Draft
Supplemental Environmental Assessment

Arroyo Canal Fish Screen and Sack Dam Fish Passage Project

December 2024

Mission Statements

The U.S. Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, Native Hawaiians, and affiliated 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.

Contents

Figures

Tables

Appendices

1.0 Introduction and Statement of Purpose and Need

1.1 Introduction

In 2013, the U.S. Bureau of Reclamation (Reclamation), as the federal lead agency, and Henry Miller Reclamation District #2131 (HMRD), as the state lead agency, prepared the Arroyo Canal Fish Screen and Sack Dam Fish Passage Project (Project) Environmental Assessment/Initial Study (2013 EA/IS) (Reclamation 2013) to analyze and disclose the anticipated environmental impacts of the proposed Project. However, as the Project neared 100 percent design, surveys revealed a significantly higher rate of regional land subsidence than anticipated at Sack Dam, and environmental compliance documentation efforts were paused to allow for design efforts to consider this new information. Since 2013, Reclamation has evaluated several design alternatives that have been eliminated from further consideration for a variety of technical reasons. Reclamation now has sufficient information to analyze the effects of a feasible design alternative for the Project and is therefore preparing environmental compliance documentation as needed to supplement the previous analyses. Reclamation is preparing this supplemental environmental assessment (SEA) to analyze and disclose any potential impacts to the human environment of the design refinements to the Project beyond those that were analyzed and disclosed in the 2013 EA/IS, which is hereby incorporated by reference. Section 1 of the 2013 EA/IS describes background information on the 2006 *NRDC, et al., v. Kirk Rodgers, et al*. *Stipulation of Settlement* (Settlement) and the 2009 Settlement Act (Settlement Act), included in Public Law 111-11 (PL111-11), as well as information on the study area.

The Project (proposed action) would be designed, constructed, operated, and maintained by Reclamation as an interrelated element of the San Joaquin River Restoration Program (SJRRP). Therefore, Reclamation is the lead agency for the proposed action in accordance with the National Environmental Policy Act. Further information on all other environmental laws and regulations applicable to the proposed action is described in Section 5.

1.2 Need for the Proposal

The purpose and need for the proposed action remains the same as described in the 2013 EA/IS. As described on Page 7 of the Settlement, the proposed action is needed to achieve the Restoration Goal:

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.

The purpose of the proposed action is to implement fish passage improvements at the Arroyo Canal and Sack Dam facilities on the San Joaquin River; as described in Paragraph 11(a)(6) and 11(a)(7)of the Settlement, as authorized by the Settlement Act included in Public Law 111-11, and as described in the 2012 SJRRP Programmatic Environmental Impact Statement/Report (PEIS/R) and Record of Decision (ROD) (Reclamation 2012):

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

2.0 Description of Alternatives

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 new fish passage or fish screen facilities. HMRD would operate the dam using the existing gates to assist in passing up to 500 cubic feet per second (cfs) of Restoration Flows. Sack Dam becomes inundated at flows greater than 1,300 cfs; therefore, HMRD would need to remove the existing 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 1,300 cfs. Periodic sediment dredging around Sack Dam and the Arroyo Canal approach channel is anticipated for the no action alternative. Additionally, fish entrainment into the Arroyo Canal for juvenile outmigration and adult migration would continue as it currently does. The no action alternative would result in not being able to meet the Settlement Restoration Goal.

2.2 Alternatives Eliminated from Further Consideration

In an effort to identify an action that provides the best environmental and engineering solution to accomplish the requirements of the Settlement, 13 alternatives were evaluated prior to the current proposed action. Design alternatives considered included: a Vee-Screen in the mouth of the canal, a ramp over the existing Sack Dam, a pumping plant at the canal entrance, a pumping plant further in the canal, various screen iterations on both banks, and various ramps around the existing dam. From all of these alternatives, several variables and considerations were retained, leading to the current design being evaluated as the proposed action. Site subsidence, fisheries criteria, and the specific requirements in the Settlement were the technical factors eliminating the other design alternatives from further consideration.

2.3 Proposed Action

In support of the SJRRP Restoration Goal, Reclamation proposes to construct, operate, and maintain a fish screen at Arroyo Canal and fish passage facilities at Sack Dam in Reaches 3 and 4A of the Restoration Area (Figure 1). The proposed modifications are necessary to prevent entrainment of anadramous fish into Arroyo Canal and ensure fish passage at Sack Dam, as required by Paragraphs 11(a)(6) and 11(a)(7) of the

Settlement. The proposed action includes the following key components (Figure 2), as further described below:

- Construct a new 700 cubic feet per second (cfs) flat-plate fish screen located on the left bank of the new channel.
- Construct a new 4,500 cfs channel around Sack Dam.
- Construct a new gated headworks structure to control flow releases into the river channel, consisting of 12 bays with operable gates.
- Construct a new vertical slot fishway around the gated headworks structure to provide salmonid passage.
- Construct a new berm downstream of the existing Sack Dam to direct fish to the fishway and river channel and prevent fish from reaching Sack Dam and possibly entering the backside of the screen and being vulnerable to entrainment into the Arroyo Canal.
- Install a new log boom placed within 50 feet upstream of the fish screen to protect the structure from debris and vegetation, aiding in encouraging juveniles to move toward the new river channel.
- Construct a new maintenance building in the area directly west of the fish screen structure on the left bank of the San Joaquin River to store equipment, including electrical controls.
- Relocate existing Pacific Gas and Electric (PG&E) gas and power lines.

Reclamation has requested authorization to construct, operate, and maintain the Project from the United States Army Corps of Engineers (Corps) in accordance with Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA), and issuance of this permit is an associated federal action that should be considered part of the proposed action.

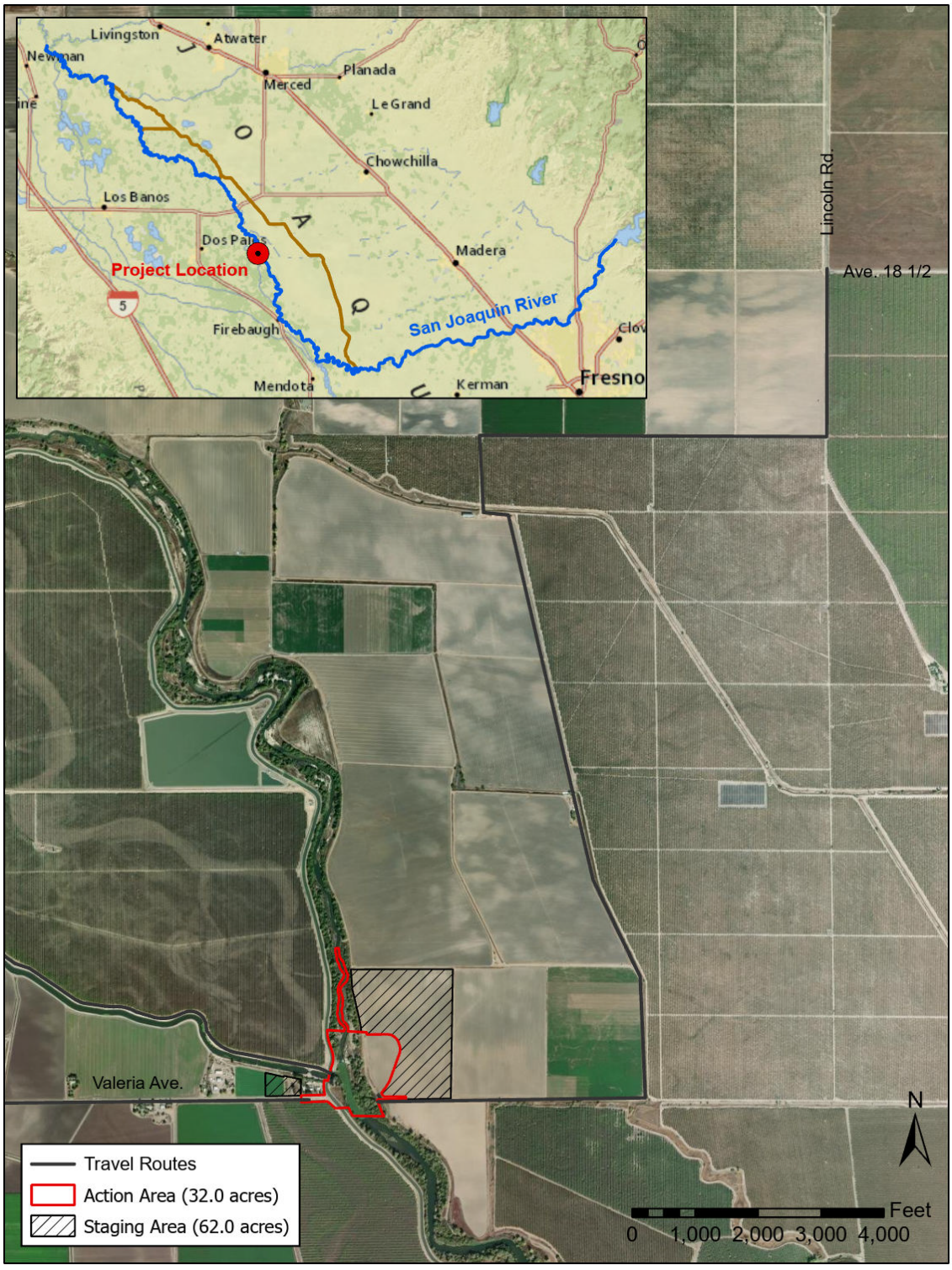

Figure 1 Project Location

Figure 2 Proposed Action Area

Fish Screen

The proposed fish screen would be a bankline, vertical flat-plate screen, with 1.75 mm opening, stainless steel screen, supported by steel supports. The fish screen would be placed along the river left bank (west side) of the river, at the point of diversion into Arroyo Canal, spanning from the left bank upstream of the entrance to Arroyo Canal to the right bank of the fish ladder exit. The fish screen would be 7 feet tall and made of 2-inch-thick stainless steel wedge wire. The design would include an elevated metal walkway behind the screen for operation and maintenance access. A mechanical brush cleaning system and airburst system would be included as screen cleaning mechanisms. Louvers or baffle plates would be installed immediately behind the wedge wire panels to allow for flow velocity tuning of the structure.

The fish screen and steel supports would be anchored to a concrete base that spans approximately 380 feet in length, 15 feet in width, and would be 1.5 feet thick. The concrete base includes an approximately 3 foot deep shear key to prevent slip shear failure and increase stability. The sides of the fish screen structure would be connected to the existing grade through sheet pile and concrete abutments. The fish screen structure foundation concept consists of driven sheet pile beneath the concrete slab, which penetrate potentially liquefiable soils in the subgrade and into underlying dense/stiff soil layers at depth in the subsurface to avoid excessive settlement of the structure in case of seismic loading and liquefaction in the subgrade.

The fish screen is anticipated to be constructed with heavy equipment behind cofferdams and in the dry. The screen will likely be constructed in pieces following the dewatering of sections of the foundation. Excavation of the riverbed behind the cofferdams will likely occur with long arm excavators and sheet pile will be driven with vibratory drivers with concrete footings poured on top. Assembly of the screen structure is expected to occur behind cofferdams in sections as well. The fish screen is expected to require three construction seasons of in-water work, making the entire project duration approximately three calendar years.

Fish Passage and Headworks Structure

This project element would have a headworks structure and fish ladder located immediately downstream of the fish screen on the left bank of the new river channel, just southeast of the existing Sack Dam. There would be vehicle access from the new levee to the west side of the new headworks structure that would also provide access to the east side of the facility. The headworks structure capacity would be designed to pass 4,500 cfs through a series of gates.

A concrete vertical-slot fish ladder would provide salmonid passage around the headworks control structure in low flow events. The fish ladder would have a maximum flowrate of 50 cfs and a total of seven pools created by baffles in its final configuration, excluding the ladder entrance and exit channels. The maximum hydraulic drop between pools would be 1 foot and the baffles would have a slot width of 1 foot, 3 inches. The first six baffles of the fish ladder would be initially constructed, and the remaining five baffles would be installed as the site subsides to accommodate additional head

differential at Sack Dam. The headworks structure would require a maximum excavation of 20 feet for the foundations. The fish ladder exit would have stoplog guides to isolate the structure if maintenance was necessary, but these would be fully removed in normal operations to pass 25–50 cfs downstream. The stoplog guides would be filled when not in use to allow for Pacific lamprey (*Entosphenus tridentatus*) passage across the headworks structure. A downstream berm would be installed adjacent to the fish ladder to remove the existing Sack Dam from the river channel and ensure all fish and flows are routed through the new headworks, creating a left bank fish screen alignment. The berm will also prevent upstream migrating fish from moving into the Arroyo Canal.

The river bypass channel would be 400 feet in length, 100 feet wide, with maximum depth of 15 feet including a low flow channel connecting the entrance of the fish ladder to the downstream river confluence. The low flow channel would be 18 inches in depth and rounded rock lined in an engineered streambed material fashion. A fish ramp channel would be constructed parallel to the river bypass channel to provide optimal passage conditions in various flow conditions to a number of native species. This fish ramp channel would measure approximately 45 feet wide, 400 feet long, and 15 feet deep. The fish ramp will include pillar structures to maintain velocities and water depth throughout the length of the channel totaling 11 sets of pillars.

A total cut and fill of 39,040 cubic yards and 15,010 cubic yards would be expected for the full construction of the features, including the right bank channels and levee. With the expected cut and fill it is estimated the project will require the haul off of 25,000 cubic yards of material.

The headworks structure and channels are expected to be constructed behind cofferdams installed with vibratory sheet pile techniques and following dewatering. The excavations will be conducted with bull dozers, skid steers, and long arm excavators to allow for fine finish grading prior to the pouring of concrete foundations. The foundations will be poured and structures constructed behind cofferdams on the east bank of the main river channel to minimize the impact to the river.

The downstream levee removing the existing Sack Dam from the river would be constructed following the completion of the headworks structure and downstream channels. This would be done by installing bulkheads or sheets on the existing Sack Dam to create a waterproof barrier with the pool, and with sheet pile on the downstream end to prevent any backwater from impacting the construction zone. The sheet pile will be driven with vibratory installation techniques and the upstream sealing of the existing sack dam would be consistent with previous dewatering techniques for work on Sack Dam. The levee would then be constructed in the dry with flows routed through the new facility for fish passage and regular Restoration Flow operations.

Maintenance Building

The proposed maintenance building is a pre-engineered one-story building that would contain equipment storage and a control room. Stormwater runoff from the building

would be collected and filtered through gravel ditches for infiltration back into the ground. The interior would be partitioned into air-conditioned and non-air-conditioned sides with the control room receiving interior finish, and code-required insulation to foundation, walls, and roof while the maintenance/storage side of the building would not require insulation or interior finish. The building would be supported by a shallow mat foundation. The building is currently planned to be 36 feet long, 24 feet wide, and 15 feet tall. It is anticipated to be connected to a local PG&E overhead power line. All lighting associated with the building will be installed on the canal side facing away from the river. It is anticipated that two lights will be installed on the building facing the canal and yard and require a switch for activation. An emergency diesel generator would be provided for short-term backup power at the site and would be used for emergency operations when PG&E power is unavailable. The building would be located on the east side of the Poso Canal and have a crossing with a 20-foot double swing gate entrance. A 15-foot-wide access road would be constructed to provide vehicular access from the Poso Canal bridge through the gated entrance and to the maintenance building.

