Part 512.2 ascribes the responsibility for ensuring protection of ITAs to the heads of bureaus and offices (U.S. Department of the Interior 1995). Part 512, Chapter 2 of the Departmental Manual states that it is the policy of the U.S. Department of the Interior to recognize and fulfill its legal obligations to identify, protect, and conserve the trust resources of federally recognized Tribes and tribal members.

Bureaus are responsible for, among other things, identifying any impact of their plans, projects, programs, or activities on ITAs; ensuring that potential impacts are explicitly addressed in planning, decision, and operation documents; and consulting with recognized Tribes who may be affected by proposed activities. Consistent with this, Reclamation's ITA policy states that Reclamation will carry out its activities in a manner that protects ITAs and avoids adverse impacts when possible, or provide appropriate mitigation or compensation when it is not.

To carry out this policy, Reclamation incorporated procedures into its NEPA compliance procedures to require evaluation of the potential effects of its Proposed Actions on ITAs (Reclamation 1993). Reclamation is responsible for assessing whether a Proposed Action has the potential to affect ITAs and will comply with procedures contained in Departmental Manual Part 512.2 guidelines, which protect ITAs.

3.12.2 Environmental Consequences

Significance Criteria

The presence of an ITA within the study area or the potential effects of a project on an ITA (regardless of the project's proximity to it) trigger evaluation of potential impacts on ITAs. If during the course of this evaluation an impact on an ITA is determined, consultation with the potentially affected Tribes would ensue to ensure that the affected Tribe(s) may fully evaluate the potential impact of the proposed alternatives on ITAs. Effects that conceivably could affect ITAs as a result of the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative, such as water rights or other assets that might be located off-reservation, also trigger further evaluation and consultation with affected Tribes.

Environmental Commitments Incorporated into the Proposed Action

No environmental commitments associated with ITAs have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

Reclamation maintains GIS coverage of American Indian reservations and rancherias for the State of California. Impact assessments for ITAs were based on a review of the SJRRP Draft PEIS/R analysis of ITAs in the program study area, which included a GIS map showing locations of federally recognized Tribes with a trust land base as of 2004. This was based on data from the Bureau of Indian Affairs and followed by a GIS analysis of proximity of American Indian reservations and rancherias in the vicinity of the study area.

There are no ITAs in the vicinity of the study area. The nearest ITA to the study area is the Table Mountain Rancheria, located 63 miles east of the study area, approximately 3 miles east-southeast of Millerton Lake and northeast of Clovis and Fresno, California. As stated in the SJRRP Draft PEIS/R and based on an examination of records held by the Bureau of Indian Affairs and Reclamation (conducted by the Regional ITA Coordinator for the SJRRP Draft PEIS/R), no reservations or rancherias are located along SJR upstream from Friant Dam (Reclamation and DWR 2011). See letter of concurrence dated April 24, 2012 (see Appendix K).

No-Action

Under the No-Action Alternative, existing site features would remain and there would not be any construction, or new site features. Because there are no ITAs in the vicinity of the study area, there is no potential for ongoing maintenance and repair activities to impact an ITA. As such, there would be no impact.

Proposed Action

The Proposed Action would not result in any direct or indirect impacts on an ITA. As such, there would be no impacts on ITAs resulting from the Proposed Action.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

For similar reasons as described under Proposed Action, there would be no impact on an ITA under the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Cumulative Effects

There would be no impacts on ITAs resulting from implementation of the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative. Therefore, there would be no cumulative impacts.

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3.13 Land Use and Agricultural Resources

3.13.1 Environmental Setting

Sack Dam is located on the SJR approximately 7 miles southeast from Dos Palos on the border of Fresno and Madera counties. The majority of land within this region of the river is privately owned, and used for agricultural production.

Fresno County. In 2008, of the 2,203,231 acres inventoried by the CDC in Fresno County, 90 percent consisted of agricultural lands. Prime farmland accounted for approximately 50 percent of the important farmland. The remaining 10 percent of acres inventoried in Fresno County were nonagricultural lands comprised primarily of urban and built-up land.

Madera County. In 2010, of the 861,043 acres inventoried by CDC in Madera County, approximately 89 percent consisted of agricultural lands. Prime farmland accounted for approximately 27 percent of the important farmland in 2010. The remaining 11 percent of the area inventoried in Madera County was nonagricultural lands, and primarily consisted of other land. Other land is described by the CDC as confined animal agriculture, nonagricultural and natural vegetation, semi-agricultural and rural commercial, vacant or disturbed, and rural residential lands. Urban and built-up land accounted for 3 percent of the total area inventoried. Table 3.13-1 shows the total acreage of inventoried farmland for both Fresno and Madera counties.

Table 3.13-1.
County Land Use Summary

Land Use Category	Total Acreage Inventoried 2008	
	Fresno County	Madera County
Prime Farmland	693,173	97,491
Farmland of Statewide Importance	439,020	85,136
Unique Farmland	94,177	163,973
Farmland of Local Importance	149,906	16,143
Important Farmland Subtotal	**1,376,276**	**362,743**
Grazing Land	826,955	399,501
Agricultural Land Subtotal	**2,203,231**	**762,244**
Urban and Built-Up Land	117,568	27,010
Other Land	111,704	65,734
Water Area	4,915	6,055
Total Area Inventoried	**2,437,418**	**861,043**

Source: CDC 2012.

Project Location. In general, urban land uses (such as residential, commercial, and industrial) account for the smallest percentage of land use within the study area and along SJR. In addition to the City of Dos Palos, the nearest city centers in close proximity to the study area include the City of Firebaugh, located approximately 9 miles southeast from the project site; the City of Chowchilla, located more than 20 miles northeast and the City of Madera, located approximately 25 miles east from the project site. A description of the land uses within the project boundaries is below.

California Department of Conservation Land Uses. Within the project boundary, approximately 53 percent of the area has a CDC designation of nonagricultural natural vegetation lands. Lands of this designation include barren, riparian, wetland areas, and small water bodies. Agricultural lands designated as prime farmland comprise 31 percent of the study area. Prime farmland generally contains the most favorable combination of physical and chemical features able to sustain long-term agricultural production. The remaining 16 percent of the study area is designated semi-agricultural and rural commercial land. Lands of this designation include farmsteads, unpaved parking areas, agricultural storage, and packing sheds (CDC 2012). Figure 3.13-1 shows land use designations within the study area.

Madera County General Plan and Zoning. The agricultural lands adjacent to the project site on the east side of SJR, within Madera County, are zoned agricultural, rural, agricultural exclusive with a minimum parcel size of 40 acres (ARE-40), and have a General Plan designation of Agricultural Exclusive (AE) (Harmstead 2011). Parcels zoned ARE-40 permit the following uses: agriculture, single-family dwelling, farm labor housing, and communication towers/wireless communications facilities (Madera County 2011a).

Fresno County General Plan and Zoning. The agricultural lands adjacent to the project site on the west side of SJR, within Fresno County, are zoned agricultural exclusive with a minimum parcel size of 20 acres (AE-20) and have a General Plan designation of Agriculture (Sharwood 2011; Jiminez 2012). Land in Fresno zoned "AE" are exclusive agricultural districts. These agricultural districts are intended to be used exclusively for agriculture and for those uses that are necessary and an integral part of the agricultural operation (such as maintaining, breeding, and raising livestock and poultry of many kinds; raising tree, vine, field, forage, and other plant life crops of many kinds; single-family dwellings, accessory buildings, and farm building of many kinds; and home occupations, harvesting, curing, processing, packaging, packing, shipping, and selling agricultural products on the premises). AE districts in Fresno are accompanied by an acreage designation that establishes the minimum-size lot that may be created within the zoning district. Parcels adjacent to the project site have a 20-acre designation.

The nearest residence is located adjacent to the project area next to the future Poso Canal crossing located within the study area.

Figure 3.13-1.
Zoning and Land Use Designation

Williamson Act. The Williamson Act enables local governments to provide private landowners with tax incentives when an agreement to maintain lands for agricultural or related open space uses is reached. The process was developed to discourage the conversion of agricultural lands to nonagricultural uses. The parcels associated with the Proposed Action in Madera County are bound in Williamson Act contracts (Harmstead 2011). The parcels within the project boundary in Fresno County are bound in Williamson Act contracts, except for one parcel immediately adjacent to the intake of the Arroyo Canal that has a CDC designation of semi-agricultural and rural commercial land (Jiminez 2012).

3.13.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An impact on land use would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Convert prime farmland, unique farmland, or farmland of statewide importance (Farmland), as shown on the maps prepared pursuant to the farmland mapping and monitoring program of the California resources agency, to nonagricultural use
- Conflict with existing zoning for agricultural use or a Williamson Act contract
- Involve other changes in the existing environment that, because of their location or nature, could result in conversion of Farmland, to nonagricultural use or conversion of forest land to non-forest use
- Physically divide an established community
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect
- Conflict with any applicable habitat conservation plan or natural community conservation plan

Environmental Commitments Incorporated into the Proposed Action

No environmental commitments related to land use and agricultural resources have been identified as necessary for the Proposed Action or the Vertical Slot Fish ladder and Fish Bypass System Alternative.

Assessment Method

To characterize existing land uses surrounding the study area, Fresno and Madera County planning departments were contacted for information regarding the level, type, location,

density, and intensity of development and overall land use within each of the county jurisdictions. Local and State land use documents, policies, and plans were reviewed. Fresno and Madera County land use maps and zoning maps were referenced for zoning and land use designations. The CDC was consulted with regard to the presence of any prime farmland, nonagricultural natural vegetation, and semi-agricultural rural and rural commercial land.

No-Action

The No-Action Alternative would not conflict and would be consistent with adopted local land use plans, goals, policies, and ordinances of Fresno and Madera counties. Under the No-Action Alternative, no improvements would be made to Sack Dam, and Arroyo Canal and surrounding land uses would continue to operate under the existing conditions.

Proposed Action

Construction.

Impact LU-1: Convert prime farmland, unique farmland, or farmland of statewide importance to nonagricultural use. Construction activities would require staging areas around the project site to accommodate construction vehicles, staging, and equipment storage. Construction activities would extend beyond the immediate project site (see Figure 3.13-1) into adjacent farmlands in both Fresno and Madera counties.

In Fresno County, approximately 3.4 acres of land designated as prime farmland would be temporarily taken out of production. This would account for less than 1 percent of the total prime farmland within Fresno County. After project construction is complete, disturbed farmland would be restored to the existing use. In addition, HMRD is working in cooperation with willing landowners. Because the impact is temporary and accounts for such a small percent of prime farmland in both Madera and Fresno counties***, this impact is less than significant; therefore, no mitigation is required***.

Temporary impacts associated with construction of the Proposed Action would not conflict with Fresno or Madera Counties General Plan Policies established for the protection and preservation of farmland, nor would the Proposed Action conflict with any Natural Community Conservation Plan or Habitat Conservation Plan.

Operation. The operation of Sack Dam and the proposed fish screen in Arroyo Canal would have no impact on existing agricultural uses, nor would the Proposed Action affect adjacent farmland or convert agricultural lands to a nonagricultural use. Additionally, lands bound in Williamson Act contracts would not be converted to nonagricultural uses.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

The Proposed Action would not result in permanent changes to existing land uses within the project vicinity. Additionally, temporary land use impacts would be less than significant; therefore, there would be no cumulative effects as a result of the Proposed Action.

3.14 Noise

3.14.1 Environmental Setting

This noise analysis describes the existing noise environment near the project site. The relevant noise standards are contained within the noise elements of the two affected counties, Fresno and Madera.

Fresno County Noise Guidelines

Fresno County has established exterior and interior noise standards for noise sensitive receptors. Noise sensitive receptors are specific geographic points, such as residences, hospitals or parks where people would possibly be exposed to unacceptable noise. Tables 3.14-1 and 3.14-2 show the exterior and interior noise standards, as established by Fresno County.

Table 3.14-1.
Fresno County Noise Control Ordinance: Exterior Noise Standards

Category[1]	Cumulative Number of Minutes in any 1-Hour Time Period	Noise-Level Standards, dBA Daytime (7 a.m. to 10 p.m.)	Noise-Level Standards, dBA Nighttime (10 p.m. to 7 a.m.)
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

Source: Fresno County 2000b.
Note:
[1] Categories are defined in terms of cumulative units of time and noise-level standards.
Key:
dBA = decibel (A-weighted scale)

Table 3.14-2.
Fresno County Noise Control Ordinance: Interior Noise Standards

Category[1]	Cumulative Number of Minutes in any 1-Hour Time Period	Noise-Level Standards, dBA Daytime (7 a.m. to 10 p.m.)	Noise-Level Standards, dBA Nighttime (10 p.m. to 7 a.m.)
1	5	45	35
2	5	50	40
3	1	55	45

Source: Fresno County 2000b.
Note:
[1] Categories are defined in terms of cumulative units of time and noise-level standards.
Key:
dBA = decibel (A-weighted scale)

The Fresno County noise ordinance establishes noise standard exemptions for construction noise. Construction noise is considered exempt from noise standards, provided that construction activities are conducted from 6 a.m. to 9 p.m., Monday through Friday and 7 a.m. to 5 p.m. on Saturday and Sunday.

Madera County Noise Guidelines

The Madera County General Plan Noise Element contains policies that address noise-sensitive land uses and standards to avoid noise-related impacts from existing uses. Madera County has established maximum allowable noise exposure limits for non-transportation noise sources. Table 3.14-3 presents these limits.

Table 3.14-3.
Maximum Allowable Noise Exposure for Non-Transportation Noise Sources[1]

	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly Leq, dB	50	45
Maximum level, dB	70	65

Source: Madera County 1995b.
Note:
[1] As determined at the property line of the receiving land use, when determining the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers at the property line.
Each of the noise levels specified above would be lowered by 5 dB for pure tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise-level standards do not apply to residential units established in conjunction with industrial or commercial uses (such as caretaker dwellings).
Key:
dB = decibel(s)
Leq = equivalent sound level

Project Location

Noise levels in the project vicinity are primarily caused by noise from agricultural activities and traffic. No railroads within the vicinity of the study area exist, and the nearest airstrip (Triangle T Ranch) is located approximately 2 miles northeast of the project site.

Noise sources associated with agricultural activities include noise from operation of heavy equipment such as trucks, tractors, combines, and harvesters, as well as worker trucks passing through the area. Occasionally, aircraft noise associated with crop dusting may occur within the study area. Intermittent noise levels of up to 85 decibels (dB) maximum noise level at a distance of 50 feet are associated with the equipment previously discussed above.

Within the study area, the main roadway and primary access to the project site is Valeria Road. Valeria Road is described as a collector route in the Fresno County General Plan. Collector routes provide internal traffic movement within communities, and connect local roads to arterials. Valeria Road ends near the project site, and does not provide a large source of traffic noise within the study area. A limited number of sensitive receptors are present within the project vicinity. The nearest sensitive receptor to the study area is one

privately owned residence located off Valeria Road, adjacent to the project site in Fresno County. There are no sensitive receptors near the project area in Madera County.

3.14.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. A noise impact would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
- Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project

Environmental Commitments Incorporated into the Proposed Action

No environmental commitments associated with noise have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes: mobile and stationary. Mobile equipment sources move around a construction site performing tasks in a recurring manner (such as loaders, graders, and bulldozers). Stationary equipment operates in a given location for an extended period to perform continuous or periodic operations (such as generators). Therefore, determining the location of stationary sources during specific phases, or the effective acoustical center of operations for mobile equipment during various phases of the construction process, is necessary. Operational characteristics of heavy construction equipment are additionally characterized by short periods of full-power operation, followed by extended periods of operation at lower power, idling, or powered-off conditions.

No-Action

Under the No-Action Alternative, impacts on noise would be limited to what is currently occurring. Interim flows would continue to inundate the existing Sack Dam, which would likely require repair the east side of the river channel and periodic dredging of the

riverbed after high-flow events. Repairs to the east side of the river and dredging would include the use of heavy equipment for 2 to 3 days per occurrence, causing a limited amount of increased noise exposure from construction equipment to sensitive receptors. The nearest sensitive receptor to this area is adjacent to the project site; however, construction equipment would be used on a short-term, temporary basis and would not substantially increase ambient noise around the study area.

Additionally, under the No-Action Alternative, increases in average daily traffic volumes along roadways within the study area would remain unchanged and would not cause an increase to existing traffic-induced noise levels.

Proposed Action

Construction.

Impact NOI-1: Exposure of sensitive receptors to temporary short-term construction noise. Construction of the Proposed Action would include the use of heavy equipment which would likely expose nearby sensitive receptors to noise levels in excess existing ambient noise levels. The most noticeable construction noise would likely be related to vehicle backup warning devices and general construction noise. The site preparation phase typically generates the highest noise levels, which are caused by onsite equipment associated with grading, compacting, and excavation, as well as vibratory hammers and/or impact hammers during installation of sheet piles and impact testing of H-piles. Site preparation equipment could include backhoes, bulldozers, loaders, excavation equipment such as graders and scrapers, and compaction equipment. Erection of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks, which could also generate high noise levels. Pile drivers would be required for construction of some project features.

Although construction noise would be audible at the nearest residence, construction noise would be temporary and would occur between the hours of 6 a.m. and 9 p.m. Monday through Friday, and 7 a.m. and 5 p.m. on Saturday and Sunday. Fresno County maintains noise standard exemptions for construction noise. ***Although audible, the resulting noise impact from construction activities would be less than significant.***

Operation.

Impact NOI-2: Operation of the Proposed Action would result in temporary increases of noise within the project site. Operation of the Proposed Action would eliminate the need to repair the east side of the river bank, resulting from inundation from Interim Flows, Restoration Flows, and flood flows. However, periodic maintenance of the facilities including dredging of the channel would result in temporary increases in noise relative to dredging operation.

Project operations would be similar to what is currently occurring; therefore, operation of the Proposed Action would not increase daily traffic volumes. Because project operations would be nearly identical to current conditions, there ***would be no impact on noise levels***.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

The Proposed Action would result in temporary increases to noise within the project area. However, because impacts related to noise are less than significant, there would be no resulting cumulative impacts on noise as a result of the Proposed Action.

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3.15 Paleontological Resources

The remains or traces of prehistoric animals and plants are known as paleontological resources (fossils). This section describes the environmental and regulatory setting for scientifically important fossil remains, as well as the environmental consequences of the Proposed Action.

3.15.1 Environmental Setting

Paleontological resources can only be affected by earth-moving activities. Therefore, this section discusses only those areas where earth-moving activities may occur. For purposes of this section, the study area consists of the anticipated project disturbance area shown in Figures 2-3 and 2-4, and includes the area in the vicinity of Sack Dam at the confluence of the Arroyo Canal and SJR where proposed facilities would be constructed. The potential borrow area on the north levee of the Arroyo Canal (see Figures 2-3 and 2-4) could also affect paleontological resources.

Physical Environment

The study area is within the San Joaquin Valley in the Great Valley geomorphic province, as described in Section 3.8, Geology and Soils. The Great Valley is composed of thousands of feet of sedimentary deposits, with most of the surface covered by recent alluvium. The study area is located in Fresno and Madera counties, and in the Delta Ranch USGS 7.5-minute quadrangle. The information that follows is summarized from the SJRRP Draft PEIS/R (Reclamation and DWR 2011).

Local Geologic Setting

Geologic conditions influence the type of fossils that may be found and the probability that prehistoric remains may be fossilized rather than decaying. As noted in the SJRRP Draft PEIS/R, geologic mapping by Wagner et al. (1991) indicates that construction of facilities would occur in Dos Palos Alluvium (stream channel deposits). Dos Palos Alluvium consists of Holocene-age deposits of unweathered, unconsolidated feldspar-rich gravel, sand, silt, and clay that covers the flood basin of SJR.

Paleontological Resource Inventory Methods

As part of the SJRRP Draft PEIS/R (Reclamation and DWR 2011), a stratigraphic inventory and paleontological resource inventory were completed to assess the potential for paleontological resources in each rock unit. Maps were reviewed to document previously recorded fossil sites and types of fossils that have been found in each rock unit.

Areas underlain by sediments that are too young to contain fossils have a low sensitivity and a low potential to produce fossils. Areas underlain by geologic units that are igneous and/or metamorphic in origin have no potential to contain fossils and, thus, have no paleontological sensitivity.

Resource Inventory Results

On the basis of inventory conducted for the SJRRP Draft PEIS/R (Reclamation and DWR 2011), the study area appears to have a low potential for paleontological resources. Sediments of the Dos Palos Alluvium are less than 10,000 years old and are generally not known to contain paleontological resources. However, recent updates to paleontological assessment procedures use a more conservative definition of paleontological resources, which are considered to be older than middle Holocene (older than about 5,000 radiocarbon years). Therefore, a slight potential that paleontological resources could be present within the study area exists. However, because no known fossil remains have been found in the Dos Palos Alluvium, the paleontological sensitivity is low.

3.15.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. These thresholds are conservative from the perspective of determining significance under NEPA, where significance of an action is considered in terms of its overall context and the intensity of impacts. An impact to paleontological resources would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in the following:

- Disturbance or destruction of a unique paleontological resource or site, or unique geologic feature

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.15 (Environmental Commitments, Paleontological Resources) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

The potential for impacts on paleontological resources was assessed by identifying the geologic units that would be disturbed by construction of facilities and determining their potential to contain fossils.

No-Action

The No-Action Alternative would not involve any construction in the study area associated with the Proposed Action. Ongoing operational activities could include repair of the east side of the river channel after high-flow events. These repair activities would not be expected to disturb geologic units that could contain fossils, so there would be no impact on paleontological resources.

Proposed Action

Construction.