The maintenance building will be constructed following the raising of the portion of land between the Poso Canal and the river. The property is expected to be raised with excavated materials from the east side of the river to limit the need for additional haul off. When the property is brought to final grade, retaining walls and drainage will be constructed with rock prior to the construction of the building itself. The building will be the final piece constructed on the plateau with the foundation slab being poured first and the pre-engineered building being constructed with the masonry wall following. This building will be constructed last following all of the pipe work and conduit necessary to support the controls and operation of the larger project.

PG&E Gas Line and Power Line Relocation

The proposed action area has an existing PG&E gas line crossing through the area under the proposed maintenance building, fish screen, and re-routed river. The project would require the abandonment of the existing line and the replacement with a new alignment to allow the utility to maintain service to their customers and allow Reclamation to construct the fish passage element of the project. The relocated line would be designed and installed by PG&E to cross the river immediately south of the fish passage element of the proposed action area and would be a directionally drilled line installed from Valeria Avenue to a connection outside of the east bank levee. This new line would be a 6-inch line consistent with the segment of gas line being removed. The entrance and exit pit for the directional drill would be a maximum of 25 feet long by 10 feet wide with a total depth of 15 feet at the locations of connection for the existing gas line. The entrance and exit pits would be excavated prior to the insertion of the directional drill. The drill would be used to create a hole large enough along the proposed alignment at 80 feet deep to pull back the gas line without having to excavate any river channel or within the riparian corridor. The pull back would occur immediately following the completion of the drilling and would occur in sections to allow for the connection of additional pipe as it is pulled through. This action is expected to occur in August of 2025 by PG&E and not take more than a month to complete.

The existing PG&E gas line would be removed within the limits of the low water mark consistent with the requirements of the State Lands Commission. The existing segment of the line would be cleaned and filled with concrete following the completion of the new line. The cleaned and filled section would then be cut at the location of the low water mark on both the east and west banks of the river. The section of line that exists between the low water mark would then be lifted and removed from the streambed and disposed of by PG&E. It is estimated that the existing segment of gas line between the low water marks was installed at 3 feet depth below the ground surface and has likely become more exposed with the recent high flows in the river. The removal is expected to occur by use of a long arm excavator releasing the pipe following the cutting of the two ends. The survey conducted on the existing line shows the depth to be less than two feet in some locations and it is expected to be easily lifted and removed from the river with minimal impact. If the pipe becomes stuck during removal, divers with hydraulic shovels will enter the channel and remove any material preventing the existing line from being removed. This is expected to occur in August of 2025 and not take more than one month to complete.

Overhead electrical lines would be used to connect the proposed facility to PG&E's existing utility lines. It is estimated that two power poles to the east and the west of the project would require removal and raising of the existing lines to allow for access of heavy equipment to the site and additional connections to the overhead line. The poles would be removed and replaced in the existing locations. New poles may be steel or concrete at the discretion of PG&E.

Construction Considerations

The following roads would provide site access on the west side of the project area: Highway 152, Indiana Road, (turns into Brannon Avenue at the border of Merced and Fresno counties), and Valeria Avenue. Access on the west bank of the project area is anticipated to be provided through an easement Reclamation is acquiring from Central California Irrigation District (CCID), who plans to independently construct a new bridge over the Poso Canal that is suitable for construction equipment in January 2025.

The east bank access to the project area would be through an easement that passes through Clayton Ranches immediately to the east of the Reclamation property. The following roads would provide site access on the east side of the project area: Highway 152, Lincoln Road, and an unnamed farm access road. The access road would be improved to allow for the passage of heavy construction equipment. Road improvements expected to be needed include widening the road to a width of 20 feet, installation of 6 inches minimum of gravel base and filling of potholes and ruts with gravel to the original slope. All improvements made on the Clayton Ranches property under this agreement would be conducted by the property owner and reimbursed by Reclamation.

Project construction staging on the east bank would be done within the boundary of the Reclamation ownership, and staging for utility relocations will occur on parts of the Clayton Ranches property as negotiated between the landowner and PG&E. A staging area will be available on the west side of the project area inside of a Poso Canal Company laydown yard for project construction and utility relocation. The contractor

may make temporary surface improvements to the staging areas to accommodate all-weather use during construction. All construction materials (e.g., concrete and cobble) will come from an off-site, permitted source. Upon completion of construction, the staging areas will be restored to pre-project conditions.

Work in the wetted area would only be conducted following dewatering of the working area behind cofferdams. The installation of sheet pile cofferdams would be done with equipment working from dry land and without the need for it to be placed in the water. The dewatering is expected to be done behind sheet pile cofferdams with various wellpoints spaced no further than 100 feet apart and operated to maintain a water level at least 3 feet below the excavated surface. The final dewatering plan will be designed and submitted by the contractor following construction contract award. The dewatering and cofferdam plan will be reviewed and approved by National Marine Fisheries Service (NMFS) prior to Reclamation's acceptance of the submittal and implementation of the dewatering and cofferdam plan. The construction activity is anticipated to occur over the course of three years and require three full in-water work windows.

The SJRRP Restoration Administrator (RA) has drafted a potential Restoration Flow schedule that could be implemented during project construction (Table 1). However, the Restoration Flow schedule that is ultimately recommended by the RA and implemented by Reclamation on behalf of the Secretary of the Interior will depend on hydrology and other factors that are unknown at this time. Paragraph 13(i) of the Settlement states: *…the Secretary shall release as much of the Restoration Flows as possible, in consultation with the Restoration Administrator, in light of then-existing channel capacity and without delaying completion of the Phase 1 improvements....*

Restoration Flows At Sack Dam during construction of the Sack Dam Project																								
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Portion of Month	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2	1/2	2/2
Release to River below Sack Dam site	220	220	220	225	225	225	225	225	225	150	0	0	0	0	0	0	150	150	150	150	200	200	200	200

Table 1 Potential Restoration Flow Schedule During Construction

The PEIS/R and NMFS and U.S. Fish and Wildlife Service (USFWS) Biological Opinions on the effects of implementing the SJRRP (SJRRP BOs) analyzed release of Restoration Flows in accordance with the Settlement up to 1,660 cubic feet per second (cfs) at a project-specific level, including the Settlement requirement that Restoration Flows not delay completion of Phase 1 improvements: *Project-level actions include the release of Interim and Restoration Flows up to 1,660 cfs, and subsequent reoperation of downstream flow control structures… as stipulated in the Settlement*. Restoration Flows released during construction will be within those analyzed at a project-specific level in the SJRRP PEIS/R and BOs. Additional effects from implementing Restoration Flow

releases during project construction are not anticipated beyond what was analyzed in the SJRRP PEIS/R and BOs.

The contractor is expected to utilize equipment as described in Table 2. This list is not exhaustive, however, and the contractor may require the use of additional equipment. Construction equipment, vehicles, personnel, and materials would be staged onsite during periods of continuous use. 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. A total of approximately 556 construction work days are anticipated over the three year construction period. 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.

Equipment use would be planned to optimize onsite staging and reduce offsite traffic and travel. Approximately 10–20 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. Carpooling would be encouraged to the extent feasible. 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.

Table 2 Estimated Equipment Use for Construction

Equipment Type	Estimated Number in Use	Hours Per Day
Crane	1	7
Drill Rig	1	4 to 8
Excavator	2	8
Concrete Truck	4	2 to 8
Bulldozer	3	8
Backhoe	3	8
Sheet-Pile Driver/Vibrator	1	6 to 8
Loader	3	8
Grader	1	8
Scraper	2	8
Compactor	1	4 to 8
Forklift	3	8
Onsite Haul Truck	3	8
Generator	1	8
Water Truck	1	2 to 4
Welder	1	8

Operation and Maintenance

The designs for the fish passage components of the project are based on the criteria in Anadromous Salmonid Passage Facility Design (NMFS 2022). Operation of the facility is intended to meet all applicable NMFS criteria as described therein. The facility operation will focus on providing volitional passage of special status species fish, including salmonids (*Onchorhynchus spp.*), North American green sturgeon (*Acipenser medirostris)* southern Distinct Population Segment (sDPS) (green sturgeon), Pacific lamprey; and other native fish, as feasible. Specifically, the improvements will provide suitable hydraulic conditions (when fish are present) for passage of up-migrating adult salmonids, out-migrating juvenile salmonids, and migration for green sturgeon (when present) and other native fish. Suitable hydraulic conditions include those conditions in which the species is physically capable of passing and do not cause undue stress on the fish.

Reclamation worked in conjunction with the Fisheries Management Work Group and other Implementing Agency, consultant, and Technical Advisory Committee technical experts to identify criteria for fish passage (including velocities, depths, and fish species jump heights). The design criteria are structured around life stages of the target

anadromous species and the timing of the runs for upstream movement of adult Central Valley fall-run Chinook salmon (*Oncorhynchus tshawytscha*) (fall-run Chinook salmon) and non-essential experimental population Central Valley spring-run Chinook salmon (NEP spring-run Chinook salmon) and winter Central Valley steelhead (*Oncorhynchus mykiss*) (steelhead); and the downstream movement of juvenile life stages spawned from these runs. Design criteria are based on a combination of swimming ability of the fish species as reported in peer-reviewed scientific literature and criteria in agency design guidelines. The criteria include passage conditions for NEP spring-run Chinook salmon and other native fishes that may be present. Fish passage elements are intended to meet criteria up to the maximum of 4,500 cfs of Restoration Flows. The fish passage facility designs meet passage criteria for NEP spring-run Chinook salmon and steelhead at flows from 45–4,500 cfs and enhance fish passage for other species at a range of flows. For sturgeon and salmonids, criteria will be met when those fish are present in the action area.

Operational criteria will be followed to minimize the potential adverse effects to the species listed above while providing passage opportunities at all flows. Operational considerations include that all slide gates would be opened to a minimum opening height of 18 inches when in operation, and fully open when flows allow, as per NMFS criteria. Low flows will be passed through a fish ladder maintaining fish passage through all conditions and will be supplemented through two overshot gates prior to opening the slide gates at flows that meet passage criteria.

The proposed action would accommodate the historical operational strategy for the Arroyo Canal, including San Luis Canal Company's contractual diversion on the San Joaquin River. HMRD would provide notice for the daily demand for irrigation and refuge water to the Mendota Pool Watermaster (a staff member of the San Joaquin River Exchange Contractors Water Authority). Flow in Reach 3 of the river (upstream of Sack Dam) would be released from Mendota Dam by the Mendota Pool Watermaster, in coordination with HMRD, to provide the required diversions into the Arroyo Canal, and for Reclamation to provide desired Restoration Flow targets in Reach 3 and 4 (upstream and downstream of Sack Dam, respectively) to implement the approved Restoration Flow schedule. Arroyo Canal diversions will be measured at the Arroyo Canal Measuring Bridge (canal gauge, approximately 850 feet downstream of Arroyo Canal Headworks) and will be automatically controlled by the existing headworks.

When flows are high enough that the fish ramp or additional slide gates on the river bypass are open, the fish ladder may be shut off for routine maintenance. When flows are low and isolated to the fish ladder, routine maintenance activities may occur on the other facility features at that time, as described along with other details on operation and maintenance activities, in the Operations and Maintenance Plan (Appendix A).

Environmental Commitments

The following environmental commitments incorporate applicable measures from the 2013 EA/IS and additional measures applicable to the current project design. These measures are consistent with the SJRRP Conservation Strategy as described in the SJRRP ROD. These environmental commitments will be implemented as part of the proposed

action. Reclamation's environmental monitor will make regular site visits during construction to document that the these measures are being implemented. Reclamation will also ensure that PG&E and their contractors implement all applicable environmental commitments, including those described in the Horizontal Directional Drilling Inadvertent Release Plan (Appendix B) and the State Lands lease that is issued to PG&E for their utility relocation actions.

Air Quality

- Construction of 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 will result in a minimum 20 percent reduction in nitrogen oxide (NO_x) emissions from heavy-duty diesel equipment, compared to statewide average emissions. Implementing Rule 9510 will 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 will result from offsite reductions achieved by paying fees that will 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.

- The proposed action will 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.

Biological Resources – Fish Species

- A qualified fish biologist will conduct pre-construction monitoring for fish species in the action area within two weeks prior to dewatering activities; and monitoring, as needed, during project construction. The biologist will conduct worker environmental awareness training on special status fish species potentially occurring in the project area prior to the start of in-water construction activities (i.e., cofferdam installation).

- During construction, SJRRP steelhead monitoring will continue to be implemented. Any steelhead captured downstream of the lowest fish passage impediment will be transported out of the Restoration Area and released downstream of the confluence of the San Joaquin and Merced Rivers. This activity, along with the operation of the Hills Ferry Barrier, and the existing fish passage impediment at the Eastside Bypass Control Structure, will reduce or eliminate steelhead from entering the project area during construction activities.

- In-water work will be done from May 15 through October 31, when temperatures typically exceed lethal limits of listed salmonids and preclude their presence in the action area to the extent feasible. In-water work that may need to occur outside of this preferred work window will be approved by NMFS prior to the work occurring.

- A fish rescue plan will be prepared and implemented for any dewatering activities that may entrain fish. The plan will include using a qualified fish biologist to capture, remove, and relocate fish present in areas to be dewatered. The fish rescue plan will be provided to NMFS for approval prior to the onset of construction activities.

- All impact pipe pile driving will be completed in the dry, either while the waterway is naturally dry or through the use of dewatered cofferdams. It is anticipated that a cofferdam will be installed around the in-channel construction area, which will be dewatered before additional pipe-pile driving and/or construction activities. The cofferdam alignment will be provided in a contractor designed submittal that will be provided to NMFS for review and approval prior to installation. Fish will not have access to the construction site, and underwater sounds produced by pipe pile driving will be attenuated as a result of being performed in the dry.

- Potential adverse effects associated with in-water pile driving will be avoided or minimized by implementing the following noise-reduction strategies:

    - The number and size of piles will be limited to the minimum necessary to meet the engineering and design requirements of the proposed project.

    - Vibratory hammers will be used whenever feasible, with the exception of impact testing for H-piles (which will be done in the dry).

- The performance of the fish screen will be evaluated to make sure that the fish screen is operated and maintained in accordance with acceptable fish screen performance criteria established during consultation with NMFS. Post-project fish monitoring components may include a combination of high resolution infra-red fish identification technology, Passive Integrated Technology (PIT) tag monitoring, telemetry, and digital camera imagery devices located at suitable on-site locations. A bulk of monitoring techniques and systems will be installed during construction commissioning and testing following the completion of the structure to ensure monitoring device accuracy and implementation is as expected. Some of the monitoring systems and instruments include flow gauges, level sensors, and side-looking flow gauges downstream of the structure. Reclamation is developing a post-construction Project Performance and Effectiveness Monitoring Plan to evaluate whether the project is meeting NMFS fish passage criteria, as intended, and whether SJRRP goals are being met. As these plans are developed, Reclamation will continue discussions with NMFS regarding post-construction project performance monitoring as a part of ongoing SJRRP Implementing Agency coordination. Reclamation will provide NMFS with draft copies of the Project Performance and Effectiveness Monitoring Plan (Plan) for comment and a final copy for NMFS approval, prior to completing a substantial portion of project construction.

- NMFS will be notified if listed species are observed within the action area. Implementing Agency personnel will have access to construction sites during construction and operation as appropriate to evaluate species presence and habitat

conditions. Access to the action area by agency staff will be coordinated by Reclamation.

- The fish screen will be operated and maintained in accordance with acceptable fish screen performance criteria, as established during consultation with NMFS.