Impact PAL-1: Disturbance of unique paleontological resource or site, or unique geologic feature. It is not expected that in-river construction would encounter

paleontological resources, because disturbance would largely be limited to recently deposited sediments. The borrow materials would be expected to be previously disturbed or imported materials. Recent sediments along the river channel have a low potential to contain paleontological resources. Although the potential for earth-moving activities to affect paleontological resources is low, if construction activities were to encounter unanticipated paleontological resources, this impact would be potentially significant. Environmental commitment PAL-1, as part of the Proposed Action, would ensure that potentially significant impacts related to potential damage to unique paleontological resources are reduced to a less than significant level, because if resources were encountered, fossil specimens would be recovered and recorded, and would undergo appropriate curation. ***This impact is less than significant.***

Operation. Operation would include periodic sediment and debris removal in SJR upstream of Sack Dam. Because only recently deposited sediment and debris would be removed, no impact on paleontological resources is expected to result from operational activities.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

As part of the evaluation conducted for the SJRRP Draft PEIS/R (Reclamation and DWR 2011), a records search was conducted of the University of California Museum of Paleontology's Paleontology Collections database in Berkeley, California. The records search did not identify any previously recorded fossil localities within the entire SJRRP study area that, for paleontological resources, encompassed SJR from Friant Dam to the Delta, including the study area. The Proposed Action and Alternative 1 would not result in a cumulatively considerable incremental contribution to a significant cumulative impact on paleontological resources.

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3.16 Public Services and Utilities

3.16.1 Environmental Setting

Sack Dam is located on the SJR on the border of Fresno and Madera counties.

Fire Protection

Fresno County Fire Protection District and Madera County Fire Department provide fire protection services.

Police Protection

Fresno County Sheriff's Department and the Madera County Sheriff's Department provide law enforcement services.

Schools and Parks

The school in the closest proximity to the project site is Bryant Middle School, located approximately 6 miles east of the project site in the City of Firebaugh. The nearest park, Pierini Park, is located approximately 7 miles west of the project site in Dos Palos.

Wastewater and Stormwater

Sanitary sewer systems in Fresno and Madera counties are generally provided by cities and special districts. Some districts provide sewer collection service only and contract with surrounding agencies for wastewater treatment and disposal. Some of the unincorporated areas of Fresno and Madera counties lack sanitary sewer infrastructure, and are served by individual or community septic systems. A municipal wastewater collection system does not serve the study area (Reclamation and DWR 2011). The study area is not served by a municipal storm drain system.

Solid Waste

The Fresno County Resources Division and the Madera County Resource Management Agency provide solid waste services.

Solid waste disposal in Fresno County is managed by the Fresno County Resources Division. Fresno County owns and operates two landfills: the American Avenue Landfill and the Coalinga Landfill. The American Avenue Landfill, defined as a Class II and Class III landfill, accepts nonhazardous and inert solid wastes and asbestos. The landfill is permitted to accept a maximum of 2,200 tons per day (tpd) of solid waste (California Integrated Waste Management Board 2008a, as cited in Reclamation and DWR 2011). American Avenue Landfill is considered a sanitary landfill and was initially opened for public and commercial solid waste haulers in 1992. The Coalinga Landfill is defined as a Class III landfill and accepts nonhazardous and inert solid wastes; it is permitted to accept a maximum of 200 tpd of solid waste.

Fresno County banned the disposal of construction and demolition debris at both landfills in an effort to meet the requirements of the California Recycling law AB 939 (Reclamation and DWR 2011).

The Madera County Resource Management Agency manages Madera County solid waste disposal. The county owns and operates the Class III Fairmead Sanitary Landfill. The landfill is permitted to accept a maximum of 1,100 tpd of solid waste. Although the county does not have a post-construction or residential recycling program, it does move some post-construction wastes out of the waste stream in the Mammoth Material Recovery Facility (California Integrated Waste Management Board 2008c, as cited in Reclamation and DWR 2011).

Power

Power is currently supplied in the vicinity of the project site by an existing power pole that is serviced by PG&E. The power pole is located southwest of the existing headworks structure.

3.16.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An impact on public services and utilities would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities and create a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:
    - Fire protection
    - Police protection
    - Schools
    - Parks
    - Other public facilities, including power
- Exceed wastewater treatment requirements of the applicable water board
- Require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects

- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects
- Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs
- Comply with federal, State, and local statutes and regulations related to solid waste

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.16 (Environmental Commitments, Public Services and Utilities) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

This analysis considers the range and nature of foreseeable conditions in relevant portions of the study area and identifies the primary ways that construction and operation of the program alternatives could affect existing utility services and municipalities. Assessment included review of local public services currently serving the study area.

No-Action

Under the No-Action Alternative, no improvements would be made to Sack Dam and Arroyo Canal. Public services and utilities would continue to operate under the existing conditions.

Proposed Action

Construction. Portable generators would be used during construction, and there would be no impact on existing power facilities.

Impact PUB-1: Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs. Demolition of the existing Sack Dam and Poso Canal would result in the accumulation of concrete (and other) waste. As described in environmental commitment PUB-1, the majority of concrete would be reused onsite, reducing the total amount of waste requiring disposal. The implementation of environmental commitment PUB-2 would assure that the remainder of the waste generated onsite would be removed to a nearby landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs. ***This impact is less than significant.***

Operation. The Proposed Action would not result in a necessity for, or impacts on, new or physically altered governmental facilities needed to maintain acceptable service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks, or other public facilities.

No new wastewater would be produced, and there would be no increased demand for wastewater collection systems as a result of the Proposed Action. The Proposed Action would not result in the expansion or construction of stormwater drainage facilities.

Impact PUB-2: Result in a substantial impact on other public facilities, including power. The mechanical systems associated with the Proposed Action include screen cleaners, a trash-rack cleaner, a sediment jetting system, gates to Sack Dam, and other miscellaneous electrical and lighting requiring new electrical connections to the project site. The onsite electrical usage is estimated to be a maximum of 110 kilowatt-hours per day (40,150 kilowatt-hours per year). Power for the Proposed Action would be supplied by the existing PG&E-serviced power pole located southwest of the existing headworks structure. The additional electrical usage associated with the Proposed Action is minor, relative to the electricity currently supplied by PG&E. ***This impact is less than significant.***

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

Neither the Proposed Action nor the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in significant changes to public services or utilities within the project vicinity. Although any new project within the vicinity of the Proposed Action could potentially affect power consumption, when combined with other projects occurring in the vicinity of the study area, the Proposed Action would not cause a considerable cumulative impact on power resources; therefore, there would be no cumulative effects as a result of the Proposed Action.

3.17 Recreation

The discussion of existing conditions for recreation and the potential environmental consequences of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative on recreation addresses the SJR area immediately upstream and downstream of Sack Dam.

3.17.1 Environmental Setting

Water from SJR is heavily managed and is extensively distributed to benefit a variety of users, including water districts, irrigation districts, municipal and industrial users, water storage districts, and municipal utility districts (Reclamation and DWR 2011). Recreation is possible in SJR and adjacent to the river in some areas. However, with such extensive modification of the river's flows, some reaches remain dry at most times, and only limited recreation opportunities are available (Reclamation and DWR 2011).

SJR contains a number of parks and public lands offering diverse recreation opportunities, particularly associated with the many reservoirs, rivers, and other water bodies found throughout this portion of California (Reclamation and DWR 2011). Numerous recreational opportunities exist on private lands, including fishing, hunting, and other activities. Recreationists occasionally use the levees take walks, walk their animals, and fish in the river; swimming is likely, and there is evidence of hunting, although this area is private property and such uses are unsanctioned. Formal and informal recreational uses of the different reaches include hiking, fishing, bird watching, canoeing, kayaking, and gold panning (Reclamation and DWR 2011).

Land within the study area has been designated as AE by both Fresno and Madera counties' general plans (see Section 3.13, Land Use and Agricultural Resources, for more information). Although the project study area can be accessed by county roads, the private property owners preclude public access to the area. The study area does not have any publically available recreational opportunities.

3.17.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An impact on recreation would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated

- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment

Environmental Commitments Incorporated into the Proposed Action

No environmental commitments related to recreation have been identified as necessary for the Proposed Action or the Vertical Slot Fish ladder and Fish Bypass System Alternative.

Assessment Method

This impact assessment is based on qualitative information regarding changes to recreation conditions that could occur under the No-Action Alternative, Proposed Action, and Vertical Slot Fish ladder and Fish Bypass System Alternative. A review of environmental documents for other projects in the vicinity of the study area was also completed.

No-Action

Under the No-Action Alternative, there would be no change in the use of recreational facilities from the existing conditions. No recreational activities occur in the Proposed Action. No additional visitors or construction workers would be onsite; therefore, there would be no increased demand for any recreation. Because increases in population that would generate any demand for recreation under the No-Action scenario are not present, there would be no impact on any recreational facilities that would cause a physical degradation.

Proposed Action

Construction.

Impact REC-1: Increase the use of existing parks or other recreational facilities. Because of the short construction period (January 2013 through October 2014) and the limited number of construction workers (10 to 20 workers at any time), most of the workforce is anticipated to come from the local region. As such, it is unlikely that the Proposed Action would contribute to any measureable population growth. Therefore, the Proposed Action would not increase the demand for recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

There is a potential for beneficial impacts on recreation to occur as a result of implementation of the Proposed Action. The construction of a new fish ladder or fish screen may result in increased number of fish upstream of Sack Dam in SJR. This increase in fish populations could result in increased recreational opportunities (such as fishing) both upstream and downstream of the study area. Although there may be an increased number of fish in the river, fishing would likely occur in the same locations where fishing occurs today. It would be unlikely that the increased fish population would result in an increase in the number of fishing days that would cause a degradation of any park facilities. ***This impact is less than significant.***

Operation.
Impact REC-2: Include recreational facilities or require the construction or expansion of recreational facilities. The Proposed Action does not include or require construction or expansion of recreational facilities. Furthermore, as previously discussed, the Proposed Action would not increase the demand for recreational facilities. ***Therefore, no impact would occur, and no mitigation is required***.

Vertical Slot Fish ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

As described in the SJRRP Draft PEIS/R, cumulative impacts on recreational resources could occur in SJR upstream from Friant Dam, in the Restoration Area, downstream from the Merced River, and in the Delta, due to construction, change in fishing regulations and opportunities, and increases in flow. Although the improvements associated with the Proposed Action and the Vertical Slot Fish ladder and Fish Bypass System Alternative are identified as elements of the greater Restoration Program, implementation of these improvements would not increase the demand for recreational facilities. Because publically accessible recreation opportunities do not exist, the Proposed Action would not adversely affect existing opportunities nor contribute considerably to overall adverse cumulative effects on recreation. A small beneficial cumulative impact could occur if an increase in the fish population resulted from the fish ladder.

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3.18 Socioeconomic Resources

This section describes the population trends and economic base trends for Fresno, Madera and Merced counties. Although the Proposed Action is located within Fresno and Madera counties, Merced County may experience socioeconomic impacts associated with the Proposed Action, and is therefore, also included in this analysis.

3.18.1 Environmental Setting

The study area is located in rural Fresno and Madera counties. Dos Palos, California Merced County is the nearest city center, located approximately 7 miles northwest of the project site (estimated population of 4,898 [City-Data 2011]). This analysis includes the nearest incorporated cities relative to the project site, where information was available.

Population Trends

Fresno County. According to the U.S. Census Bureau, the population in Fresno County was 930,450 in 2010, which was an 18 percent increase over the population reported 10 years prior. The City of Fresno comprised the majority of the population (494,665) in the county. The City of Firebaugh had a reported population of 7,549 in 2010. According to the U.S. Census Bureau, tract 84.02, which is located adjacent to the study area and encompasses 181.69 square miles, there was a reported total population of 2,192 in 2000 (U.S. Census Bureau 2012), accounting for less than 1 percent of the total population in Fresno County.

Madera County. According to the U.S. Census Bureau, the population in Madera County was 150,865 in 2010, which was a 23 percent increase over the population reported 10 years prior. Throughout the county, the City of Madera has the highest percentage (40 percent) of people living within its city limits (61,416). According to the U.S. Census Bureau, tract 4, which is located adjacent to the study area and encompasses 248.02 square miles, there was a reported total population of 1,559 in 2000 (U.S. Census Bureau 2012), which accounts for less than 1 percent of the total population for Madera County.

Merced County. According to the U.S. Census Bureau, the population in Merced County was 255,793 in 2010, which was a 21.5 percent increase over the population reported 10 years prior. Throughout the county, the City of Merced, with a population of 78,958, holds the highest percent of the total population (30 percent) for the county. The City of Los Banos had a reported population of 35,972 in 2010. According to the U.S. Census Bureau, tract 24, which is located northwest of the project site and contains the City of Dos Palos, there was a reported total population of 7,655 in 2000 (U.S. Census Bureau 2012).

Economic Base

Table 3.18-1 provides the employment profile for the three counties, as compared to the State of California. The table also shows the employment profiles for the cities of Firebaugh, Madera, Los Banos, and Dos Palos.

Table 3.18-1.
Employment Profile November 2011

Location	Total Labor Force	Number of Employed	Number of Unemployed	Percent of total
Fresno County[1]	429,700	362,500	67,300	15.7
City of Firebaugh[1]	2,900	2,100	800	26.8
Madera County[1]	64,600	55,300	9,300	14.3
City of Madera[1]	23,200	18,600	4,700	20.1
Merced County[1]	104,600	86,900	17,600	16.9
City of Los Banos[1]	13,100	10,800	2,300	17.7
Dos Palos	2,100	1,600	500	22.7
California[2]	18,182,000	16,124,000	2,058,000	11.3

Source: EDD 2011c.
Notes:
[1] Not seasonally adjusted.
[2] Seasonally adjusted.

As shown, the geographical areas are experiencing higher unemployment rates than what is occurring in California. In 2011, Fresno County experienced a total loss of 5,600 farm jobs from October to November; however, nonfarm employment rose by 700 jobs. Farm jobs represent approximately 12 percent of the overall workforce in Fresno County. Madera County also experienced a loss in farm jobs from October to November 2011, by approximately 1,300 jobs. EDD reported that losses to farm jobs during this time period were typical. Farm employment for Madera County comprises approximately 20 percent of the total work force. Merced County experienced a total loss of 3,100 jobs for both farm and nonfarm employment (EDD 2011d).

3.18.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. Impacts on socioeconomic conditions would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Displace a large number of people or existing housing
- Displace a business or residence from its established location, or disrupt access to a business or residence for more than 14 days
- Conflict with the established goals of local, county, or regional development plans

Environmental Commitments Incorporated into the Proposed Action

No environmental commitments related to socioeconomics have been identified as necessary for incorporation into the Proposed Action or the Vertical Slot Fish ladder and Fish Bypass System Alternative.

No-Action

Under the No-Action Alternative, the Proposed Action would not be constructed. Current trends in population economic trends would continue as they are. The No-Action Alternative would have no impact on social and economic conditions within the study area.

Proposed Action

Construction.

Impact SOC-1: Construction activities would have a minor beneficial impact on the local economy. Construction of the Proposed Action would result in temporary beneficial effects, as a result of increased labor needs for construction and increased spending at local businesses. Small construction crews would work for specific periods, resulting in increased spending by workers at local businesses and for local suppliers. Additionally, when feasible, materials and equipment needed for construction and actual facilities (such as concrete) would be obtained from the community nearest to the study area. It is assumed that construction personnel would be either local or from out of the area, using hotels as necessary during the construction period; therefore, this would not induce substantial growth to any of the surrounding areas to any measureable extent.

As discussed in Section 3.13, Land Use and Agricultural Resources, minor impacts on surrounding agricultural lands may occur during the construction period because of contractor staging and equipment storage areas extending into neighboring agricultural lands. These impacts would not significantly displace an established business. Additionally, after construction has completed, the surrounding agricultural lands would be restored to their original condition, and agricultural activities would resume to pre-project levels. ***This impact is less than significant.***

Operation. Operational activities for the Proposed Action would require routine maintenance, including removal of sediment and debris in SJR (immediately upstream of Sack Dam), the Arroyo Canal approach channel, and around the fish screen structure. This maintenance would generally be conducted during the low-demand period in December and January. Sediment and debris buildup is expected, and maintenance would be conducted as necessary. These activities are consistent with existing activities and would not require HMRD to hire additional staff. New equipment may be required for operational activities; however, this equipment would be purchased locally if possible, and would provide a minor beneficial impact on the local economy.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

The Proposed Action would likely result in small but beneficial social and economic effects during the construction phase. No cumulative socioeconomic effects are anticipated, because no effects on this resource are expected from implementing the Proposed Action.

3.19 Transportation and Traffic

3.19.1 Environmental Setting

Fresno County General Traffic Conditions

According to the *Fresno County General Plan Background Report* (Fresno County 2000b), the county's circulation system consists of a roadway network that is primarily rural in character, with the exception of the urbanized area surrounding the cities of Fresno and Clovis and various smaller communities in the southern and western parts of the county. The most important interregional roadways in the county are Interstate 5 (I-5) located over 25 miles west of the project site, State Route (SR) 99 located approximately 20 miles east of the project site, and SR 41 located over 25 miles from the project site. I-5 is the primary north-south route for interregional and interstate business, freight, tourist, and recreational travel, linking Southern California to Northern California and the Pacific Northwest. Fresno County is linked to Yosemite National Park and the Sierra communities to the north via SR 41, as well as to Kings County and the Central Coast to the south. In addition to I-5, SR 99, and SR 41, Fresno County is served by SRs 33, 43, 63, 145, 168, 180, 198, and 269 (Fresno County 2000b).

The county is also served by other major roadways that carry local and regional traffic, connect the cities and communities of Fresno County, and provide farm-to-market routes. These roadways provide critical freight and commercial linkages between production/manufacturing and the larger interregional distribution system.

Madera County General Traffic Conditions

The *Madera County General Plan Background Report* (Madera County 1995b) states that the physical constraints on the county's circulation system are the natural and constructed barriers to travel that limit existing and future roadway connections and alignments, and thus constrain the county's access and circulation capability.

Circulation constraints in Madera County vary between the valley region and the foothill/mountain region. In the flat valley of the western county, major circulation elements are the north/south-oriented SR 99 and railroad tracks that also run north/south, parallel to the SR. The SRs and railroad tracks facilitate north/south travel and hinder east/west travel. Access to the north, west, and south of the county is limited by the Chowchilla River and SJR. The Fresno River, which runs generally in an east/west direction, also poses a constraint to north/south travel. Numerous creeks and canals pose minor constraints to travel in the county.

No airports are within 2 miles of the study area. The closest airstrip is in Madera County at the Triangle T Ranch, about 3 miles east of SJR.

Local Traffic Conditions

Access to the project site would require the use of several roads, including SR 99, SR 152, and several local roadways within Madera, Merced, and Fresno counties.

SRs 99 and 152 provide regional access through all three counties. SR 99 is the primary interregional corridor, providing both a north/south route for agriculture commerce, and through traffic between the major cities within the San Joaquin area. SR 152 extends east/west between the San Joaquin Valley and the Pacific Coast. SR 152 is also considered an important agricultural, commercial, and recreational route within the area (Madera County 2011b).

Because no urbanized areas are within the immediate vicinity of the study area, traffic levels on arterials, collectors, and local roads are likely to be moderate with local agricultural trucks and commuters. With the exception of the SR 152 bridge, public roads crossing SJR are arterials, collectors, or local roads and are under the jurisdiction of either Madera, Merced, or Fresno County. Traffic counts are not available through many county roads, and were not available for the local roads included in the study area.

The following roads would provide site access on the west side of SJR. Roads providing access to the project site would not be upgraded. Access to the project site spans both Merced and Fresno counties (see Figure 3.19-1):

- Highway 152 (through Merced County) to Indiana Road, south on Indiana Road (turns into Brannon Avenue at the border of Merced and Fresno counties), east on Valeria Avenue to the project site.

3.19.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An impact on traffic and transportation would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)
- Result in inadequate emergency access
- Result in inadequate parking capacity
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)