Biological Resources – Terrestrial Species

- A brief employee education presentation will be conducted by a USFWS-approved biologist. The presentation will include the following: a description of San Joaquin kit fox (*Vulpes macrotis mutica*) (SJKF), Fresno Kangaroo Rat (*Dipodomys nitratoides exilis*) (FKR) and giant garter snake (*Thamnophis gigas*) (GGS); the habitat needs for each species; a report of each species' occurrences in the project vicinity; an explanation of the status of each species and its protection under the Endangered Species Act (ESA); and a list of measures being taken to reduce impacts to each species during project construction. A fact sheet conveying this information will be prepared for distribution to construction personnel.

- A USFWS-approved biologist will conduct pre-construction surveys for SJKF no fewer than 14 days and no more than 30 days prior to the onset of any ground disturbing activity. If SJKF are detected at any time, all construction activities associated with the project will be halted immediately. The project will be placed on hold until consultation with USFWS is completed.

- Pre-construction surveys will be conducted by a qualified biologist per USFWS and California Department of Fish and Wildlife (CDFW) survey methodology to determine if potential burrows for FKR are present in the proposed action area. Surveys will be conducted within 30 days before ground-disturbing activities. The biologist will conduct burrow searches by systematically walking transects, which will be adjusted based on vegetation height and topography, and in coordination with USFWS and CDFW. Transects will be used to identify the presence of kangaroo rat burrows. If burrows are found within 100 feet of the proposed project footprint, Reclamation will consult with USFWS and coordinate with CDFW prior to implementing any construction activity.

- If a GGS is detected during SJKF and FKR surveys, or during construction, Reclamation will consult with USFWS and coordinate with CDFW. Construction activities will not occur until consultation with USFWS is complete.

- As described in Conservation Measure WPT-1 in the SJRRP ROD: to avoid and/or minimize effects on western pond turtle (*Actinemys marmorata*), a qualified biologist will conduct surveys in suitable aquatic habitats to be dewatered prior to dewatering and/or filling during project construction. Surveys will be conducted immediately after dewatering and before fill of aquatic habitat suitable for western pond turtles. If pond turtles are found, the biologist will capture them and move them to nearby agency-approved areas of suitable habitat that would not be disturbed by project construction.

- Project-related vehicles will observe a daytime speed limit of 15-mph throughout the site in all project areas, except on state and federal highways. Off-road traffic outside of designated project areas will be prohibited.

- Construction work at night (30 minutes after sunset until 30 minutes before sunrise) will not be allowed.

- All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in securely closed containers and removed daily from the project site.

- No firearms will be allowed on the project site.

- No pets will be permitted on the project site.

- Use of rodenticides in the project area will not be allowed.

- All construction-related holes will be covered to prevent entrapment of individuals.

- The contractor will be required to keep their equipment in good working condition in order to prevent leaks and spills of petroleum products or other fluids.

- Before the start of work each day, the biological monitor, or a designated individual who is USFWS-approved and under direct supervision of the biological monitor, will check for wildlife under any equipment to be used that day, such as vehicles or stockpiles of items such as pipes. If any listed species are found, they will be allowed to leave on their own volition before the initiation of construction activities for the day. To prevent inadvertent entrapment of wildlife during construction, all excavated, steep-walled holes or trenches more than 1 foot deep will be covered by plywood or similar materials, at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals.

- All construction pipes, culverts, or similar structures with a diameter of four inches or greater that are stored at a construction site for one or more overnight periods will be thoroughly inspected before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a SJKF is discovered inside a pipe, all work will be halted, and that section of pipe will not be moved until the USFWS has been consulted and CDFW contacted. If necessary, and under the direct supervision of the biologist, the pipe may be moved only once to remove it from the path of construction activity, until the SJKF has escaped.

- Lights will be installed at the lowest allowable height and wattage, screened and directed downwards and away from residences and the water to the highest degree possible; and the number of nighttime lights used will be minimized to the extent possible.

- Conservation Measure MBTA-1, as described in the SJRRP ROD, is incorporated as appropriate into this analysis, including measures to avoid and minimize impacts on nesting migratory birds.
    - Tree and vegetation removal will occur prior to the nesting season of February 1 to September 15, as feasible.
    - If tree or vegetation removal must occur during the nesting season, a qualified biologist will conduct a pre-construction survey within the proposed action area to survey for nesting migratory birds within 7 days of work occurring.
    - At least one survey will be conducted no more than 7 days 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 will be established around the nest site, and the nest site monitored by a qualified biologist. No construction activities will occur within the buffer zone. The buffer zone will be maintained until the young have fledged (as determined by a qualified biologist). The buffer zone will be delineated with exclusionary fencing and flagging and/or signage as appropriate.

Biological Resources – Vegetation and Wetland Species

- Staging areas, temporary access roads, and stockpile areas will be confined to the minimum area necessary to complete the project. They will be placed in areas that are already disturbed. Prior to equipment mobilization, the contractor work area boundaries within the proposed action area will be clearly marked to prevent disturbance of sensitive areas. Temporary orange fencing will be placed to delineate environmentally sensitive areas to exclude these areas from being impacted by construction activities.

- To prevent the introduction and spread of nonnative invasive plant species during project construction, vehicles and machinery wheels and tires will be sprayed down before entering the project area. Erosion control materials used during construction will be certified as weed-free, and only native grasses and forbs will be used for erosion control or revegetation purposes.

- Disturbance to existing valley foothill riparian habitat will be minimized to the extent feasible.

- Disturbed portions of the San Joaquin River floodplain within the action area that are not permanently disturbed will be reseeded and planted with a mix of native plants to return the areas to a pre-construction vegetated state and prevent the establishment of nonnative invasive plant species. Riparian vegetation removed or damaged will be replaced or allowed an opportunity for natural recruitment within the immediate area of disturbance to the extent feasible to maintain habitat quality. Approximately one acre of disturbed area will be reseeded and planted following the completion of the construction activities.

- Erosion control materials used during construction will be certified weed-free and only native grasses and forbs will be used for erosion control or re-vegetation purposes.

- Reclamation will continue vegetation monitoring as described in Conservation Strategy Measures RHSNC-1, RHSNC-2, as described in the SJRRP ROD, and the 2014 Riparian Habitat Mitigation and Monitoring Plan; in the vicinity of the action area - Reaches 3 and 4a.

Cultural Resources

- If archaeological resources are inadvertently discovered during earthmoving activities, the construction crew will immediately cease work near the find (recommended 100-foot radius, no less than 50-foot radius from location of discovery) and Reclamation's Regional Archaeologist will be consulted on how to proceed in accordance with regulations at 36 CFR 800.13. If archaeological resources are inadvertently discovered on lands under the jurisdiction of the California State Lands Commission, the Senior Staff Counsel of the California State Lands Commission would also be consulted.

- In the event that human remains are discovered, the discovery will 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 Reclamation will ensure that the discovery is treated in accordance with the provisions of Section 5097.98(a)-(d) of the California Public Resources Code. Should human remains identified as Native American be identified on federal land, work will immediately cease in the area of discovery, and the requirements of the Native American Graves Protection and Repatriation Act (NAGPRA) will be adhered to as prescribed in the regulations at 43 CFR 10.4.

Geology and Soils

- 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, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared and implemented during project construction. The SWPPP will be developed and implemented to include best management practices (BMPs) for the storage and use of hazardous materials and waste, and spill response procedures. Hazardous materials and waste will be stored in containers that prevent the release of material or hazardous content and within secondary containment, and spill kits will 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 will be performed in accordance with the SWPPP.

  The SWPPP will include BMPs for the handling of contaminated soil. Operators and construction personnel will be asked to report unusual conditions to the appropriate personnel. If contaminated soil is encountered during construction, the area and/or material will be properly contained during investigative actions. If soils require

temporary stockpiling, piles will 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 will be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste will be handled and properly disposed of in an authorized waste management facility. In addition, the appropriate local, State, and federal agencies will be notified.

Global Climate Change

- The following measures will be considered to lower greenhouse gas (GHG) emissions during construction:
    - 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 using efficient heating and cooling units.
    - Recycle construction waste 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 construction.

Hazardous Materials and Public Health Hazards

- Hazardous materials and waste will 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.
- Hazardous materials will be stored and used in accordance with the health and safety plan to be implemented durning project operation and maintenance activities. The health and safety plan will include guidelines on the storage and use of hazardous materials and spill response measures. Hazardous materials will be stored in containers that prevent the release of material or hazardous content and within secondary containment, and spill kits will be maintained throughout the project site for immediate response to spills.
- Transportation of hazardous materials and hazardous waste will comply with California Department of Transportation and California Highway Patrol regulations. Additionally, hazardous materials and wastes will only be transported along approved

transportation routes. In the event of a vehicle accident, first responders will be notified immediately to direct emergency response requirements appropriate for the situation. Following initial emergency response, cleanup will be performed with agency oversight in accordance with applicable regulations.

- Before initiating ground-disturbing activities, Reclamation will survey the project site for unknown and abandoned wells. If the survey discovers an idle or abandoned well, ground-disturbing activities will not occur within 100 feet of the well, if feasible. If ground-disturbing activities need to occur within 100 feet of the abandoned well, Reclamation will 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 will be notified, as appropriate.
- Reclamation will implement Mitigation Measure PHH-4 as described in the SJRRP ROD, that 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 will 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.

Transportation and Traffic

- Prior to construction commencing, Reclamation will work with local transportation planning agencies to assure cooperation with local policies regarding transportation infrastructure within the study area as required.
- To minimize impacts on local traffic, Reclamation will limit truck trips to less than 50 per hour on any affected roadway during morning and afternoon or evening peak-hour periods, as described in Mitigation Measure TRN-1 in the SJRRP ROD.

Water Resources

- To maintain continuous irrigation service to Arroyo Canal, a temporary cofferdam bypass system or alternate method (such as bypass pipes or alternative canal delivery to confine the project area) will be installed to maintain flow in the canal.

- Poured concrete will be excluded from the wetted channel for a period of 30 days after it is poured. During that time the poured concrete will be kept moist, and runoff from the concrete will not be allowed to enter the wetted channel.

- Water quality monitoring will be implemented during in-water construction activities in accordance with all applicable CWA compliance documents. This monitoring typically includes:
    - Ensuring via visual observation that waters do not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.
    - Ensuring via grab sample every four hours that activities do not cause pH to be depressed below 6.5 nor raised above 8.5 in surface water.
    - Ensuring via grab sample every four hours that turbidity does not exceed the following parameters:
        - where natural turbidity is less than 1 Nephelometric Turbidity Units (NTUs), controllable factors will not cause downstream turbidity to exceed 2 NTU;
        - where natural turbidity is between 1 and 5 NTUs, increases will not exceed 1 NTU;
        - where natural turbidity is between 5 and 50 NTUs, increases will not exceed 20 percent;
        - where natural turbidity is between 50 and 100 NTUs, increases will not exceed 10 NTUs;
        - where natural turbidity is greater than 100 NTUs, increases will not exceed 10 percent.
    - Water quality sampling during in-water work will be conducted upstream out of the influence of the work area, and approximately 300 feet downstream of the work area.

3.0 Affected Environment and Environmental Consequences

This section incorporates by reference the detailed descriptions of the existing physical environment that could be affected by the proposed action as well as the environmental consequences anticipated from construction, operation and maintenance of the proposed action as compared to the no action alternative, which for the most part remain unchanged from what was described in the 2013 EA/IS. However, any changes to the affected environment and environmental consequences based on changes to the physical environment and design refinements to the proposed action are described below.

Each resource area evaluated in this section also includes an analysis of cumulative effects resulting from all past, present, and reasonably foreseeable future projects. Actions considered in the cumulative effects analyses includes those actions that were identified in the SJRRP PEIS/R, 2013 EA/IS, and 2016 Mendota Pool Bypass and Reach 2B Improvements Project EIS/R which are hereby incorporated by reference, as well as all other known projects that are, or are reasonably forseeable to occur within the general project area.

The proposed action would have no impacts to the following resource categories beyond what was analyzed and disclosed in 2013, and therefore they are not discussed further in this EA:

- Aesthetics
- Environmental Justice
- Growth Inducing Impacts
- Hazardous Materials and Public Health Hazards
- Indian Trust Assets
- Land Use and Agricultural Resources
- Noise
- Socioeconomic Resources

3.1 Air Quality

Affected Environment

The affected environment remains as described in the 2013 EA/IS.

Environmental Consequences

Air quality impacts of the no action alternative would be as described in the 2013 EA/IS. Air quality impacts of constructing the proposed action would be similar to

those described in the 2013 EA/IS. As shown in Table 3, project construction annual emissions would be below de minimis levels. Emissions associated with operating and maintaining the proposed action would be within those analyzed and disclosed in the 2013 EA/IS. Therefore, construction, operation, and maintenance of the proposed action would comply with Clean Air Act general conformity requirements and would have less than significant impacts on air quality. Further demonstration of conformity is not required.

Table 3 Estimated Construction Emissions for Proposed Action

	Volitile Organic Compounds (tons/year)	Carbon Monoixde (tons/year)	Nitrogen Dioxide (tons/year)	Sulfur Dioxide (tons/year)	Particulate Matter less than 10 micrometers in aerodynamic diameter (tons/year)	Particulate Matter less than 2.5 micrometers in aerodynamic diameter (tons/year)
Construction Emissions	0.88	8.00	8.35	0.02	4.10	2.08
De Minimis Threshold	10	100	100	100	100	100

3.2 Biological Resources – Fish and Marine Mammal Species

Affected Environment

The affected environment remains largely as described in the 2013 EA/IS, with the exception of the following updated information. Sack Dam is currently impassible for fish at most flow rates. During flood control releases when the flow rate past Sack Dam exceeds 1,300 cfs, HMRD removes flashboards and the existing gates to prevent damage to these components and to pass flood flows. Some fish passage may be possible when the flashboards are removed from the dam in these flood scenarios; however, velocities remain high and may present a temporary barrier. When the flowrate lowers to below 1,000 cfs, the features removed previously are replaced. Reclamation obtained from NMFS an updated list of anadromous species and marine mammals potentially occurring in the project area or indirectly affected by the proposed action (Appendix D).

Green Sturgeon

Based upon evidence from the Sacramento River Basin, green sturgeon immigrate from San Francisco Bay into freshwater from mid-winter to late summer. Spawning in the Sacramento River Basin occurs April to July and adult emigration to the estuary occurs in both the summer and fall. Until 2017, documentation of green sturgeon in the San Joaquin River and its tributaries have primarily been anecdotal. In 2017, an adult green sturgeon was sighted and confirmed by eDNA in the Stanislaus River near Knights Ferry. In April 2020, an adult green sturgeon was captured in the lowest reach of the Restoration

Area, near the confluence with the Merced River, representing the first verified evidence of green sturgeon in the Restoration Area. Neither of these recent accounts documented evidence of spawning activity in the San Joaquin River Basin.

Given the limited verified accounts of green sturgeon in the San Joaquin River Basin, only one occurrence in the Restoration Area, and no evidence of spawning, the probability of green sturgeon in the project area is very low. During construction and in the period of project operation prior to remedying both upstream and downstream passage impediments, adult green sturgeon will not have access to the project area. Once major fish passage impediments are remedied and volitional passage is achieved, green sturgeon will have access to all reaches in the Restoration Area and may be present in the project area, both as immigrating adults and as emigrating adults and juveniles.

Spring-run Chinook Salmon NEP

In accordance with the Settlement, the SJRRP is reintroducing spring-run Chinook salmon to the San Joaquin River. NMFS has designated the spring-run Chinook salmon being reintroduced to the San Joaquin River as a NEP in accordance with Section 10(j) of the ESA. The SJRRP has been releasing juvenile NEP spring-run Chinook salmon into the San Joaquin River since 2014. Low numbers of adults returning from these juvenile releases were expected in the near-term; however, the SJRRP has genetic evidence that adult NEP spring-run Chinook began returning in 2017. When volitional passage is not possible, as is the current condition, returning adults are trapped in the lower reaches of the Restoration Area and transported for release in Reach 1, where they can hold over the summer and spawn in the fall. Additionally, ancillary adult broodstock from the Salmon Conservation and Research Facility are released on an annual basis to allow for additional spawning adults in Reach 1 of the Restoration Area.

During construction and in the period of project operation prior to remedying both upstream and downstream passage impediments, the probability of NEP spring-run Chinook salmon ocurring in the project area is low. During this period, the SJRRP adult trap and haul effort will continue, which captures returning adult NEP spring-run Chinook salmon in the lower reaches of the Restoration Area, transports them around instream fish passage impediments (including the proposed action area), and releases them in Reach 1. However, under flood conditions, when adult trap and haul is less effective or halted, NEP spring-run Chinook salmon adults may reach the proposed action area. Juvenile emigration and survival monitoring using rotary screw traps demonstrate that at present. under normal flow conditions, very few juvenile NEP spring-run Chinook salmon produced in Reach 1 survive to Reach 2B, which is upstream of Mendota Dam (Hutcherson et al. 2020, 2021, 2023). These NEP spring-run Chinook salmon juveniles would need to survive in Mendota Pool, successfully pass Mendota Dam, and survive through the end of Reach 3 to occur in the proposed action area. Under flood flow conditions, when it is presumed that NEP spring-run Chinook salmon juvenile emigration suvival is better, juveniles may pass through Mendota Dam and reach the proposed action area. However, water operation under flood conditions may also result in fish routed down the Chowchilla Bypass and into the Eastside Bypass, thereby avoiding the proposed action area.

Once major fish passage impediments are remedied and volitional passage is achieved, NEP spring-run Chinook salmon will have access to all reaches in the Restoration Area and will be present in the project area, both as immigrating adults and as emigrating juveniles.

During ESA Section 7 formal consulation with NMFS on the effects of the project, NMFS requested that Reclamation include Southern Resident killer whale (*Orcinus orca*) (SRKW) in the species being consulted on, since operating the Project would benefit Chinook salmon populations, a prey source for SRKW. Therefore, this species is included in the analysis of effects of the proposed action.

Environmental Consequences

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 screen or fish passage facilities. Although HMRD would operate the dam using the recently installed Lopac gates (interim gates) to assist in passing up to 500 cfs of Restoration Flows, when Sack Dam becomes inundated at flows greater than 1,300 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 1,300 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 implementing the proposed action, Sack Dam would continue to be a fish passage impediment, and Arroyo Canal would continue to be an entrainment hazard for migrating fish. 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

The impacts of constructing, operating, and maintaining the proposed action would generally be within those analyzed and disclosed in the 2013 EA/IS with the following specific additions to the analysis.

While extremely unlikely, it is impossible to preclude the possibility that *Onchorhynchus mykiss* (rainbow trout) upstream of the action area may emigrate down the San Joaquin River and into the action area and could be affected by impacts of constructing the project. NEP spring-run Chinook salmon could be affected by impacts of constructing the project, should they be present in the proposed action area. Green sturgeon are not anticipated to occur in the project area during construction, but may be affected by impacts of operating and maintaining the proposed action. However, implementation of the conservation measures as described above, including preferred work windows for

cofferdam construction when water temperatures preclude presence of the species in the action area and implementation of fish monitoring and rescue activities would minimize these potential impacts to the extent feasible.

Operation of the proposed facilities would provide protection from entrainment and provide upstream and downstream passage that does not currently exist to multiple life stages of various native fish species. Thus, the conservation value of this portion of the San Joaquin River as a migratory corridor would be greatly improved for all life stages of these fish, thereby enhancing the ability of the watershed to contribute to the recovery of the species that will be able to spawn and rear there.

The fish screen is designed to allow for the delivery of contract water to the Arroyo Canal without causing entrainment and stranding of fish into the previously unscreened diversion. The fish screen will be operated to meet all NMFS criteria during different flow delivery conditions when steelhead, green sturgeon, and NEP spring run Chinook Salmon are present. The proposed fish screen is designed to meet or exceed NMFS requirements to protect juvenile salmonids. While the proposed fish screen is intended to benefit special status fish species by improving passage conditions in the action area, there is a potential for listed fish to be stressed, harmed, or killed as a result of the operation of the new fish screen. Operation of the fish screen could cause fish to occasionally be trapped or hide behind the brush mechanism, therefore making it easier for predators to hone in on them. Impingement and entrainment is still expected to occur after construction of the new fish screen, although rates would be low.

As described in Appendix A, the typical operation of the fish passage facilities is expected to provide effective passage for steelhead, green sturgeon, and NEP spring-run Chinook Salmon. The fish screen and fish passage facilities would work in tandem to provide safe passage within the previously referenced NMFS criteria when the species listed above are present at the site.

Since operating the Project would benefit Chinook salmon populations, a prey source for SRKW, implementing the proposed action would indirectly benefit SRKW.

Reclamation has determined the proposed action would: be not likely to adversely affect SRKW; be likely to adversely affect steelhead and green sturgeon; and not jeopardize NEP spring-run Chinook salmon. Impacts to this resource category would remain less than significant under the proposed action. Reclamation has initiated ESA Section 7 formal consultation with NMFS on the effects of the Project, as further described in Section 4.

3.3 Biological Resources – Vegetation and Wildlife

Affected Environment

The project area remains generally as described in the 2013 EA/IS, and this analysis incorporates by reference the affected environment information from the 2013 EA/IS. In addition, vegetation, widlife and wetlands in the project area were assessed during May

2022 and July 2023 field surveys performed by Reclamation (Figures 3 and 4). The project area is characterized by a perennial stream (San Joaquin River) flanked by riparian forest, annual grassland, scrubland, and disturbed/developed areas. Vegetation between the east- and west-bank levees in the action area is predominantly naturalized annual grassland, cottonwood (*Populus fremontii*), black willow (*Salix gooddingii*) forest, and narrowleaf willow (*Salix exigua*) scrub. There is also a small area of eucalyptus (*Eucalyptus spp.*) trees on the west bank of the river. Outside the east and west-bank levees (which are unvegetated), the action area is disturbed/developed (e.g., fallow field, barn, and parking area). The Poso Canal levee road and Clayton Ranches farm road are entirely unvegetated. In addition to the species described in the 2013 EA/IS, Table 4 lists wildlife species (or their sign, such as burrows or scat) observed in the study area during recent field surveys, and the text below describes updated information on potential special status species occurrence in the vicinity of the proposed action.

Table 4 Wildlife Species Observed in the Study Area

Common Name	Scientific Name
Birds	
Eurasian collared dove	*Streptopelia decaocto*
European starling	*Sturnus vulgaris*
horned lark	*Eremophila alpestris*
red-tailed hawk	*Buteo jamaicensis*
western kingbird	*Tyrannus verticalis*
Mammals	
Valley pocket gopher[1]	*Thomomys bottae*
California ground squirrel[1]	*Otospermophilus beecheyi*
coyote[1]	*Canis latrans*
kangaroo rat[1]	*Dipodomys spp*

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

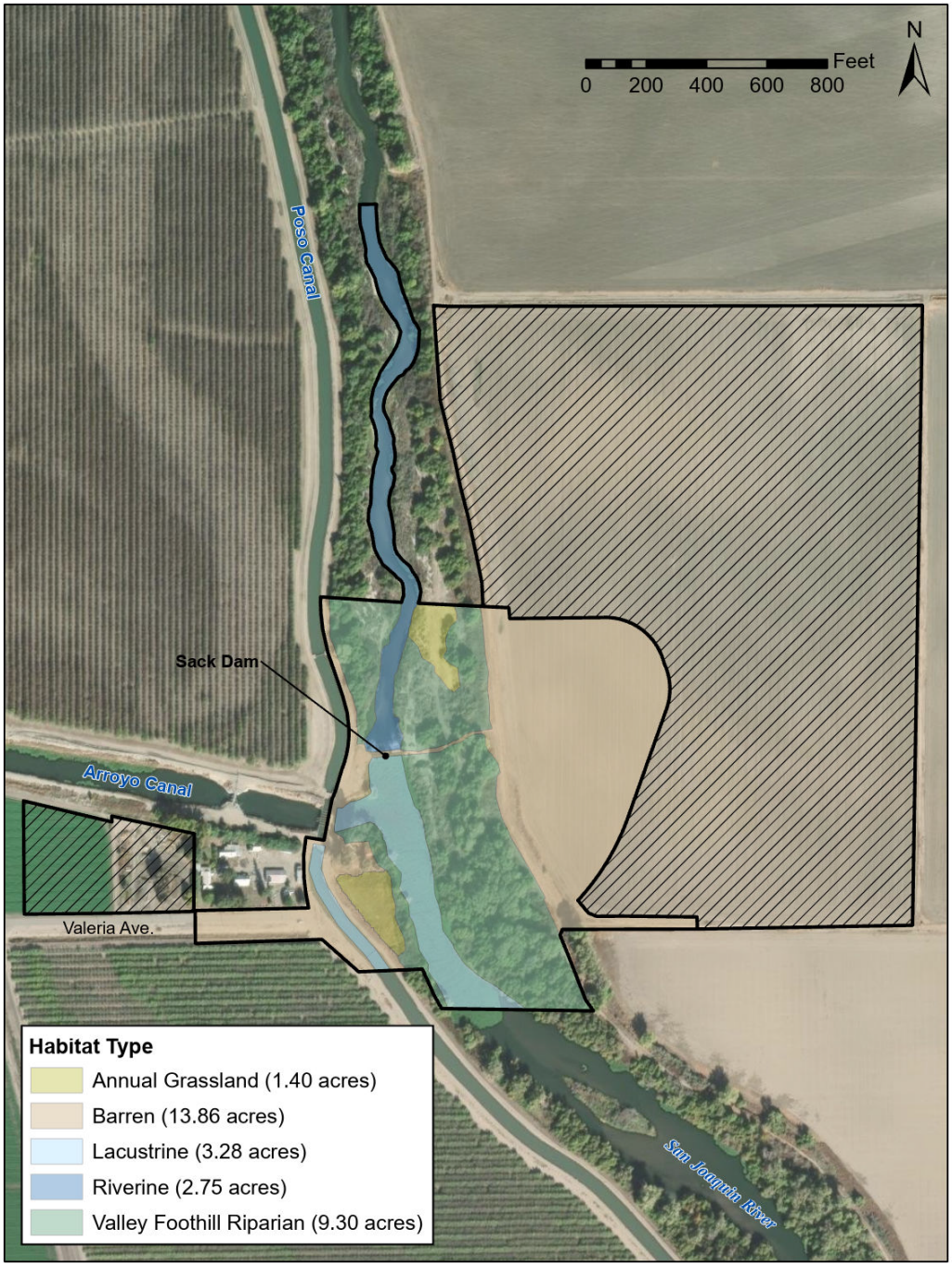

Figure 3 Vegetation Types in the Proposed Action Area

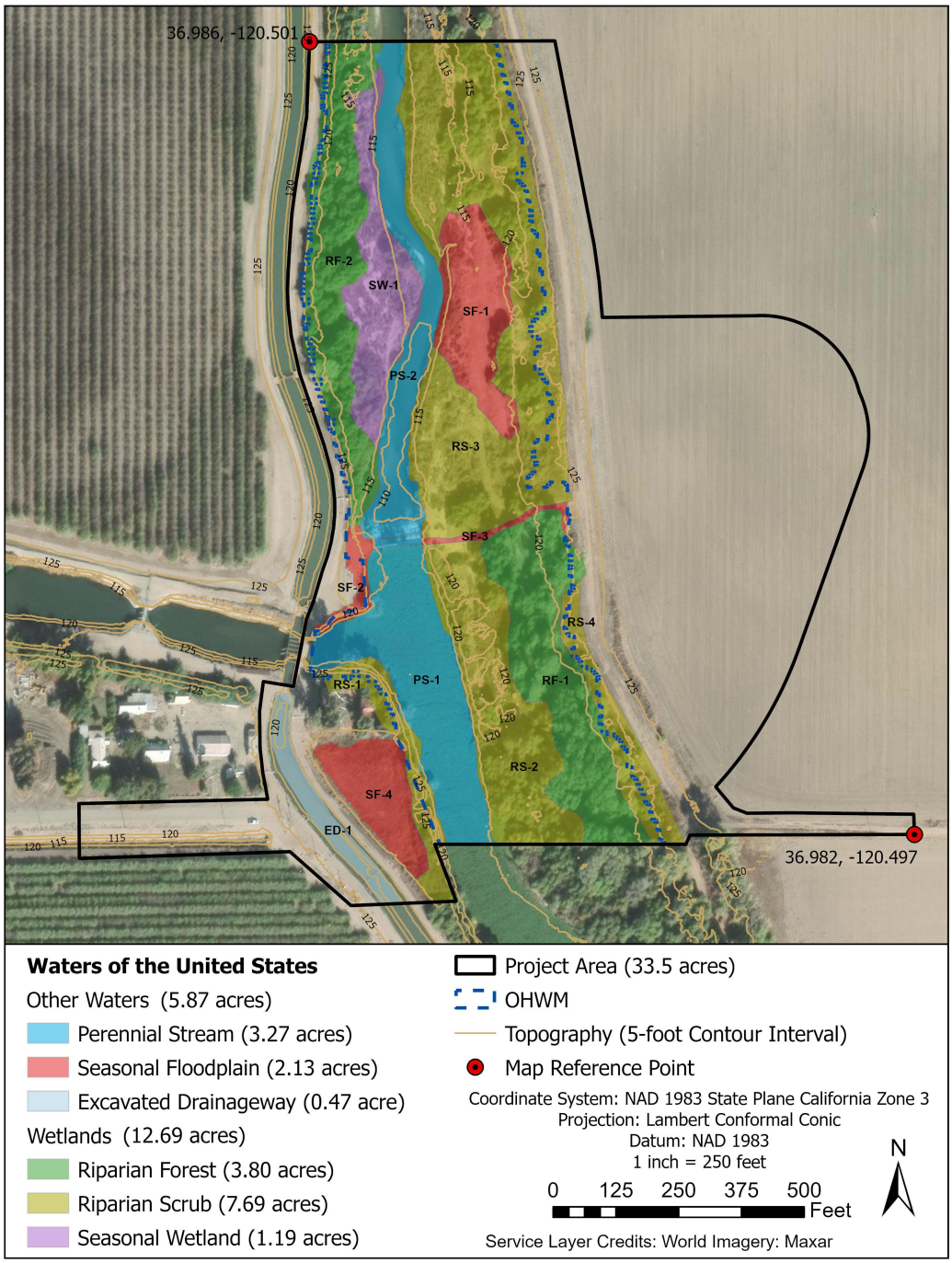

Figure 4 Wetlands and Waters of the U.S. in the Proposed Action Area

Special-Status Species and Habitats

In addition to incorporating by reference the information on special-status terrestrial wildlife species with the potential to occur in the study area from the 2013 EA/IS, the following updated information is included in the affected environment for the proposed action. Reclamation obtained an updated IPaC Trust Resources Report for the Project on October 23, 2024, to determine listed species potentially occurring in the project area (Appendix D). In addition, the California Natural Diversity Database (CNDDB) was queried. SJKF, FKR, and GGS are the only listed species with a potential to occur in the vicinity of the action area. No proposed or designated critical habitat occurs within the project area. On December 12, 2024, USFWS issued a proposal to list the monarch butterfly (*Danaus Plexippus*) as a threatened species and designate critical habitat for the species under the ESA (FWS-R3-ES-2024-0137).