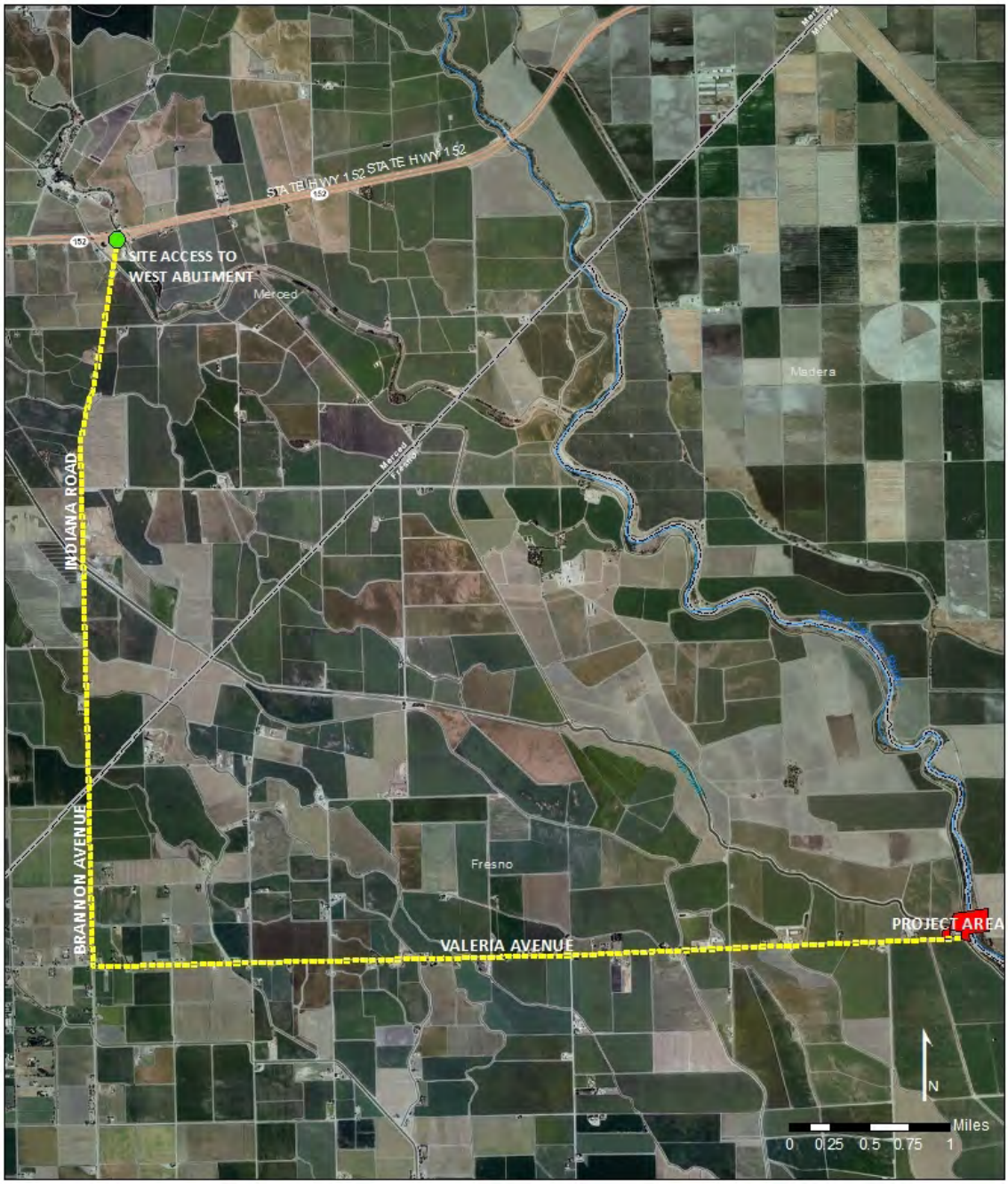

Figure 3.19-1.
Project Access Route

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.19 (Environmental Commitments, Transportation and Traffic) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

This analysis considers the range and nature of foreseeable traffic conditions on roadways in relevant portions of the study area and identifies the primary ways that construction and operation of the alternatives could affect existing traffic conditions and infrastructure. Assessment included review of local traffic conditions, traffic plans, and transportation ordinances.

No-Action

Under the No-Action Alternative, impacts on transportation and traffic would be limited to what is currently occurring. Interim flows would continue to inundate the existing Sack Dam, which would likely require repair to the east side of the river channel and periodic dredging of the riverbed after high-flow events. Repairs to the east side of the river and dredging would include the use of heavy equipment for 2 to 3 days per occurrence; however, construction equipment would be stored onsite and would not require the transport of heavy equipment to the study area. Additionally, under the No-Action Alternative, increases in average daily traffic volumes along roadways within the study area caused by workers accessing the site would remain unchanged.

Proposed Action

Construction.

Impact TRAN-1: Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system. The primary route of daily site access to the project site starts in Merced County and continues through Fresno County. Local traffic on Indiana Road/Brannon Avenue and Valeria Avenue would slightly increase during construction resulting from construction workers entering and exiting the site, and general construction traffic such as dump trucks hauling material to and from the site. The most noticeable increase in traffic would be during the mobilization phase and concrete placement during the construction phase; however, because borrow material would be generated onsite, the majority of construction vehicles would remain onsite during construction. Daily traffic estimates associated with worker commute traffic are estimated at up to 20 trucks per day traveling to and from the project site. Concrete trucks would be used to transport an estimated 1,500 cubic yards of concrete to the project site. On any given day, a maximum of 10 concrete-truck trips would occur. Concrete placement is estimated to take 8 weeks during the period of construction, but this period would not be consecutive. The increased levels of traffic would be temporary and last only during the construction period. Additionally, intermittent increases in truck traffic of up to 30 trucks per day traveling to and from the construction site would not affect current level of service to local roadways. Implementation of environmental commitments TRAN-1 and TRAN-2 would further assure that no impacts on traffic and

transportation would occur as a result of the Proposed Action. ***This impact is less than significant.***

Operation. Operational activities for the Proposed Action would require routine maintenance including removal of sediment and debris in SJR (immediately upstream of Sack Dam), the Arroyo Canal approach channel, and around the fish screen structure. This maintenance would generally be conducted in December and January during the low-demand period. Sediment and debris buildup is expected, and maintenance would be conducted as necessary. These activities are consistent with existing activities and would not require HMRD to hire additional staff. Therefore, operational activities associated with the Proposed Action would be consistent with existing operations and not affect local traffic patterns.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

Given other project-related impacts associated with the Proposed Action would be less than significant, and there are no other known similar projects that, considered with the project, could cumulatively cause impacts on local traffic conditions, the Proposed Action would not constitute a considerable contribution to cumulative impacts.

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3.20 Water Resources

3.20.1 Environmental Setting

The Proposed Action is located in the San Joaquin Valley, on the SJR bordering Fresno and Madera counties. The San Joaquin Valley is bounded to the west by the Coast Ranges, to the south by the San Emigidio and Tehachapi mountains, to the east by the Sierra Nevada, and to the north by the Delta and Sacramento Valley. The Proposed Action is located at Sack Dam, which is located at the junction of reaches 3 and 4A of SJR as described in the SJRRP Draft PEIS/R (Reclamation and DWR 2011). Following is a description of SJR and the hydrology surrounding the project area.

Surface Water

San Joaquin River. SJR originates high in the Sierra Nevada mountains and carries snowmelt from mountain meadows to the valley floor before turning north and becoming the backbone of tributaries draining into the San Joaquin Valley (see Figure 3.20-1). The river is California's second longest river and discharges to the Delta and, ultimately, to the Pacific Ocean through San Francisco Bay.

Historically, SJR supported a rich and diverse ecosystem influenced by seasonal runoff patterns. During winter and spring months, runoff from Sierra Nevada streams would spread over the valley floor and slowly drain to the Delta, providing rich habitat supporting numerous aquatic and wildlife species, including Chinook salmon.

Over the past 2 centuries, development of water resources transformed the river. In the late 1880s, settlers in the Central Valley drained large areas of valley floor lands and put these lands into agricultural production, supported by small and seasonal diversion dams on the river and a series of conveyance and drainage canals.

In 1944, Reclamation completed construction of Friant Dam on the SJR, which remains the main control structure on the river. With the completion of Friant-Kern Canal in 1951 and Madera Canal in 1945, Friant Dam diverted SJR water supplies to over 1 million acres of highly productive farmland along the eastern portion of the San Joaquin Valley. Operation of the dam ceased flow in some portions of the river and affected salmon runs in SJR upstream from its confluence with the Merced River. Today, flows in SJR are affected by water projects on the river's tributaries, imports to the river from other regions, diversions from the river, return flows, and Millerton Lake.

The project site is centered around Sack Dam, which is located at RM 182.0, in a portion of SJR that flows northward, towards the Delta. Sack Dam is located approximately 23 miles downstream from Mendota Dam. This portion of the river is described as Reach 3 in the SJRRP Draft PEIS/R (Reclamation and DWR 2011). Historically, the primary source of water entering Reach 3 is from the Delta-Mendota Canal through releases at Mendota Dam. This portion of SJR is characterized by a sandy,

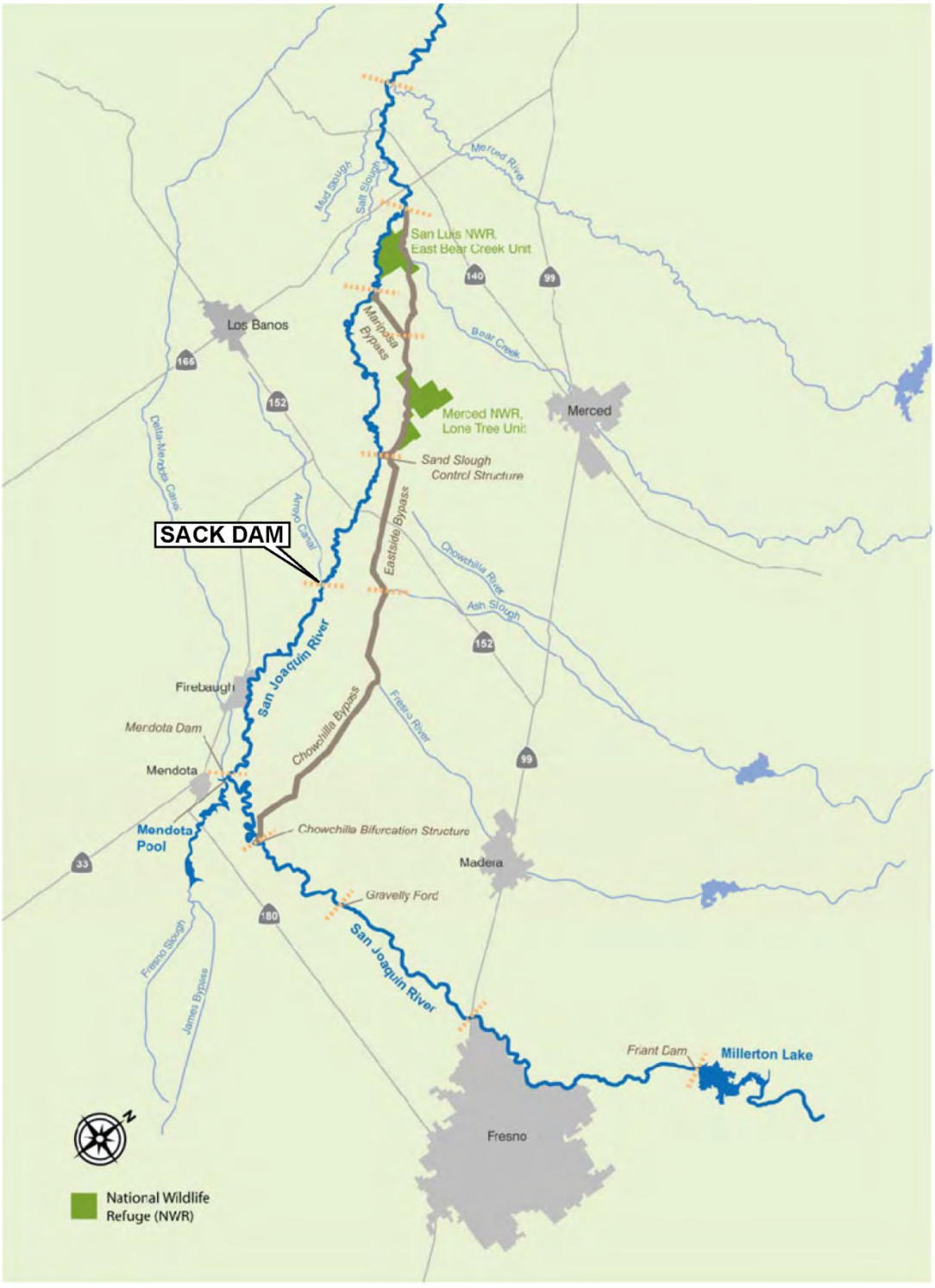

Figure 3.20-1.
San Joaquin River Hydrologic Features

meandering channel that conveys perennial flows of Delta water released from the Mendota Pool. Table 3.20-1 shows the historical average streamflow and maximum daily average streamflow as recorded at the USGS gaging station located along SJR near Mendota, approximately 2.5 miles downstream of Mendota Dam. Table 3.20-2 shows the historical average monthly flows for the SJR near Mendota.