SJKF

According to the CNDDB, there are 6 recorded occurrences of SJKF within a 10-mile radius of the proposed action. The last recorded occurrence of SJKF dates back to the early 1990's. Their range is restricted to the San Joaquin Valley in south-central California, as well as the Carrizo Plain, Panoche Valley, and adjacent smaller valleys in the Coast Range. The preferred habitat of the SJKF is native, sloping annual grassland with sparse vegetation.

FKR

FKR occupy sands and saline sandy soils in chenopod scrub and annual grassland communities on the valley floor. Recently, they have been found only in alkali sink communities between 61 to 91 meters (200-300 feet) in elevation. The last confirmed FKR occurrence was a single male captured twice in autumn of 1992 on the Alkali Sink Ecological Reserve, west of Fresno. There are no known FKR populations within the circumscribed historical geographic range in Merced, Madera, and Fresno Counties. FKR is believed to be extirpated in Merced, Madera, and Fresno Counties.

In March 2016, a USFWS biologist observed kangaroo rat burrows in the river channel while visiting Reach 4A of the San Joaquin River, downstream of the action area. During a kangaroo rat burrow mapping survey on April 4, 2016, burrows, tracks, and tail drags were found at a multitude of locations within the vicinity of Reach 4A. A protocol level trapping survey was completed by Reclamation for 7 trapping areas along Reach 4A of the San Joaquin River and the Eastside Bypass in July 2016. Many Heermann's kangaroo rats were detected, but no FKR were captured. Protocol level trapping in Reach 2B, upstream of the action area, completed in August 2016, did not detect any FKR either. Based on these results, it is unlikely that FKR reside in the action area.

GGS

Currently, the USFWS recognizes 13 separate populations of GGS spanning the following 11 counties: Butte, Colusa, Glenn, Sutter, Yolo, Solano, Sacramento, San Joaquin, Stanislaus, Merced, and Fresno (USFWS 2017a). This species inhabits marshes,

sloughs, ponds, low-gradient streams, agricultural wetlands (predominantly rice fields) and associated waterways including irrigation and drainage canals and ditches, and adjacent uplands. The three main habitat components required by GGS are: (1) adequate water and emergent, herbaceous wetland vegetation—such as bulrush or cattails—during the active season for foraging and escape cover; (2) grassy banks and openings in waterside vegetation for basking; and (3) higher elevation uplands with terrestrial burrows or crevices for cover, hibernation, and refugia from seasonal floods (USFWS 2017). GGS are active mostly during the daytime, requiring low-lying vegetation or open areas adjacent to water to bask. The active season for GGS is generally early April through late October, while the inactive period lasts from roughly late October to mid- or late-March (USFWS 2017).

The project area is downstream of an important population of GGS at Mendota Pool. There are populations of GGS downstream of Sack Dam in the San Luis refuge system and to the northwest in wetland areas. The San Joaquin River may provide a dispersal corridor linking the populations, and Mendota is the last known extant population in the Tulare region. There are documented sightings not far from the project area, most likely in irrigation canals, which also can serve as dispersal corridors that can connect populations. These GGS occurrences provide further evidence that GGS are using waterways as dispersal corridors. Because the San Joaquin River now has Restoration Flows providing river connectivity throughout the Restoration Area, it is considered a possible dispersal corridor.

Maintaining connectivity between populations is one of the highest priorities for GGS recovery (USFWS 2017). Nearly all the existing data for GGS movement and dispersal are for mature adult females (Halstead et al. 2015). However, dispersal movements between populations are generally made by young males, as is the case for other similar squamates (lizards and snakes; Keogh et al. 2007; Folt et al. 2019; Li and Kokko 2019). Restoration Flows potentially helping connect populations that had previously been isolated would have a beneficial effect on GGS populations. Any gene flow would drastically improve the long-term outlook of an isolated population like Mendota. Wood et al. (2015), found evidence of admixture (gene flow) between putatively "isolated" populations, suggesting that GGS are using waterways to disperse. Halstead (personal communication 2024) suggested that inbreeding could be an issue in southern populations of GGS, providing further impetus for acknowledging and supporting even limited dispersal between the Tulare and San Joaquin recovery units. Implementing the SJRRP is likely to enhance the ability of GGS to disperse and exchange genetic material, decreasing the likelihood of population extirpation.

There are five documented CNDDB GGS occurrence records of this species within 10 miles of the action area with the most recent occurring in 1977 (CNDDB 2023). The project area is near the southern extent of this species' range. Parts of the project area, with a dense tree canopy, are unsuitable for GGS, as they do not provide basking opportunities. There is moderately suitable aquatic habitat immediately upstream from Sack Dam and in nearby irrigation canals. However, there is limited upland habitat available for GGS despite the presence of ground squirrels, which provide burrows for snakes to seek refuge. Similar to SJKF, and FKR, the potential for GGS to occur in the action area is considered low.

Non-Native Invasive Species

Non-native invasive species in the project area remain similar to as described in the 2013 EA/IS. In addition, the following updated information is incorporated into this analysis. Water hyacinth (*Eichhornia crassipes*) is a non-native invasive plant currently occurring in the project area. Nutria (*Myocastor coypus Molina*) is a semi-aquatic rodent with the potential to occur in the project area.

Environmental Consequences

No Action

The effects of the no action alternative would be as described in the 2013 EA/IS.

Proposed Action

The effects of the proposed action would generally be as described in the 2013 EA/IS, with the following updates to the analysis.

Habitat Alteration

The approximately 400-foot long by 190-foot wide river bypass, fish ramp, and fish ladder would result in the loss of approximately 3.73 acres of riparian vegetation.

As described in the SJRRP ROD, Reclamation will compensate for loss of riparian habitat and other sensitive natural communities in accordance with the 2014 SJRRP RHMMP: *credits for increased acreage or improved ecological function of riparian and wetland resulting from the implementation of the SJRRP actions will be applied as compensatory mitigation before additional compensatory measures are required...*

As described in the RHMMP, the San Joaquin River Riparian Recruitment Model estimated that release of Restoration Flows are anticipated to contribute to creation of approximately 230 acres of riparian habitat in Reach 3 and 158 acres in Reach 4a. To evaluate the establishment and development of riparian vegetation in response to release of SJRRP flows (Interim Flows beginning in 2009, and Restoration Flows beginning in 2014), Reclamation initiated the Vegetation Management Study in October 2010. Vegetation data were collected annually from 2011 to 2015, as well as in 2017, 2019 and 2022. Vegetation transects were sampled within Reaches 1A through 5 of the Restoration Area. The most recent (2022) vegetation sampling was conducted at 20 permanent transects. Plant cover, species composition, woody stem density, and overstory height were measured along each transect, which traversed the width of the floodplain perpendicular to the river. This sampling indicated that Goodding's willow regenerated at transects in the Eastside Bypass over the monitoring period from 2011 (0 percent cover) to 2022 (9 percent cover).

To ensure that there is no net loss of riparian habitat as a result of implementing the SJRRP, including the proposed action, areas of land adjacent to the fish passage facility that are disturbed but not permanently impacted by construction activities that are federally owned as part of the project footprint (approximately 1 acre) will be returned to original grade and planted with riparian vegetation to the extent feasible following construction, and Reclamation will continue vegetation monitoring as described in the

RHMMP in the vicinity of the action area - Reaches 3 and 4a. These measures are consistent with measures RHSNC-1 and RHSNC-2 as described in the SJRRP ROD.

Wetlands and Waters of the U.S.

Impacts to wetlands and other waters of the U.S. were calculated by intersecting the project footprint areas of temporary and permanent impacts with the delineated features, as summarized in Table 5.

Table 5 Temporary and Permanent Impacts to Wetlands and Waters of the U.S.

Feature Type	Acres	Square Feet	Cubic Yards
Permanent Impacts			
Wetlands			
Seasonal Wetland	0.13	5,205	193
Riparian Scrub	2.81	122,219	4,527
Riparian Forest	0.81	35,174	1,303
Subtotal	**3.75**	**162,598**	**6,023**
Other Waters of the U.S.			
Perennial Stream	1.02	44,313	4,924
Excavated Drainageway	--	--	--
Seasonal Floodplain	1.16	50,580	5,620
Subtotal	**2.18**	**94,893**	**10,544**
Total	**5.93**	**257,491**	**16,567**
Temporary Impacts			
Wetlands			
Seasonal Wetland	0.15	6,601	--
Riparian Scrub	2.28	99,305	--
Riparian Forest	1.33	57,908	--
Subtotal	**3.76**	**163,814**	**--**
Other Waters of the U.S.			
Perennial Stream	0.78	34,541	--
Excavated Drainageway	--	--	--
Seasonal Floodplain	0.26	11,493	--
Subtotal	**1.04**	**46,034**	--
Total	**4.80**	**209,848**	--

Alteration of aquatic habitat would occur as described above, including permanent impacts to approximately 5.93 acres of wetlands and Waters of the U.S.; however, the proposed action would provide the beneficial effects of screening Arroyo Canal and providing passage around Sack Dam and access to other areas of improved habitat being created by other SJRRP actions in a degraded system that has not had a spawning population of salmonids in decades. As described above, the proposed action is necessary

to prevent entrainment of anadromous fish into Arroyo Canal and ensure fish passage at Sack Dam, as required by Paragraphs 11(a)(6) and 11(a)(7) of the Settlement. These proposed improvements are interrelated actions to the SJRRP, in that they are part of and depend on the implementation of the SJRRP for their justification. Based on the mapping of the low flow channel that was done for the 2014 SJRRP Wetland Delineation Planning Report, and the current channel capacity constraint of 300 cfs, release of Restoration Flows in accordance with the Settlement has reconnected approximately 805 acres of the San Joaquin River channel in the area downstream of Sack Dam to the confluence with the Merced River (approximately 52 river miles), which was dry prior to 2016 (Figure 5).

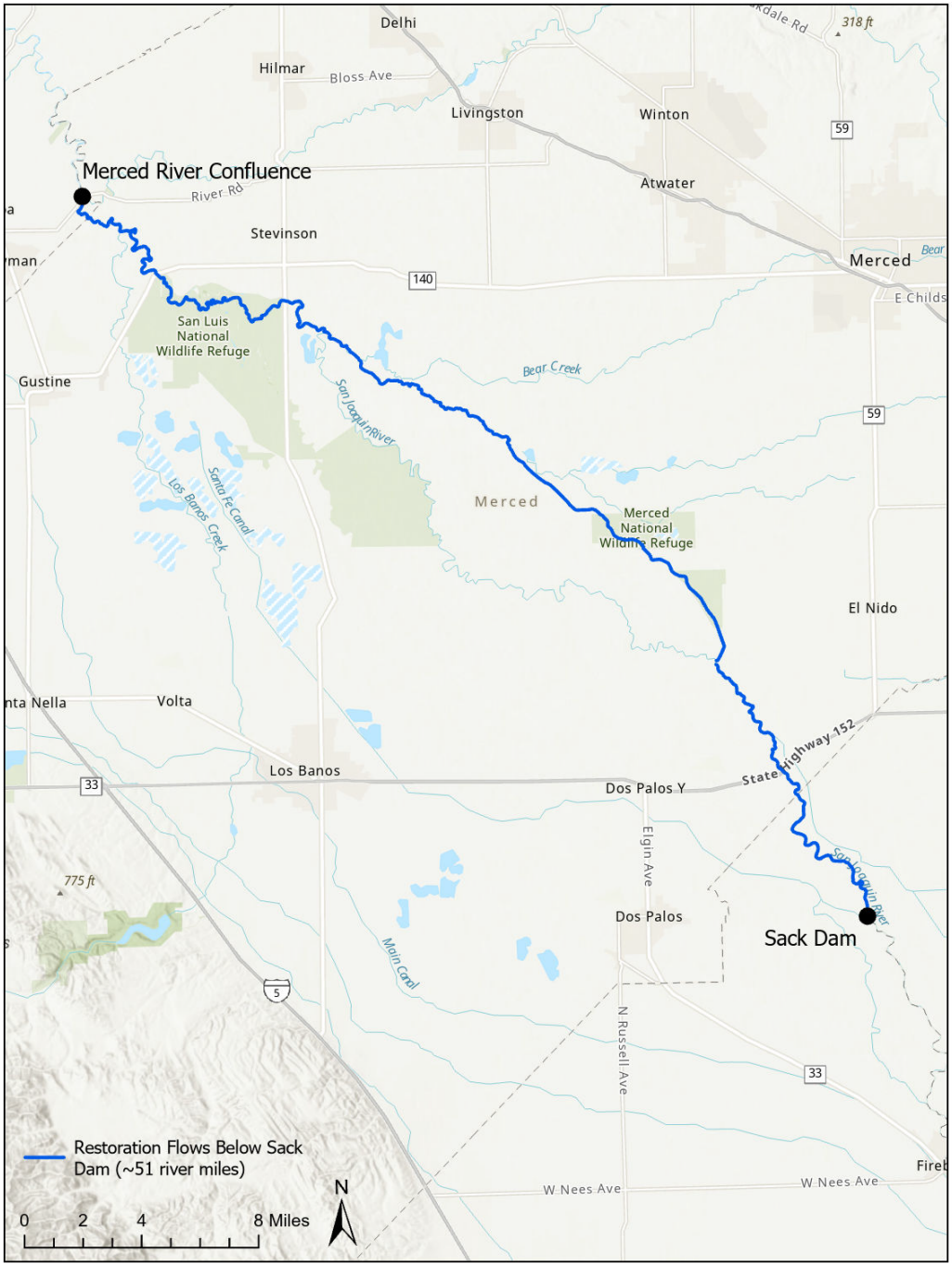

Figure 5 Area of San Joaquin River Channel Reconnected by Restoration Flows since 2016

Therefore, the proposed action is anticipated to:

- Result in no net loss of wetlands or riparian habitat
- Contribute to restoring function and flow to the project area
- Establish fish passage to additional habitat, including areas of habitat being restored or created by the SJRRP

Although some wetlands and other waters of the U.S. will be lost as a result of this Project, the overall improvement to the wetland and riverine system's functions and values and the increase in total wetland acreages being provided by the release of Restoration Flows are considered net benefits.

Special Status Species

SJKF

As described above, potential for SJKF to occur in the project area is low. While suitable denning habitat is not present in the project area, individuals may travel through, and possibly forage, in the vicinity of the project area. Construction activities may cause temporary avoidance of the area due to operational noise and increased human presence, in the unexpected event that the species is present in the project area. The project area is currently lit at night by lights at the CCID maintenance yard near the location of the proposed project's maintenance building. Lighting conditions during construction and operation of the proposed project are anticipated to be similar to existing conditions.

FKR

As described above, potential for FKR to occur in the project area is low. However, measures are incorporated into the proposed action to avoid and minimize to the extent feasible any potential effects to this species, in the unexpected event that it occurred in the project area. Any potential effects to this species from constructing, operating and maintaining the proposed facilities as described above would be insignificant and discountable.

GGS

As described above, potential for GGS to occur in the project area is low. While not anticipated to occur in the project area, measures as previously described are incorporated into the proposed action to avoid and minimize to the extent feasible any potential effects to this species, in the unexpected event that it occurred in the project area. Any potential effects to this species from constructing, operating and maintaining the proposed project as described above would be insignificant and discountable.