Table 3.20-1.
Streamflow Gage San Joaquin River near Mendota

USGS Gage, Station No. or CDEC ID	Drainage Area (square miles)	Period of Record[1]	Average Streamflow	Maximum Daily Average Streamflow (cfs) (date measured)
11254000	3,940	1951–1954 1975–2007[2]	545	8,770 (May 29, 1952)

Source: Reclamation and DWR 2011.
Notes:
[1] Water Year.
[2] Period of record coincides with the start of diversions from Friant Dam 1950.
Key:
CDEC = California Data Exchange Center
cfs = cubic feet per second
ID = identification
No. = number
USGS = U.S. Geological Survey

Table 3.20-2.
Historical Average Monthly Flows for San Joaquin River near Mendota

Year Type[1]	Average Monthly Flow (cfs)[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
All Years	203	221	306	444	661	732	920	979	839	613	439	275
Wet	160	234	488	1,019	1,770	2,274	2,646	2,534	1,820	939	483	311
Normal-Wet	292	530	746	654	495	278	223	364	463	497	433	274
Normal-Dry	175	101	67	86	208	190	240	328	491	522	406	247
Dry	218	115	61	56	175	230	209	245	445	526	445	275
Critical-High	133	67	1	87	146	157	231	345	479	486	459	312
Critical-Low	188	58	4	27	126	219	141	141	341	507	412	214

Source: Reclamation and DWR 2011.
Notes:
[1] Restoration year types are defined in Appendix I of the SJRRP Draft PEIS/R, "Surface Water Supplies and Facilities Operations."
[2] Period of Record Water Years 1951 through 2007; some years may be missing data.
Key:
cfs = cubic feet per second

Significant bed lowering has been measured within this reach; however, the extent of this lowering that is due to subsidence from groundwater overdraft, or to human-induced

sediment and hydrology modification within the channel is unknown (McBain & Trush, Inc. 2002). No operational storage for water supply exists within this reach. The design flood flow capacity of this reach is 4,500 cfs; however, anecdotal evidence suggests that seepage and associated flooding may begin at sustained flows above 800 cfs (San Joaquin River Resource Management Coalition 2007). Flows from Mendota Dam are typically 500 to 600 cfs during the irrigation season and predominantly consist of water conveyed from the Delta by the Delta-Mendota Canal that is released from the Mendota Pool for diversion.

The portion of SJR beginning at Sack Dam and extending downstream approximately 14 miles to the Sand Slough Control Structure is sand-bedded and meandering. This portion of the river is described as Reach 4A in the SJRRP Draft PEIS/R (Reclamation and DWR 2011). This portion of the river is usually dry except for seepage through Sack Dam, interim Restoration Flow releases, and flood flows. The channel also experiences flow during the agricultural season from agricultural return flows (Reclamation and DWR 2011). Table 3.20-3 shows the historical average streamflow and maximum daily average streamflow as recorded at the USGS gaging station located along SJR near Dos Palos. Table 3.20-4 shows the historical average monthly flows for the river near Dos Palos.

Table 3.20-3.
Streamflow Gage San Joaquin River near Dos Palos

USGS Gage, Station No. or CDEC ID	MP	Drainage Area (square miles)	Period of Record[1]	Average Streamflow	Maximum Daily Average Streamflow (cfs) (date measured)
11256000	NA	4,669	1951-1954 1975-1987 1996[2]	478	8,170 (June 5, 1952)

Source: USGS 2008.
Notes:
[1]Water Year.
[2]Period of record coincides with the start of diversions from Friant Dam (1950).
Key:
CDEC = California Data Exchange Center
cfs = cubic feet per second
ID = identification
MP = milepost
NA = not applicable/not available
No. = number
USGS = U.S. Geological Survey

This portion of the river has experienced bed lowering, similar to what is occurring upstream of Sack Dam. The project area and the river downstream approximately 14 miles are bounded on the west bank by the Poso Canal, and on the east bank by locally maintained private levees.

Interim Flow Releases. In accordance with the 2006 Settlement between the Natural Resources Defense Council, Friant Water Users Authority, and the U.S. Departments of the Interior and Commerce, water is to be released from Friant Dam to the Delta to conduct data collection and monitoring activities. The intent of the Interim Flows Project is to allow data to be collected on flows, water temperatures, fish needs, seepage losses,

and water recirculation, recapture, and reuse. These data will also be useful in evaluating channel characteristics and capacity, and infiltration losses. The Interim Flows would be evaluated prior to release of full Restoration Flows.

Table 3.20-4.
Historical Average Monthly Flows for San Joaquin River near Dos Palos

Year Type[1]	Average Monthly Flow (cfs)[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
All Years	49	202	458	556	794	943	1,064	1,007	562	187	22	29
Wet	6	182	610	751	1,642	2,515	2,879	2,726	1,512	469	45	68
Normal-Wet	154	501	873	995	585	55	4	3	6	6	7	3
Normal-Dry	5	4	52	62	154	6	8	7	8	6	6	7
Dry	0	0	0	41	23	15	3	8	10	Data not available		
Critical-High	58	6	6	51	1	2	1	3	7	12	8	0
Critical-Low	0	13	0	0	2	3	2	1	9	9	9	6

Source: USGS 2008, Gage Station No. 11256000.
Notes:
[1] Restoration year types are defined in Appendix I of the SJRRP Draft PEIS/R, "Surface Water Supplies and Facilities Operations."
[2] Period of Record Water Years 1951-1996; some years may be missing data.
Key:
cfs = cubic feet per second

The Interim Flows Project began in WY 2010, continued in 2011, and is proposed to continue in 2012. Interim Flow releases are ramped up slowly over time with flows held at constant levels to allow surface water and groundwater conditions to stabilize before the next increase. If WY 2012 is determined to be a wet year, Interim Flows would be ramped down over a 60-day to 90-day period to collect data on the establishment of riparian vegetation at appropriate elevations in the SJR channel.

Groundwater elevation constraints associated with seepage concerns to adjacent agricultural lands downstream of Sack Dam limited the release of Interim Flows past Sack Dam in WY 2011. Releases past Sack Dam were held at 80 cfs and then subsequently reduced to 50 cfs to address downstream seepage concerns from neighboring landowners. Starting on February 1, 2011, flows were commenced again for the spring Interim Flow releases and were held to no greater than 50 cfs past Sack Dam. For the implementation of WY 2012 Interim Flows, it is possible that flows past Sack Dam would again be constrained by potential seepage concerns from neighboring landowners and that flows may again be limited to reduce or avoid groundwater impacts as a result of the release of Interim Flows. Table 3.20-5 shows the Interim Flow release schedule as presented in the *Final Supplemental Environmental Assessment Interim Flows Project – Water Year 2012* (Reclamation 2011).

Table 3.20-5.
Example Estimated Regulated Nonflood Flows from Friant Dam in a Wet Year[1]

Begin Date	End Date	Estimated Flows Consisting of Interim Flows and Water Right Flows at Locations in the Restoration Area (cubic feet per second)									
		Head of Reach 1[2]	Head of Reach 2A[3]	Head of Reach 2B[4]	Head of Reach 3[5]	Head of Reach 4A	In Reach 4B1[6]	In Reach 4B2	In Bypass System[7]	Head of Reach 5	Merced River Confluence[8]
10/1/2011	10/31/2011	350	195	115	715	115	0	115	115	115	415
11/1/2011	11/6/2011	700	575	475	1,075	475	0	475	475	475	775
11/7/2011	11/10/2011	700	575	475	1,075	475	0	475	475	475	775
11/11/2011	12/01/2011	350	235	155	755	155	0	155	155	155	555
12/02/2011	1/31/2012	350	235	155	755	155	0	155	155	155	155
2/1/2012	2/28/2012	350	255	175	775	175	0	175	175	175	675
3/1/2012	3/15/2012	500	375	285	885	285	0	285	285	285	785
3/16/2012	3/31/2012	1,500	1,375	1,225	1,300	1,225	0	1,225	1,225	1,225	1,700
4/1/2012	4/15/2012	1,620	1,475	1,300	1,300	1,300	0	1,300	1,300	1,300	1,700
4/16/2012	4/30/2012	1,620	1,475	1,300	1,300	1,300	0	1,300	1,300	1,300	1,700
5/1/2012	6/30/2012	1,660[9]	1,475	1,300	1,300	1,300	0	1,300	1,300	1,300	1,700
7/1/2012	8/31/2012	350	125	45	645	45	0	45	45	45	320
9/1/2012	9/30/2012	350	145	65	665	65	0	65	65	65	340

Source: Reclamation 2011.

Notes:

[1] Example only. Actual Interim Flows may vary depending on a variety of factors. Flows may be lower under other water year types.

[2] Assumes up to 230 cubic feet per second diverted by in-stream water right holders (that is, holding contracts), consistent with Exhibit B of the Settlement.

[3] Assumes up to 200 cubic feet per second lost through infiltration, consistent with Exhibit B of the Settlement.

[4] Estimated WY 2012 Interim Flows at the head of Reach 2B account for seepage losses experienced in Reach 2A, consistent with Exhibit B of the Settlement.

[5] Assumes up to 600 cubic feet per second released to Reach 3 from the Mendota Pool for diversions at Sack Dam into the Arroyo Canal.

[6] The Proposed Action, as reported in the Interim Flows EA/IS, does not include any activity in Reach 4B1.

[7] Includes Eastside and Mariposa bypasses.

[8] Assumes accretions from Mud and Salt sloughs in Reach 5, consistent with Exhibit B of the Settlement.

[9] May through June flow would include a block of water for shaping for testing riparian recruitment recession flow.

Sack Dam and Arroyo Canal. HMRD owns and operates Sack Dam. HMRD supplies irrigation water to approximately 47,000 acres within the SLCC service area. HMRD also delivers water to the federal San Luis Wildlife Refuge Complex, the California State Wildlife Refuge, and refuge lands within Grasslands Water District. The existing Sack Dam was constructed in the 1940s and is a 5.75-foot-high concrete and wooden diversion structure delivering water to the Arroyo Canal. The Arroyo Canal begins on the west side of the river and continues approximately 20 miles to the northwest, where it becomes part of the Santa Fe Canal near the town of Los Banos. The Poso Canal is also located on the west side of the river and passes over the Arroyo Canal by a flume structure. The Poso Canal originates as a diversion off Main Canal in the town of Firebaugh, which is located upstream of the project area and continues on at least 15 miles downstream.