Reclamation has completed informal consultation with USFWS on the effects of the Project, as further described in Section 4. No impacts to monarch butteflies or their proposed critical habitat are anticipated to occur from implementation of the proposed action. No impacts beyond those analyzed and disclosed in the 2013 EA/IS are

anticipated to occur in regards to the updated information on non-native invasive species included in this analysis. Impacts to this resource category would remain less than significant under the proposed action.

3.4 Cultural Resources

"Cultural resources" is a broad term that includes pre-contact and historic-era archaeological resources, architectural and structural resources, and traditional cultural properties. Title 54 United States Code [USC] Section 300101 et seq., also known as the National Historic Preservation Act (NHPA), is the primary legislation for federal historic preservation. Section 106 of the NHPA (54 USC Section 306108) requires federal agencies to take into consideration the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation an opportunity to comment. Historic properties are those cultural resources that are listed in or eligible for inclusion in the National Register of Historic Places (National Register). The implementing regulations at 36 CFR Section 800 for Section 106 describe the process that the federal agency follows to identify historic properties within the Area of Potential Effects (APE) and to assess the effects that the proposed undertaking would have on those historic properties, through consultations with the State Historic Preservation Officer (SHPO), Indian Tribes, and other identified consulting and interested parties.

The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR Section 800.16[b]). The APE for the proposed undertaking consisted of proposed improvements and activities necessary to support them, including the fish screen, earthen fish passage channel, maintenance building, bridge, headworks structure, new levee, utility relocations, staging, access and utility relocations.in a 97.28-acre area on both banks of the San Joaquin River. The APE for this project is located in Sections 12 and 13, T. 11 S., R. 13 E., Mount Diablo Baseline and Meridian, as depicted on the Oxalis and Poso Farm, California U.S. Geological Survey 7.5′ topographic quadrangle maps. The maximum vertical extent of the APE is approximately 20 feet below ground surface for excavation and placement of the headworks structure along the river's east bank. The most common activity within the vertical APE is excavation of approximately 15 feet for the fish passage channel along the east bank. A majority of the proposed activities, such as construction of the headworks structure, fish ladder, and fish conveyance channel, are focused on the eastern portion of the APE, along the river's east bank.

Affected Environment

The project is located primarily on lands owned by Reclamation in fee title, with some staging and access activities occurring on private lands managed by CCID. The project location is situated about 18 miles southeast of the town of Los Banos, California. Lands owned by Reclamation in fee title are located on the eastern bank of the San Joaquin River adjacent to Sack Dam, whereas the remainder of the project area for staging and access, is property managed by CCID. The project area is bisected north/south by both

the San Joaquin River and Poso Canal. The Arroyo Canal runs westward outside of the project area. Water control and conveyance features such as Sack Dam, Arroyo Canal, Poso Canal, and earthen levees are situated within the project area. The surrounding landscape consists almost entirely of rural agricultural developments, such as orchards and fields. Structures related to Poso Canal operation and maintenance are situated to the southwest, adjacent to an open gravel-lined lot that would be used for project staging.

Environmental Consequences

Correspondence with Native Americans. On April 4, 2023, Reclamation invited eight federally recognized tribes (the Big Sandy Rancheria; the California Valley Miwok Tribe; the North Fork Rancheria of Mono Indians; the Picayune Rancheria of Chukchansi Indians; the Santa Rosa Rancheria Tachi/Yokut Tribe; the Table Mountain Rancheria; the Tejon Indian Tribe and the Tule River Indian Tribe of the Tule River Reservation) to assist in identifying sites of religious and cultural significance. In addition, letters were also sent to two Native American Organizations (the Amah Mutsun Tribal Band; and the North Valley Yokuts Tribe) to solicit information regarding potential effects to sites of religious and cultural significance. To date, only the Tule River Indian Tribe of the Tule River Reservation and the Santa Rosa Rancheria Tachi/Yokut Tribe responded to these consultation requests. Reclamation responded to these requests and through these consultations did identify specific concerns or comments regarding effects to sites in the APE. On June 14, 2024, Reclamation continued consultation with the aforementioned tribal entities concerning the supplemental utility relocations and invited them to assist in identifying sites of religious and cultural significance. To date no response has been received concerning these supplemental efforts.

Other Correspondence. Through consultation, the Corps designated Reclamation NHPA Section 106 lead agency for the undertaking. Reclamation consulted with the Corps on August 2, 2023, and shared a summary of the studies and finding. The Corps requested the draft report once it was available. Reclamation transmitted the draft studies to the Corps on August 29, 2023. No concerns or comments were raised by the Corps during this consultation. On August 30, 2024, Reclamation continued consultation with the Corps and shared with their office the results of the historic property identification efforts and finding of no adverse effect and invited them to review and comment upon the studies. To date, no response has been received concerning these supplemental efforts.

Cultural Resource Survey Methods. In an effort to identify historic properties within the APE, Reclamation requested a record search through the Southern San Joaquin Valley Information Center in February, 2023 (Record Search File No. 23-058). Reclamation also reviewed recent studies and conducted pedestrian surveys of the APE. Archival research resulted in six previously identified resources located within the current APE: Arroyo Canal (P-10-006238), the Storage Building (P-10-006039), a segment of the Poso Canal (P-10-006248), the Poso Canal Bridge (12SC-043-001H), Valeria Avenue (12SC-043-002H), and Sack Dam (P-10-006035). The entire APE was subject to a cultural resource pedestrian survey. This survey resulted in one new resource being identified within the APE: The East Bank and Levee and Roads (12SC-043-003H). Reclamation prepared a buried site assessment which included a review of prior geoarchaeological testing inside the APE. The results of these prior archaeological

testing efforts did not identify historic properties, nor did they find landforms of sufficient antiquity conducive to buried archaeological deposits. As a result, these studies determined the buried site potential in the APE is low.

Cultural Inventory Results. As a result of these efforts, eight cultural resources were identified within the APE: Sack Dam (P-10-006035), the Storage Building (P 10 006039), Arroyo Canal (P-10-006238), a previously recorded segment of the Poso Canal (P-10-006248), the Poso Canal Bridge (12SC-043-001H), Valeria Avenue (12SC-043-002H), the East Bank and Levee Roads (12SC-043-003H), and the PG&E Distribution Line (12SC-043-004H). The Storage Building (P-10-006039), Sack Dam (P-10-006035), Poso Canal Bridge (12SC-043-001H), and a segment of the Poso Canal (P-10-006248) inside the APE were previously determined not eligible for inclusion on the National Register of Historic Places (National Register) through several consensus determinations. The SHPO's office concurred with these eligibility determinations on various dates. Reclamation reviewed these evaluations and determined they are still appropriate. Arroyo Canal, Valeria Avenue, and the remainder of the Poso Canal outside the APE remain unevaluated.

Although the segment of the East Bank and Levee Roads (12SC-043-003H) inside the APE does not appear to have any significant features that would make it individually eligible for listing on the National Register, it may contribute to the larger resource as a whole. Reclamation determined that recording and evaluating the entire East Bank and Levee Roads and the Poso Canal is beyond the scope and scale of the project and Reclamation treated the East Bank, Levee Roads and the Poso Canal, in their entirety, as eligible for listing onto the National Register, for the purposes of this undertaking only, under Criterion A for their association with the extensive early developments of irrigation activities endemic in the San Joaquin Valley and association with early agricultural development by Miller & Lux, respectively. In addition, Reclamation determined that there is limited potential for proposed project actions to adversely affect Valeria Avenue and Arroyo Canal, and will be treated eligible for listing on the National Register, for the purposes of this undertaking only, under Criterion A for their association with the extensive early developments of irrigation activities endemic in the San Joaquin Valley and association with early agricultural development by Miller & Lux, respectively. Because the PG&E Electric Distribution Line extends well outside the APE, the line will not be relocated (only raised by installing taller poles), and the National Register evaluation of the PG&E Distribution Line (12SC-043-004H) is beyond the scope of the project, Reclamation will treat this resource as eligible for listing onto the National Register, for project purposes only, under Criterion A as a potential contributor to the larger distribution system.

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. Ongoing maintenance and repair activities would continue by HMRD. There would be no impact on cultural resources.

Proposed Action

Reclamation identified five historic properties inside the APE of the undertaking: Valeria Avenue (12SC-043-002H) Arroyo Canal (P-10-006238), Poso Canal (P 10-006248), East Bank Levee and Roads (12SC-043-003H), and the PG&E Distribution Line (12SC-043-004H). Reclamation applied the criteria of adverse effect to the five treated as eligible historic properties in the APE, Valeria Avenue (12SC-043-002H) Arroyo Canal (P-10-006238), Poso Canal (P 10-006248) East Bank Levee and Roads (12SC-043-003H), and the PG&E Distribution Line (12SC-043-004H) pursuant to 36 CFR Part 800.5(a).

The project would require driving over Valeria Avenue, Arroyo Canal, Poso Canal, on existing access roads and decks, without any modification or improvement to these resources. Reclamation finds the proposed action will have a limited and temporary visual impact and will not alter or diminish Valeria Avenue's, Arroyo Canal's, and Poso Canal's ability to convey their significance and would therefore retain integrity of location, design, setting, materials, workmanship, feeling, and association. The project would require demolition of part of the East Bank Levee and Roads for the construction of the fish channel, headworks structure, and earthen levee. Reclamation finds the proposed action will not alter or diminish East Bank Levee and Road's ability to convey its significance as the portion of the resource in the project footprint, an unimproved access road, has diminished integrity, and does not convey the significance of the historic property. Reclamation finds the remainder of the East Bank Levee and Road's integrity of location, design, setting, materials, workmanship, feeling, and association would not be altered or diminished as it would be used for access for construction activities. The proposed replacement of the seven utility poles along the PG&E Distribution Line would be undertaken in a manner consistent with the Secretary of the Interior Standards for Treatment of Historic Properties since the utility poles of this line, which are routinely maintained and replaced, would be replaced with new poles in nearly the same location, similar scale, and identical function. Reclamation has found that Valeria Avenue (12SC-043-002H) Arroyo Canal (P-10-006238), Poso Canal (P 10-006248), East Bank Levee and Roads (12SC-043-003H), and the PG&E Distribution Line (12SC-043-004H) would not be adversely affected pursuant to 36 CFR § 800.5(b)

Consultation and Results

Reclamation initiated consultation with the SHPO's office on November 7, 2023, and sought concurrence for a finding of no adverse effect for the Arroyo Canal Fish Screen and Sack Dam Fish Passage Project (12 SCAO-043.002). The Arroyo Canal Fish Screen and Sack Dam Fish Passage Project entailed the construction of a fish screen, fish passage, earthen levee, headworks structure, maintenance building, and other supporting improvements. Reclamation found that project activities would not adversely affect historic properties such as Valeria Avenue, Arroyo Canal, Poso Canal, and the East Bank Levee and Roads pursuant to 36 CFR § 800.5(b). On December 11, 2023, Reclamation notified the SHPO's office that it was moving forward with the original project (12-SCAO-043.002) as no response was received within the 30-day review period.

On November 5, 2024, Reclamation continued consultation with the SHPO's office, and reaffirmed and sought concurrence for their finding of no adverse effect for the PG&E

Utility Modifications Project (12-SCAO-043.005). Reclamation found that the supplemental utility modifications project would not adversely affect Valeria Avenue, East Bank Levee and Roads, and the PG&E Distribution Line. The SHPO responded on December 18, 2024, and concurred with Reclamations finding of no adverse effect. Impacts to this resource category would remain less than significant under the proposed action.

3.5 Indian Sacred Sites

Executive Order 13007 (May 24, 1996) requires that federal agencies accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. Pursuant to 36 CFR § 800.4(a)(4) and Executive Order 13007, Reclamation invited eight federally recognized tribes (the Big Sandy Rancheria; the California Valley Miwok Tribe; the North Fork Rancheria of Mono Indians; the Picayune Rancheria of Chukchansi Indians; the Santa Rosa Rancheria Tachi/Yokut Tribe; the Table Mountain Rancheria; the Tejon Indian Tribe and the Tule River Indian Tribe of the Tule River Reservation) to assist in identifying sites of religious and cultural significance on April 4, 2023 and on June 14, 2024. To date, only the Tule River Indian Tribe of the Tule River Reservation and the Santa Rosa Rancheria Tachi/Yokut Tribe responded to these consultation requests. The Santa Rosa Rancheria Tachi/Yokut Tribe initially requested a site visit. Between April and August 2023, Reclamation staff attempted to coordinate a site visit with the Tribe to discuss the project. No response was received to any of these site visit requests and subsequently no Indian Sacred Sites were identified inside the APE. As a result, Reclamation consultations did not identify Indian sacred sites inside the APE; therefore there would be no impacts to Indian sacred sites under the proposed action.

3.6 Geology and Soils

Affected Environment

The affected environment remains as described in the 2013 EA/IS, which is hereby incorporated by reference, with the exception of new information regarding site subsidence. There has been regional ground subsidence at both the Sack Dam site, and to a lesser degree, the lands served by the Arroyo Canal. This differential subsidence has required a higher water surface elevation (WSE) at Sack Dam compared to the water district to maintain a gravity-fed delivery.

Environmental Consequences

No Action

Under the no action alternative, current operations at the existing Sack Dam and associated facilities would continue during implementation of Restoration Flows. Routine dredging by HMRD, which temporarily disturbs the bed of the San Joaquin River, and repair of the east side of the river channel and floodplain by HMRD, which

temporarily disturbs soil and vegetation, would be required more frequently. HMRD 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 Restoration Flows (Reclamation and DWR 2011, Appendix N, Part 2). Ongoing subsidence would require HMRD to periodically raise the height of Sack Dam and the east bank, increasing the water surface of the impounded water upstream of Sack Dam.

As the site continues to subside, delivery of water into the Arroyo Canal would continue to be diminished until at some future date a modification is made at the existing Sack Dam to allow for a higher WSE. The continual raise of WSE will require significant improvements on the east bank to protect the impounded pool for delivery into Arroyo Canal. 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

Impacts associated with project construction would be generally the same as analyzed in disclosed in the 2013 EA/IS, except that the area of disturbance would be larger under the current proposed action. However, implementation of the environmental commitments as previously described would avoid and minimize impacts to the extent feasible, and the impacts would remain less than significant.

Operation

Operation of the Project would have an overall beneficial effect on geology and soil resources adjacent to Sack Dam, as the hardened features of the fish passage facilities 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. Both upstream and downstream of the proposed new infrastructure, higher-energy flows associated with 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 Restoration Flows would achieve an equilibrium state. HMRD routine maintenance activities immediately adjacent to the new fish screen and fish passage facilities would continue during operation of the proposed action. The impact would remain less than significant.

3.7 Global Climate Change

Affected Environment

The affected environment would be generally as described in the 2013 EA/IS.

Environmental Consequences

No Action

The impacts associated with the no action alternative would be as described in the 2013 EA/IS.

Proposed Action

The impacts of the proposed action would be similar to those described in the 2013 EA/IS. Construction of the proposed action would generate GHG emissions, as estimated in the previously described Air Quality Analysis, and as summarized in Table 6; but would not make a considerable contribution to significant cumulative impacts due to greenhouse gas emissions and the related global climate change impacts. GHG emissions for operation and maintenance of the proposed action would be within those analyzed and disclosed in the 2013 EA/IS. The Project has been designed to consider the potential effects of climate change over the life of the Project. Therefore, this impact would remain less than significant under the proposed action.