Under typical operations, water within SJR reaching Sack Dam is diverted to the Arroyo Canal for irrigation or delivery to refuges. Diversions to Arroyo Canal range from zero to 800 cfs; however, diversions typically do not exceed 600 cfs. Flood flows and flows greater than those required for diversion spill over Sack Dam and continue downstream.

Water Quality

Water upstream from Friant Dam generally contains relatively low mineral and nutrient concentrations due to the insolubility of granitic soils in the watershed and the river's granite substrate (Southern California Edison 2007). As the SJR and tributaries flow from the Sierra Nevada foothills across the eastern valley floor, their mineral concentration increases. Sediment is likely captured behind the many impoundments in this geographic subarea.

Water quality criteria applicable to some beneficial uses are not currently met within SJR upstream and downstream of the project vicinity. Water quality in various segments of the river below Friant Dam is degraded because of low flow and discharges from agricultural areas and wastewater treatment plants. In the project area, water released during the irrigation season at Mendota Dam to Sack Dam generally has higher concentrations of total dissolved solids than water in the upper reaches of SJR (Reclamation and DWR 2011). Water temperatures below Mendota Dam are dependent on water temperatures of inflow from the Delta-Mendota Canal and, occasionally, the Kings River system via James Bypass. Water temperature conditions downstream of Sack Dam are dependent on inflow water temperatures during flood flows (Reclamation 2007) or interim Restoration Flows.

Groundwater

The San Joaquin Valley Groundwater Basin is located within the southern two-thirds of the 400-mile-long, northwest-trending asymmetric trough of the Central Valley regional aquifer system. Aquifers in the basin are thick and typically extend to depths of up to 800 feet.

The SJR Hydrologic Region relies heavily on groundwater, with groundwater making up approximately 30 percent of the annual supply for agricultural and urban uses. Groundwater resources in the project area are within the Chowchilla and Delta-Mendota Groundwater subbasins.

The semiconfined aquifer system of the San Joaquin Valley has historically been recharged by mountain rain and snowmelt along the valley margins. Recharge has generally occurred by stream seepage, deep percolation of rainfall, and subsurface inflow along basin boundaries (McBain & Trush, Inc. 2002). Groundwater in the SJR Hydrologic Region historically flowed from the valley flanks to the axis of the valley during predevelopment conditions, then north towards the Delta (DWR 2003). Groundwater pumping and recharge from imported irrigation water have resulted in a change in regional flow patterns. Flow largely occurs from areas of recharge to areas of lower groundwater levels because of groundwater pumping. Vertical movement of water in the aquifer has been altered in this region as a result of thousands of wells constructed with perforations above and below the confining unit (Bertoldi et al. 1991).

Water levels declined along the west side of the region beginning in the 1940s, and dropped more than 30 feet by 1960. Groundwater pumping in the region and the entire Central Valley rose during the 1970s, and reached a peak during the 1976 through 1977 and 1987 through 1992 drought periods (Reclamation and DWR 2011).

Seepage has been reported to occur in agricultural fields adjacent to SJR downstream from Mendota Dam near the town of Firebaugh (Steele 2008). Flows exceeding 800 cfs can cause lateral seepage impacts associated with increased groundwater levels and resultant water logging of the crop root zones (San Joaquin River Resource Management Coalition 2003, 2005, 2007). Riparian landowners along the reach between Sack Dan and SR 152 have reported seepage problems on adjacent lands downstream from Sack Dam at flows in excess of 600 cfs (Moss 2002).

3.20.2 Environmental Consequences

Significance Criteria

Thresholds of significance are based on Appendix G of the CEQA Guidelines. An impact on water quality would be considered potentially significant if the Proposed Action or the Vertical Slot Fish Ladder and Fish Bypass System Alternative would result in any one of the following in the study area:

- Violate any water quality standards or waste discharge requirements
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or offsite
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially

increase the rate or amount of surface runoff in a manner that would result in flooding on- or offsite

- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff
- Otherwise substantially degrade water quality
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam
- Inundation by seiche, tsunami, or mudflow

Environmental Commitments Incorporated into the Proposed Action

Section 2.8.20 (Environmental Commitments, Water Resources) presents a complete list of environmental commitments incorporated into the Proposed Action and Vertical Slot Fish Ladder and Fish Bypass System Alternative.

Assessment Method

The assessment methodology includes evaluation of construction-related potential impacts and operation impacts. Potential short-term impacts would be associated with construction and be limited to the immediate study area. Construction-related impacts assessed in this EA/IS include required in-river work as well as associated required temporary construction areas surrounding the project site (such as, contractor staging sites). The evaluation of potential short-term, construction-related impacts is based on several considerations including construction timing, hazardous spills, turbidity, sedimentation, and erosion. Long-term operation impacts take into consideration regular maintenance activities, including removing sediment and debris in SJR (immediately upstream of Sack Dam), the Arroyo Canal approach channel, and around the fish screen structure. Additionally, dredging activities would occur within the SJR channel.

To assess the impacts of the water surface elevations resulting from the Proposed Action, a one-dimensional hydraulic model, Hydrologic Engineering Center River Analysis System (HEC-RAS) was developed. The HEC-RAS model was used to compare the effects of the Proposed Action on the existing Reach 3 water surface elevations at the reported channel capacity (4,500 cfs). Water surface elevations were compared from approximately 400 feet upstream to 100 feet downstream of the existing Sack Dam with and without project improvements. Full details of the HEC-RAS study are included in Appendix I.

No-Action

Under the No-Action Alternative, HMRD would continue to operate Sack Dam and the Arroyo Canal to maintain current water deliveries. HMRD would not replace Sack Dam or construct the proposed improvements. Also, under the No-Action Alternative, HMRD would need to repair the east side of the river channel after high-flow events (flood flows and interim flows), which would likely require the use of heavy equipment for 2 to 3 days per occurrence. Additionally, periodic sediment dredging around Sack Dam and the approach channel is anticipated. Dredging would require the use of a long-reach excavator or dredge. Such work would be done so as to minimize impacts on the river and associated water quality, and in compliance with local, State, and federal requirements.

Proposed Action

Construction.

Impact WR-1: Violate water quality standards or waste discharge requirements. Without mitigation, construction activities including site grading, soil stockpiling, and in-river activities (for example, pile driving) for the Proposed Action could cause soil erosion and sedimentation that would degrade water quality in SJR downstream of the project area. Construction activities could also discharge waste petroleum products or other construction-related substances that could enter waterways in runoff. In addition, chemicals associated with operating heavy machinery would be used, transported, and stored onsite during construction activities.

As specified in environmental commitments WR-1 and WR-2, implementation of an SWPPP and associated BMPs, and compliance with State and federal CWA requirements would ensure impacts are minimized. Implementation of the sediment control measures included as part of the Proposed Action would result a ***less than significant impact on water quality*.**

Impact WR-2: Substantially alter the existing drainage pattern of the site or area resulting in flooding on- or offsite. In-river construction activities include the following elements: temporary low-water access crossing downstream of Sack Dam, demolition of the existing dam and construction of the new dam, construction of the trash-rack structure, and construction of the work benches. These activities are scheduled to begin in February 2013, and extend for up to 20 months through September 2014. During this time, it is anticipated that Interim Flows and flood flows would occur that could inundate the project area. To accommodate flood flows and Interim Flows, the contractor would use one of the two in-river construction methods as described in Section 2.3.3, In-River Construction.

Either of the two methods of construction would allow flood flows and Interim Flows to move beyond the project area. The installation of either of these methods during construction ***would reduce any impact from flood flow and Interim Flow inundation to a less than significant level***.

Impact WR-3: Inhibit agricultural and refuge water deliveries and diversions to Arroyo Canal and Poso Canal. As previously described, in-river construction activities, including the installation of the fish screen and trash rack, and other construction

activities, including the construction of the transport channel/fish bypass, would occur within an approximate 20-month timeframe. Arroyo Canal diverts water year-round, and disruptions to water diversions could occur as a result of construction activities.

Additionally, Poso Canal, located adjacent to the project site, conveys water north past the project site year-round, except when the canal is dewatered for maintenance (generally from mid-December through mid-January). The transport channel/fish ladder would cross Poso Canal, and may entail an open-cut method of construction. Disruptions of service to Poso Canal due to construction of the transport channel/fish ladder could affect agricultural diverters downstream.

As specified in environmental commitment WR-3, continuous service to both canals would be provided during construction. These measures would eliminate potential impacts on water users, including wildlife refuges, diverting from the Arroyo Canal and Poso Canal. ***This impact is less than significant.***

Operation.

Impact WR-4: Violate water quality standards or waste discharge requirements. Maintenance of the fish screen and dam would include sediment and debris removal in SJR (immediately upstream of Sack Dam), the Arroyo Canal approach channel, and around the fish screen structure. A small hydraulic dredge would be used around the fish screen structure if the Arroyo Canal cannot be dewatered and sediment removal is required. Similarly, a long-reach excavator or dredge would be required to remove sediment from SJR (immediately upstream of Sack Dam) and the Arroyo Canal approach channel. This maintenance would generally be conducted in December and January during the low-demand period. Sediment and debris buildup is expected, and maintenance would be conducted as necessary. Dredged material would be placed in approved areas to make sure material does not re-enter the river. Additionally, as specified in environmental commitments WR-1 and WR-2, prior to these maintenance operations occurring, HMRD would obtain approval from the Water Board through the CWA Section 401 process as to appropriate sediment control measures required to perform the work. Compliance with the CWA requirements as agreed to with the Water Board ***would reduce impacts on water quality to a less than significant level***.

Impact WR-5: Substantially alter the existing drainage pattern of the site or area, resulting in flooding on- or offsite. Sack Dam would be reconstructed upstream of the existing dam approximately 100 feet. The new dam would include revetment protection (for example, stones or articulating concrete block) on the riverbed and banks upstream and downstream of the dam to resist channel degradation and bank erosion. Hydraulic controls would be included to allow flexibility in operating the dam to accommodate flood flows.

The HEC-RAS model results demonstrated no measurable increase in the water surface elevation at the Reach 3 channel capacity (4,500 cfs) and the highest recorded flood flow (5,900 cfs) as a result of project improvements. The model did show nominal changes in the water surface elevations in localized areas around the structure, but these fluctuations did not exceed 0.1 foot of rise at any of the modeled cross sections. ***Changes in the flood profile resulting from the Proposed Action are less than significant***.

Vertical Slot Fish Ladder and Fish Bypass System Alternative

Construction. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Operation. Impacts resulting from the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be the same as impacts discussed under the Proposed Action.