Table 6 GHG Emissions for Proposed Action Construction

Carbon Dioxide (metric tons/year)	Methane (metric tons carbon dioxide equivalent/year)	Nitrous Oxide (metric tons carbon dioxide equivalent/year)	Total GHGs (metric tons carbon dioxide equivalent/year)
1,702	0.06	0.05	1,719
Exceed significance threshold of 2,000 metric tons carbon dioxide equivalent/year? No			

3.8 Public Services and Utilities

Affected Environment

Public services and utilities in the project area are as described in the 2013 EA/IS, which is hereby incorporated by reference, with the exception of some existing PG&E utilities located in the construction area for the proposed action, given the current design refinements. The project site has an existing PG&E gas line crossing through the area under the proposed maintenance building, fish screen, and re-routed river (Figure 2). As previously described, the project would require the abandonment of the existing line and the replacement with a new alignment in order to allow the utility to maintain service to their customers and allow Reclamation to construct the fish passage element of the project as shown in Figure 2.

Environmental Consequences

No Action

The impacts of the no action alternative would be as described in the 2013 EA/IS.

Proposed Action

The construction impacts of the PG&E utility relocations as previously described are included in the impact analysis section for each resource category. Operational impacts

would be within those analyzed and disclosed in the 2013 EA/IS. The impacts for this resource category would remain less than significant under the proposed action.

3.9 Recreation

The affected environment remains as described in the 2013 EA/IS, which is hereby incorporated by reference.

Environmental Consequences

No Action
The impacts of the no action alternative would be as described in the 2013 EA/IS.

Proposed Action
The impacts of constructing, operating and maintaining the proposed action would be generally the same as described in the 2013 EA/IS, with the following update to the analysis. The proposed action area would be unavailable for recreational access during construction, due to safety concerns. This impact would be temporary, however. Following construction, portage at the future facility will be available to the east of the new infrastructure allowing for boaters and recreational users to transfer their vessel around the facility on the bank and safely downstream of the structure. Impacts to this resource category would remain less than significant under the proposed action.

3.10 Transportation and Traffic

Affected Environment
The affected environment remains as described in the 2013 EA/IS, which is hereby incorporated by reference.

Environmental Consequences

No Action
The impacts of the no action alternative would be as described in the 2013 EA/IS.

Proposed Action
The impacts of implementing the proposed action would generally be within those described in the 2013 EA/IS, with the exception of an additional access route on the east side of the project area, as previously described. Impacts would remain less than significant under the proposed action.

3.11 Water Resources

Affected Environment

The affected environment remains as described in the 2013 EA/IS, with the exception of new information regarding HMRD modifications to Sack Dam. As previously described, there has been regional ground subsidence at both the Sack Dam site, and to a lesser degree, the lands served by Arroyo Canal. This differential subsidence has required a consistent WSE regardless of subsidence at Sack Dam compared to the water district to maintain a gravity-fed delivery. This requires an additional 2–2.5 inches of WSE yearly. In 2018, HMRD modified the top of Sack Dam to provide additional space to install flash boards and increase the over dam height by another three feet. Sheet pile was also placed around the sides of the dam for structural stability. The current flashboards can now be installed to a maximum height of 8.3 feet above the concrete slab to account for changing site and flow conditions. HMRD plans to use this height to maintain a set pool elevation for the Arroyo Canal diversion as the ground surface subsides, increasing the depth of impoundment as needed to keep the WSE upstream of Sack Dam constant. In 2023, HMRD replaced the 5 dual leaf gates with slide gates to provide further flow control and measurement on the system when passing Restoration Flows. HMRD has conducted testing and is currently operating the gates in the structure.

Environmental Consequences

No Action

Impacts of the no action alternative would be as described in the 2013 EA/IS with the following addition. Subsidence at the site would continue as projected causing continued diminishing capacity at the entrance to the Arroyo Canal with no ability for additional WSE changes.

Proposed Action

Construction

Impacts of constructing, operating and maintaining the proposed action would remain within what was analyzed and disclosed in the 2013 EA/IS.

During construction, it is anticipated that Restoration Flows, Arroyo Canal deliveries, and flood flows would occur that could inundate portions of the project area. To accommodate flood flows, Arroyo Canal deliveries and Restoration Flows, the contractor would use in-river construction methods as previously described. Construction methods would allow flood flows and Restoration Flows to move beyond the project area.

As previously described, in-river construction activities, including the installation of the fish screen, and other construction activities, including the construction of the headworks and channels, would occur within an approximate 32-month timeframe. Arroyo Canal diverts water year-round, and potential disruptions to water diversions could occur as a result of construction activities, but would be coordinated with HMRD prior to a disruption occurring, and would be avoided to the extent feasible by implementating the environmental commitment to provide continuous service to HMRD, as previously discussed.

Operation

Water resource impacts from operating and maintaining the proposed action would be within those analyzed and disclosed in the 2013 EA/IS. The proposed facility will allow for HMRD to operate consistent with their operations prior to the implementation of Restoration Flows.

The HEC-RAS and SRH2D model results demonstrated no measurable increase in the WSE at the Reach 3 channel capacity (4,500 cfs) and the highest recorded flood flow (5,900 cfs) as a result of project improvements holding the existing water delivery WSE. The model did not show changes in the WSE in localized areas around the structure for the purposes of continued operation. The potential for future water surface changes would be caused by regional subsidence and the need to increase the WSE for the purposes of water delivery to the Arroyo Canal. Impacts to water resources would remain less than significant under the proposed action.

4.0 Consultation and Coordination

4.1 National Environmental Policy Act

Reclamation invited the following agencies to participate as cooperating agencies in development of this SEA: the Corps, USFWS, NMFS, State of California Water Resources Control Board (State Board), State of California Department of Water Resources, DFW, HMRD, Central Valley Flood Protection Board, Central Valley Regional Water Quality Control Board (CVRWQCB), CCID, and the Lower San Joaquin Levee District. The Corps, USFWS, NMFS and the State Board accepted cooperating agency status for the Project, and reviewed an administrative draft of this SEA. In addition, SJRRP Implementing Agencies and Settling Parties reviewed an administrative draft of this SEA for consistency with the Settlement. A draft of this SEA will be available for public review and comment for 30 days.

4.2 Clean Water Act

Section 401

Reclamation has requested that the State Board enroll the Project under the State Board Order for CWA Section 401 Water Quality Certification and Waste Discharge Requirements for Restoration Projects Statewide. Construction activities will not commence until a Notice of Applicability is received from the State Board.

Section 404

As previously described, Reclamation has requested authorization from the Corps to construct, operate and maintain the Project in accordance with CWA Section 404. Construction activities will not commence until an individual permit is received from the Corps.

Section 402

As previously described, a stormwater pollution prevention plan (SWPPP) will be prepared, kept on site, and implemented during project construction. The SWPPP will be prepared and implemented by Reclamation's construction contractor. Once the SWPPP is approved as a construction submittal by Reclamation, Reclamation will submit it for approval by the CVRWQCB prior to construction activities commencing.

River and Harbors Act Section 10

As previously described, Reclamation has requested authorization from the Corps to construct, operate and maintain the Project in accordance with Section 10 of the RHA. Construction activities will not commence until an individual permit is received from the Corps.

4.3 Endangered Species Act

As previously described, Reclamation has determined that the proposed action:

- would have no effect on critical habitat
- would indirectly benefit, and be not likely to adversely affect SRKW
- may affect, and is likely to adversely affect steelhead and green sturgeon
- may affect, but would not jeopardize NEP spring-run Chinook salmon.
- would be not likely to adversely affect SJKF, FKR and GGS

Reclamation has requested formal consultation with NMFS in accordance with ESA Section 7(a)(2) on the effects of the proposed action on listed species. Conference in accordance with Section 7(a)(4) of the ESA on the proposed action's effects on NEP spring run Chinook salmon is not required, as Reclamation has determined the proposed action would not jeopardize the NEP. Reclamation requested informal consultation with USFWS in accordance with ESA Section 7(a)(2) on Reclamation's determination of the proposed action's effects on listed species. Reclamation received a concurrence memo from USFWS on December 18, 2024. Reclamation will complete ESA consultations with NMFS prior to finalizing this SEA and preparing a decision document.

Fish and Wildlife Coordination Act

Reclamation has initiated coordination with USFWS and NMFS to comply with the Fish and Wildlife Coordination Act. The agencies will complete this coordination prior to finalizing this EA and preparing a decision document.

National Historic Preservation Act

On April 4, 2023, Reclamation invited eight federally recognized tribes (the Big Sandy Rancheria; the California Valley Miwok Tribe; the North Fork Rancheria of Mono Indians; the Picayune Rancheria of Chukchansi Indians; the Santa Rosa Rancheria Tachi/Yokut Tribe; the Table Mountain Rancheria; the Tejon Indian Tribe and the Tule River Indian Tribe of the Tule River Reservation) to assist in identifying sites of religious and cultural significance. In addition, letters were also sent to two Native American Organizations (the Amah Mutsun Tribal Band; and the North Valley Yokuts Tribe) to solicit information regarding potential effects to sites of religious and cultural significance. To date, only the Tule River Indian Tribe of the Tule River Reservation and the Santa Rosa Rancheria Tachi/Yokut Tribe responded to these consultation requests. Reclamation responded to these requests and through these consultations did identify specific concerns or comments regarding effects to sites in the APE. On June 14, 2024, Reclamation continued consultation with the aforementioned tribal entities concerning the supplemental utility relocations and invited them to assist in identifying sites of religious and cultural significance. To date no response has been received concerning these supplemental efforts. Through consultation, the Corps designated Reclamation NHPA Section 106 lead agency for the undertaking. Reclamation consulted with the Corps on August 2, 2023, and shared a summary of the studies and finding. The Corps requested the draft report once it was available. Reclamation transmitted the draft studies to the Corps on August 29, 2023. No concerns or comments were raised by the Corps during this consultation. On August 30, 2024, Reclamation continued consultation with the Corps and shared with their office the results of the historic property identification efforts and finding of no adverse effect and invited them to review and comment upon the studies. To date no response has been received concerning these supplemental efforts.

Reclamation initiated consultation with the SHPO's office on November 7, 2023, and sought concurrence for a finding of no adverse effect for the Arroyo Canal Fish Screen and Sack Dam Fish Passage Project (12 SCAO-043.002). The Arroyo Canal Fish Screen and Sack Dam Fish Passage Project entailed the construction of a fish screen, fish passage, earthen levee, headworks structure, maintenance building, and other supporting improvements. Reclamation found that project activities would not adversely affect historic properties pursuant to 36 CFR § 800.5(b). On December 11, 2023, Reclamation notified the SHPO's office that it was moving forward with the original project (12-SCAO-043.002), as no response was received within the 30-day review period.

On November 5, 2024, Reclamation continued consultation with the SHPO's office, and reaffirmed and sought concurrence for their finding of no adverse effect for the PG&E Utility Modifications Project (12-SCAO-043.005). Reclamation found that the supplemental utility modifications project would not adversely effect Valeria Avenue, East Bank Levee and Roads, and the PG&E Distribution Line. The SHPO responded on December 18, 2024, and concurred with Reclamations finding of no adverse effect.

Magnuson-Stevens Fishery Conservation and Management Act

Reclamation has determined that construction of the proposed action would adversely affect Essential Fish Habitat (EFH). However, implementation of environmental commitments as previously described would avoid and minimize these adverse effects to the extent feasible, and it is anticipated that the long-term benefit to Pacific salmonids of improving fish passage conditions in the action area, in addition to the EFH improvements provided by Restoration Flows would contribute to an overall improvement in quantity and quality of EFH. Reclamation has requested consultation with NMFS on this determination in accordance with the Magnuson-Stevens Fishery Conservation and Management Act. Reclamation will complete this consultation prior to finalizing this EA and preparing a decision document.

4.4 California Environmental Quality Act

The first non-federal action or decision that would occur associated with the proposed action is the State Board's decision to enroll the Project in the SRGO. Therefore, the State Board has accepted lead agency status in accordance with the California Environmental Quality Act.

5.0 Literature Cited

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Attachment B - Arroyo Canal Fish Screen and Sack Dam Fish Passage Project Operation & Maintenance Plan

General Operations

1. The facility is designed to be operated year-round but will require maintenance to perform according to criteria. There are three categories of maintenance for this project: scheduled maintenance, unscheduled maintenance, and emergency maintenance.

2. Scheduled maintenance is predictable maintenance to ensure equipment and facilities continue to operate as intended and is conducted throughout the year. Routine maintenance for long-term operation, facility modifications, or other activities that will require the project to be out of service will be conducted during the summer maintenance period of May 15 – October 31. Efforts will be made to reduce the frequency of outages during the fish passage season of November 1–May 14. Scheduled maintenance for project components is further described below in this Operation and Maintenance Plan.

3. Unscheduled maintenance is a non-emergency maintenance need that was not predicted as part of a regular maintenance schedule. Unscheduled maintenance that may affect fish passage will be coordinated with the Reclamation biologist, who will coordinate with National Marine Fisheries Service (NMFS) for approval of unscheduled maintenance prior to commencing the activity. Project maintenance that has no effect on special status fish may occur at any time of the year.

4. Emergency situations will be immediately addressed in coordination with the Reclamation biologist. The Reclamation biologist will assess the emergency, consider alternatives to reduce the potential impacts to fish, and will document the recommended corrective action for reporting out to NMFS. If the Reclamation biologist is unavailable, the Project staff may proceed with corrective action but must document the action and inform the Reclamation biologist within 24 hours. The Reclamation biologist is responsible for coordinating with NMFS within 48 hours regarding the corrective action taken to remedy emergency situations.

5. The Reclamation biologist will ensure operation, maintenance and monitoring activities are implemented in accordance with the terms and conditions of the biological opinion for the project, unless the activity is an emergency situation as described above. All operation, maintenance and monitoring activities will be coordinated with NMFS to the extent feasible.

General Maintenance

1. Gauges would be inspected quarterly, or as needed, to ensure that outages are minimized, and measurements are accurate.

2. The Supervisory Control and Data Acquisition (SCADA) system and controls are held in the maintenance building and would be regularly tested and inspected consistent with manufacturer recommendations and specifications. A secondary communications system will be established via cellular or satellite to ensure connectivity if the traditional radio system goes offline.

3. Should an outage be required for a modification of the facility or a maintenance activity, every effort would be made to ensure passage opportunities are still available for native species at the time of the outage. Outage windows are preferred to occur outside of the migration windows and will be coordinated with NMFS to ensure outages and modifications are consistent with the terms and conditions of the biological opinion.

Facilities

1. Fish Ladder

1.1 Description

The vertical slot fish ladder is a concrete structure ten feet wide and 175 feet total length with a full build out of ten baffles each at 7.5 feet tall (Figure 1). The downstream fish ladder entrance is 4.5 feet wide with a slot to install a bulkhead and allow or preclude fish entrance. The bulkhead is in place when the ladder is non-operational and fully removed when operational. The fish ladder is located on the left bank (west side of the re-routed river channel), adjacent to the downstream end of the fish screen. The fish ladder entrance is located within the river bypass immediately adjacent to overshot gate number one (Gate 1) which provides supplemental attraction flow to the ladder. The entrance to the fish ladder is positioned within the low flow channel of the river bypass. The low flow channel invert is 1.5 feet deeper than the river bypass floor to ensure adequate downstream depth at all flow conditions. The upstream fish ladder exit is ten feet wide and has a bulkhead/slide gate which is either fully open to facilitate ladder operation or fully closed when the ladder is non-operational. Ladder flow is between 30 and 50 cfs and is dictated by the upstream water surface elevation (WSE). The fish ladder will include ten 7.5 foot tall vertical baffle weirs, each spaced 12 feet apart. The six upstream weirs only have the wider baffle wall section installed. The narrower left baffle sections will be added as needed to create a vertical weir and maintain proper fish ladder hydraulic conditions. Each baffle is intended to accommodate half a foot of head loss rather than the traditional one foot of head per baffle. The edges of the baffle walls and corners are rounded for lamprey passage, as per NMFS criteria. Additionally, the wider baffle section of each weir contains a 12-inch by 12-inch lamprey orifice at the bottom

right corner of each baffle to facilitate lamprey passage. Orifices in the fish ladder would be inspected during daily visual inspections to ensure clogging by debris has not occurred that would impact lamprey passage.