Cumulative Effects

Temporary impacts on water resources would occur during the construction and operation phases of the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative. Although other projects occurring on SJR associated with the SJRRP and other unrelated efforts could potentially affect water resources, impacts resulting from the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative would be mitigated to a less than significant level. When combined with other projects occurring near the study area, the Proposed Action and the Vertical Slot Fish Ladder and Fish Bypass System Alternative would not cause a considerable cumulative impact on water resources; therefore, there would be no significant cumulative effects.

4.0 Consultation and Coordination

Several federal and State laws, permits, licenses, and policy requirements have directed, limited, or guided the NEPA and CEQA analyses and decision-making processes of this EA/IS and are listed below.

4.1 Federal

4.1.1 Clean Water Act, Section 404 and Section 10

USACE regulates the discharge of dredging material or fill into waters of the United States, including wetlands, under Section 404 of the CWA. Waters of the United States include surface waters such as navigable waters and their tributaries, interstate waters and their tributaries, natural lakes, wetlands adjacent to other waters, and impoundments of these waters. Under Section 10 of the Rivers and Harbors Act, USACE also regulates the obstruction or alteration of navigable waters of the United States. A wetlands delineation is being prepared for the project site and will be submitted to USACE in spring 2012.

Reclamation and HMRD representatives have met with USACE, and it is anticipated that an individual permit will be required for the Proposed Action.

4.1.2 Endangered Species Act

Section 7 of ESA (16 United States Code 1531 et seq.) requires federal agencies, in consultation with the Secretary of the Interior or Commerce, to confirm that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species. A biological assessment is currently being prepared for the Proposed Action. Reclamation will submit the biological assessment to USFWS and NMFS and, upon doing so, will request consultation for compliance with ESA under Section 7.

4.1.3 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act requires federal agencies to consult with USFWS and NMFS before undertaking or approving water projects that would control or modify surface water. Coordination under the Fish and Wildlife Coordination Act is intended to promote conservation of fish and wildlife habitats by preventing their loss or damage and to provide for development and improvement of fish and wildlife habitats in connection with water projects. Federal agencies undertaking water projects are required to fully consider recommendations made by USFWS and NMFS in project reports and include measures in project plans to reduce impacts on fish and wildlife habitat. Because the Proposed Action would affect surface waters, Reclamation has initiated coordination with

USFWS and NMFS to comply with the Fish and Wildlife Coordination Act (see Appendix J).

4.1.4 National Historic Preservation Act

Section 106 of the NHPA requires federal agencies to consider the effects of federal undertakings on historic properties (properties determined eligible for inclusion in the NRHP). Compliance with Section 106 follows a series of steps that are designed to identify interested parties, determine the APE, identify if historic properties are present within the APE, and assess effects on any identified historic properties. Reclamation is preparing a cultural resources investigation report that will be submitted to SHPO for Section 106 consultation.

4.1.5 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act establishes a management system for national marine and estuarine fishery resources. This legislation requires that federal agencies consult with NMFS regarding actions or proposed actions permitted, funded, or undertaken that may adversely affect "essential fish habitat (EFH)." EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Magnuson-Stevens Fishery Conservation and Management Act states that migratory routes to and from anadromous fish spawning grounds are considered EFH. The phrase "adversely affect" refers to the creation of any impact that reduces the quality or quantity of EFH. Federal activities that occur outside of EFH but may have an impact on EFH must be considered in the consultation process. The Magnuson-Stevens Fishery Conservation and Management Act applies to Pacific salmon, groundfish, and several pelagic species found in the Pacific.

The Pacific Fisheries Management Council (2003) has determined that SJR up to Friant Dam is EFH for Pacific salmon (*Oncorhynchus tshawytscha*). Salmon have been extirpated from a majority of the river because of Friant Dam operations. One of the central goals of the SJRRP is to re-establish a spring-run Chinook population in the river. When the population is re-established it would be considered part of the Central Valley Spring-Run Chinook Evolutionarily Significant Unit (SJRRP 2011b). A biological assessment that incorporates the EFH assessment is being prepared by Reclamation.

4.1.6 Migratory Bird Treaty Act

The Migratory Bird Treaty Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Unless permitted by regulations, the Migratory Bird Treaty Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Subject to limitations in the Migratory Bird Treaty Act, the Secretary of the Interior may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting or exporting of any migratory bird, part, nest or egg will be allowed, having regard for

temperature zones, distribution, abundance, economic value, breeding habits, and migratory flight patterns.

Most of the birds found in the study area are protected under the Migratory Bird Treaty Act. Reclamation and HMRD have met with USFWS and DFG. Nesting birds would not be impacted because preconstruction surveys and appropriately timed vegetation removal would be implemented. HMRD would seek incidental take authorization from DFG in order to work within the designated buffer for a nearby Swainson's hawk nest. No take is anticipated because the nest is located in areas where significant noise already occurs. Additional information can be found in Section 3.4 this EA/IS.

4.2 State

4.2.1 Clean Water Act, Section 401

Under Section 401 of the CWA, an applicant for a Section 404 permit must obtain a certificate from the appropriate Water Board stating that proposed fill is consistent with the State's water quality standards and criteria. In California, the authority to grant water quality certification is delegated by the State Water Resources Control Board to the nine Water Boards. Because of its location, the Proposed Action falls under jurisdiction of the Central Valley Water Board; therefore, Reclamation will coordinate with the Central Valley Water Board to obtain a Section 401 Water Quality Certification.

4.2.2 Clean Water Act, Section 402

Dischargers whose projects disturb 1 or more acres of soil or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activity (Construction General Permit 2009-0009-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The authority to regulate compliance with CWA Section 402 requirements is shared between the State Water Resources Control Board and the nine Water Boards. Most enforcement responsibilities are delegated to the Water Boards; therefore, Reclamation and HMRD will coordinate with the Central Valley Water Board to achieve compliance.

4.2.3 California Endangered Species Act

CESA and DFG Code (Sections 2050 to 2097) are similar to ESA. DFG Commission is responsible for maintaining lists of threatened and endangered species under CESA. The CESA prohibits the "take" of listed and candidate (petitioned to be listed) species. Take, under California law, means to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch capture, or kill" (see DFG Code Section 86). Reclamation and HMRD have initiated preliminary consultation with DFG through agency coordination meetings

and have provided the opportunity for agency feedback regarding study methods and conclusions. Reclamation and HMRD will continue to work cooperatively with DFG to facilitate the CESA consultation process and make sure the necessary protection measures are provided for listed species.

4.2.4 California Fish and Game Code Sections 1602 and 1603

DFG's Lake and Streambed Alteration Program (DFG Code Section 1600 et seq.) requires any person, State, or local governmental agency, or any public utility who proposes a project that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake or use materials from a streambed to notify DFG. HMRD will prepare the Notification of Streambed Alteration for submittal to DFG and attend an agency coordination meeting to discuss project characteristics, permit requirements, and permitting schedules.

4.2.5 California Fish and Game Code Sections 1900 to 1913 – Native Plant Protection Act

The Native Plant Protection Act (DFG Code Sections 1900 to 1913) directs DFG to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this state." Under the Native Plant Protection Act, DFG has the authority to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. CESA expanded upon the Native Plant Protection Act and enhanced legal protection for plants.

4.2.6 California Code of Regulations Title 23

SJR is a Central Valley Flood Protection Board (CVFPB)-regulated stream. The CVFPB requires that an encroachment permit be filed for work that will be conducted within the floodways under its jurisdiction, and on levees adjacent to any stream that may affect those floodways. There are no jurisdictional levees in the study area; however, HMRD will prepare an encroachment permit application package for submittal to the CVFPB. Reclamation and HMRD have met with USACE engineers to discuss encroachment permit review and issues.

4.2.7 State Lands Commission Land Use Lease

The Proposed Action includes construction of project elements that are within SJR, which may be under management authority or jurisdiction of the State Lands Commission. The Proposed Action may require a State lands lease agreement. Reclamation and HMRD will consult with the State Lands Commission to determine whether the Proposed Action would require a lease agreement.

4.2.8 Surface Mining and Reclamation Act of 1975

The requirements of the Surface Mining and Reclamation Act of 1975 apply to anyone, including government agencies, engaged in surface mining operations in California (including those on federally managed lands) that disturb more than 1 acre or remove more than 1,000 cubic yards of material. This includes, but is not limited to, prospecting

and exploratory activities, dredging and quarrying, streambed skimming, borrow pitting, and the stockpiling of mined materials. Although unlikely, if Surface Mining and Reclamation Act of 1975 is necessary, the compliance process will be triggered during the county-level review of the Proposed Action. If necessary, a permit, reclamation plan, and financial assurances for reclamation will be submitted to the county.

4.3 Local

4.3.1 San Joaquin Valley Air Pollution Control District

The CAA establishes NAAQS. Under the CAA, USEPA is responsible for setting and enforcing the federal ambient air quality standards for atmospheric pollutants. SJVAPCD has the authority to issue permits and ensure compliance with air quality regulations.

Reclamation and HMRD will consult and coordinate with SJVAPCD on specific requirements for general conformity and mitigation requirements. A conformity analysis will be performed during the NEPA/CEQA process. Additionally, Reclamation and HMRD will submit an Indirect Source Review package and a dust control plan to SJVAPCD.

4.3.2 Fresno County Code of Ordinances

Fresno County General Plan Policy OS-D.4 and OS-D.6 (Fresno County 2000c) requires riparian protection zones around natural watercourses, and specifies a compensation ratio of 3:1 for modification of existing native riparian habitat by new private or public developments.

Fresno County Ordinance Code Section 15.28, Chapter 18 and Appendix I of the 2007 California Building Code sets forth rules and regulations to control excavation, grading, and earthwork construction, including fills and embankments; establishes the administrative procedure for issuance of permits; and provides for approval of plans and inspection of grading construction. An application for grading permit will be submitted to Fresno County prior to project construction.

The Madera County General Plan (1995) and the Fresno County General Plan (2000) include general policies relevant to the provision of parks and recreational opportunities in their respective counties. The study area does not contain formal recreational facilities. Therefore, the goals and policies associated with such facilities are not applicable to the study area. However, both general plans identify policies to support the policies of the San Joaquin River Parkway Plan to protect SJR as an aquatic habitat and a water source.

The San Joaquin River Parkway Plan includes portions of Fresno County and Madera County and the City of Fresno, well outside of the project study area. The San Joaquin River Parkway Plan's area is approximately 23 miles long, from RM 267.6 at the face of Friant Dam to state Highway 99 at RM 243.2 on both sides of the river (San Joaquin River Conservancy 2000).

4.3.3 Madera County Municipal Code

Madera County General Plan Policy 5.D (Madera County 1995c) requires riparian protection zones around natural watercourses, and specifies a compensation ratio of 3:1 for modification of existing native riparian habitat by new private or public developments.

Chapter 14 of the Madera County Code requires projects that require grading, leveling, earth moving, or, specifically, the removal of natural vegetation or disturbance of the soil, except for cultivation of crops where the area exceeds 15,000 square feet, to obtain a grading permit. An application for a grading permit will be submitted to Fresno County prior to project construction.

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