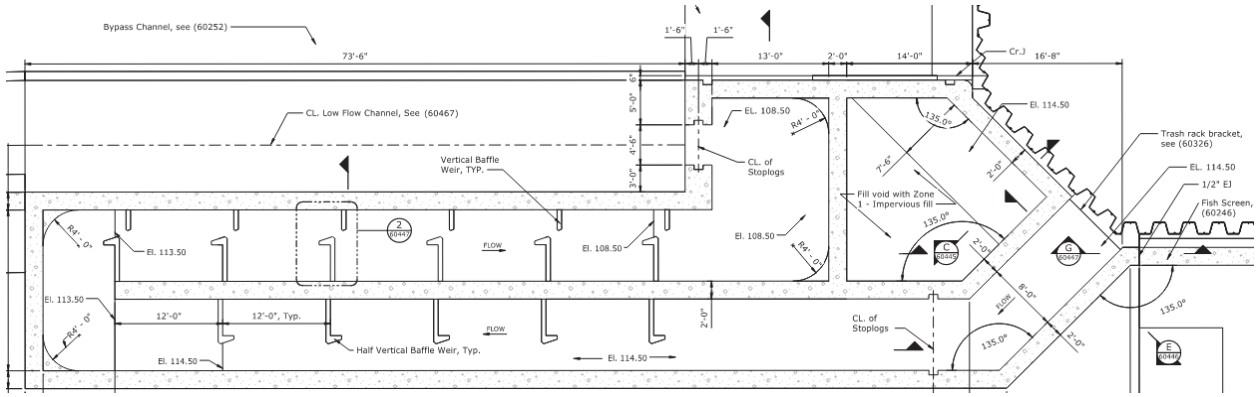

Figure 1. Fish Ladder Plan View

1.2 Operations

The fish ladder would be the first feature to receive flow under all flow conditions and would remain in the fully open position when operational. Initial flow is intended to be between 30-50 cfs, depending on the upstream water surface elevation. The fish ladder will remain operational during adult salmonid migratory season (November 1 – May 14). This would also apply to when the river bypass is fully open, allowing for the fish ladder to be open or closed to allow for maintenance as long as fish passage criteria is met in the river bypass.

Downstream releases of 0-250 cfs will be released as attraction flows through the fish ladder and two overshot gates, Gate 1 and Gate 8, located on the left and right sides of the river bypass, respectively. Gate 1, located adjacent to the fish ladder entrance, is the primary gate for downstream releases to assist fish in locating the fish ladder entrance. However, Gate 8 may also be used to pass floating aquatic vegetation as needed. These overshot gates prevent upstream fish passage and provide attraction to the fish ladder by creating a splashing sound at the entrance of the ladder. This flow scenario (Figure 2) is modeled as Scenario A in the Hydraulics Report.

To wet up the fish ladder for operation, the downstream bulkhead would be pulled first, allowing water to fully fill the downstream entrance of the fish ladder before pulling the upstream bulkhead. The upstream bulkhead would be pulled following an equalization of flow downstream, allowing for the fish ladder to function while meeting criteria from first opening.

Draw down would occur in the reverse of wet up, with the upstream bulkhead installed before the downstream bulkhead to prevent upstream passage in the feature with no attraction flow. The downstream bulkhead would be installed following draining of the ladder to equalize downstream flow before installation of the downstream bulkhead.

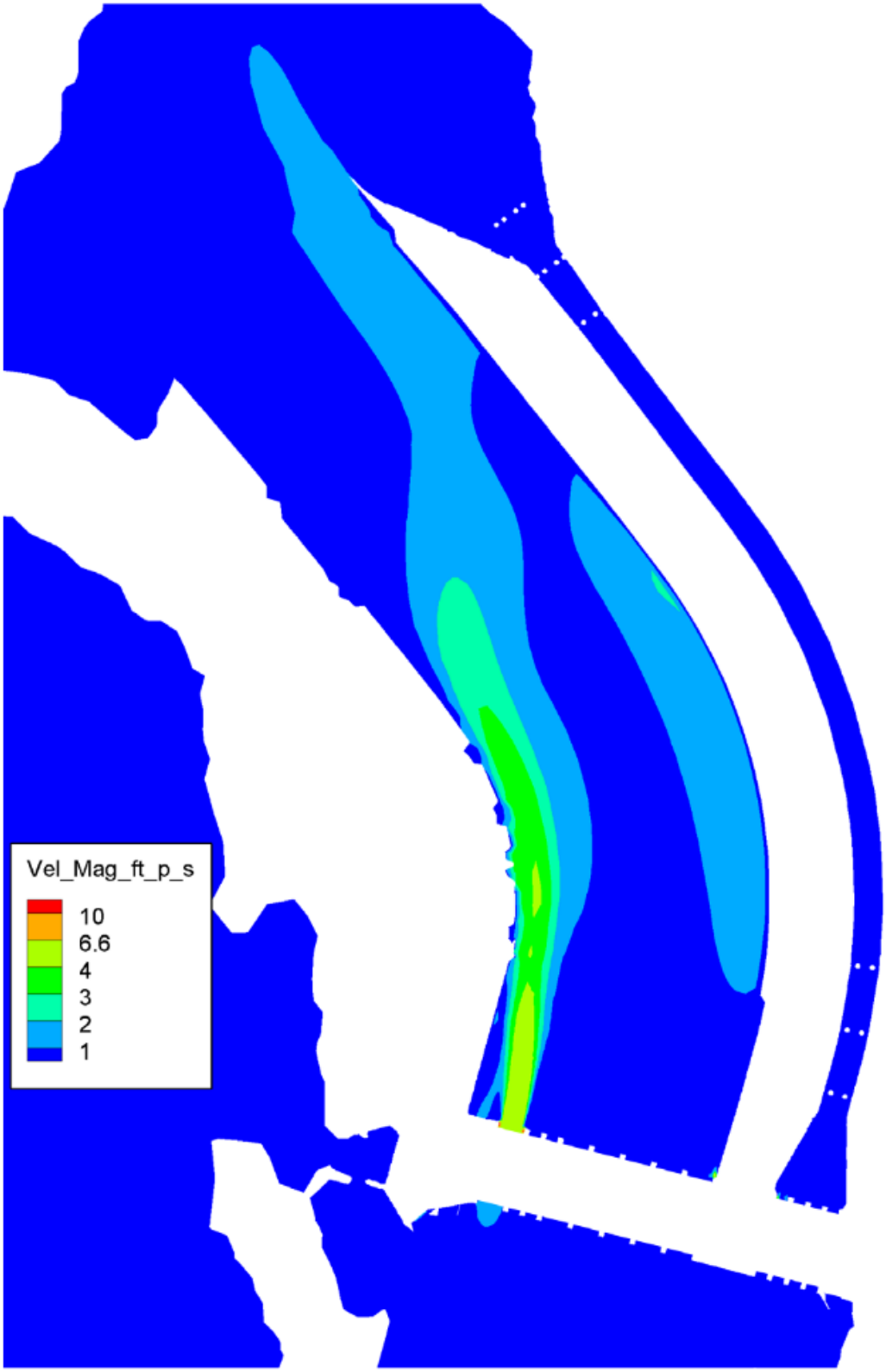

Figure 2. Hydraulic Modeling Scenario A

1.3 Maintenance

Although the fish ladder is intended to be frequently operated, it will require maintenance to ensure that it meets criteria and operates as designed. Scheduled maintenance for the fish ladder would include regular cleaning and dewatering which will occur during the summer maintenance period (May 15 through October 31). Construction, maintenance, research, or other heavy activity during the fish passage season that may impact fish passage, fish survival, or operating according to criteria will not be permitted without prior coordination with the Reclamation biologist, as per NMFS criteria. The Reclamation biologist will ensure these activities are coordinated and approved by NFMS prior to implementation, unless the activity is an emergency situation.

Maintenance would include inspecting all staff gauges and repairing or cleaning as necessary, clearing debris from lamprey orifices, clearing debris from gaps in baffles, confirming that joints and gaps in the ladder that are sealed with joint compound are intact, and confirming that rounded and smooth surfaces are still in good condition. The ladder was designed so that none of the baffles are located under the driving deck to allow for visual inspections, easy access for maintenance crews, and the ability to clean out all orifices and openings without having to enter or drop down into the ladder.

Daily Maintenance – Inspect orifices, located in the bottom right corner of each wide baffle wall, and vertical weir slots to ensure no debris is obstructing the openings. Sticks present in and against the openings act as a strainer and quickly collect debris and could impinge and kill fish. If blockages are detected during the fish passage season, attempts to remove the blockage will be made prior to dewatering the ladder. Additionally, the facility will be inspected for the presence of contaminants (e.g., oil).

Weekly Maintenance – Weekly fishway inspections will ensure fishway entrance hydraulic drop is maintained between 1.0 and 1.5 feet as determined by staff gauges inside the entrance pool and in the tailwater just outside of the fishway and channel velocity is 1.5-4.0 feet/s, as per NMFS criteria. Channel velocity may be measured by dropping a piece of floating woody debris with time recorded for travel over a fixed distance.

Annual Maintenance – In the summer maintenance period (May 15 through October 31), when adult migration is complete, the fish ladder will be closed, dewatered, cleaned, and inspected. The upstream bulkhead would be installed first to allow the water in the ladder to recede and encourage fish to exit into the main river. Prior to installing the downstream bulkhead, a visual inspection of the ladder would be performed and a long-handled net will be used to encourage any remaining fish to exit the ladder. A portable pump would be used to dewater the ladder in a manner consistent with the fish rescue plan approved by NMFS for dewatering during construction. Any fish remaining in the ladder will be rescued and immediately relocated to the main river channel. All debris and sediment would be removed. Joints and gaps in the ladder would be inspected and

sealed with joint compound to ensure that they are intact and maintain a rounded/smooth surface.

2. Fish Ramp

2.1 Description

The fish ramp is located on the right bank (east side of the river) between the river bypass channel and the levee. The channel is approximately 500 feet long with 2:1 riprap lined slopes and a four-foot wide cobble floor. There are seven sets of chevrons (26-foot tall concrete pillars) in the channel to optimize hydraulic conditions for fish passage conditions. Each set of chevrons consists of four concrete pillars in a row perpendicular to the channel. The two center pillars are 4.5 feet apart and the two outer pillars are 1.5 feet apart from the center pillars. Each pillar is 26 feet tall and three feet in diameter. The headworks (Figure 3) has four slide gates, each 4.5-foot wide with stoplogs upstream and downstream to allow for the isolation of each individual gate. The fish ramp has a flared entrance and exit to the headworks, creating equal flow distribution on the entrance and exit. At the gates, the fish ramp floor elevation, at the gates, is designed at elevation 109 feet, with a top of structure elevation 15 feet higher.

2.2 Operations

The fish ramp's optimal operational range for fish passage is between 250 cfs and 500 cfs in the ramp. The fish ramp hydraulic models show that the ramp is most effective at meeting fish passage criteria with flows between 250 cfs and 500 cfs and can operate independently (Figure 4). The chevrons in the fish ramp channel allow for additional water surface elevation (depth) and uniform velocities from the headworks to the tailwater. Tailwater effects at higher flows from the river bypass often slow velocities and allow for backwater on the downstream end of the ramp. The ramp can operate at river flows from 250 cfs through 4,500 cfs but would remain at flows between 250 and 500 cfs. Although the ramp operates at various flow rates, it maintains between 250 cfs and 500 cfs at all times. When possible, Gates 9 and 10 would be opened fully (out of the water) allowing for through gate passage as often as possible. When needed to allow for supplemental flow, the third gate would be opened to a minimum of 18 inches to prevent impingement of fish.

Gates 9 and 10 would be utilized initially for wet up, allowing flow to equalize in the channel to the appropriate depths and allowing for through gate passage as quickly as possible upon channel activation, prior to the opening of Gates 11 and 12 to provide supplemental flow. As the gates are being opened, a visual observation of the downstream channel will be made to ensure that all chevrons are free of debris and in good condition.

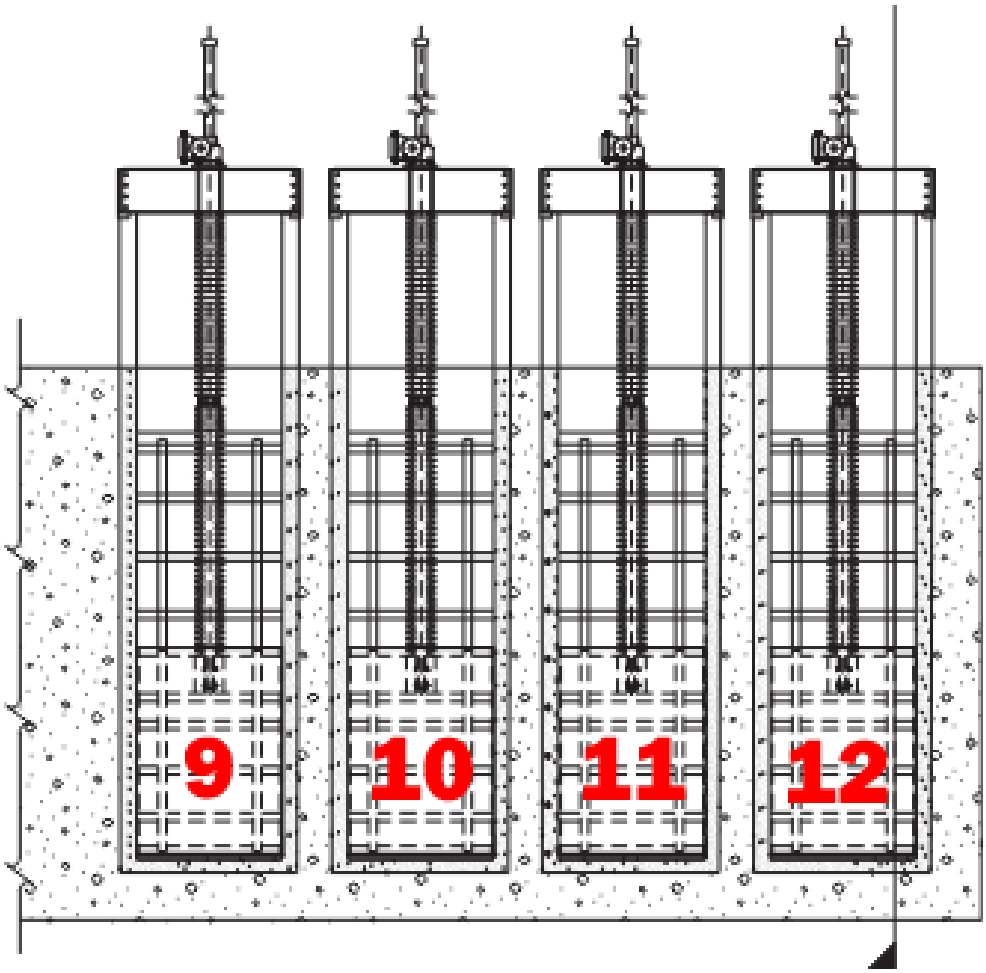

Figure 3. Fish Ramp Headworks Downstream Section View

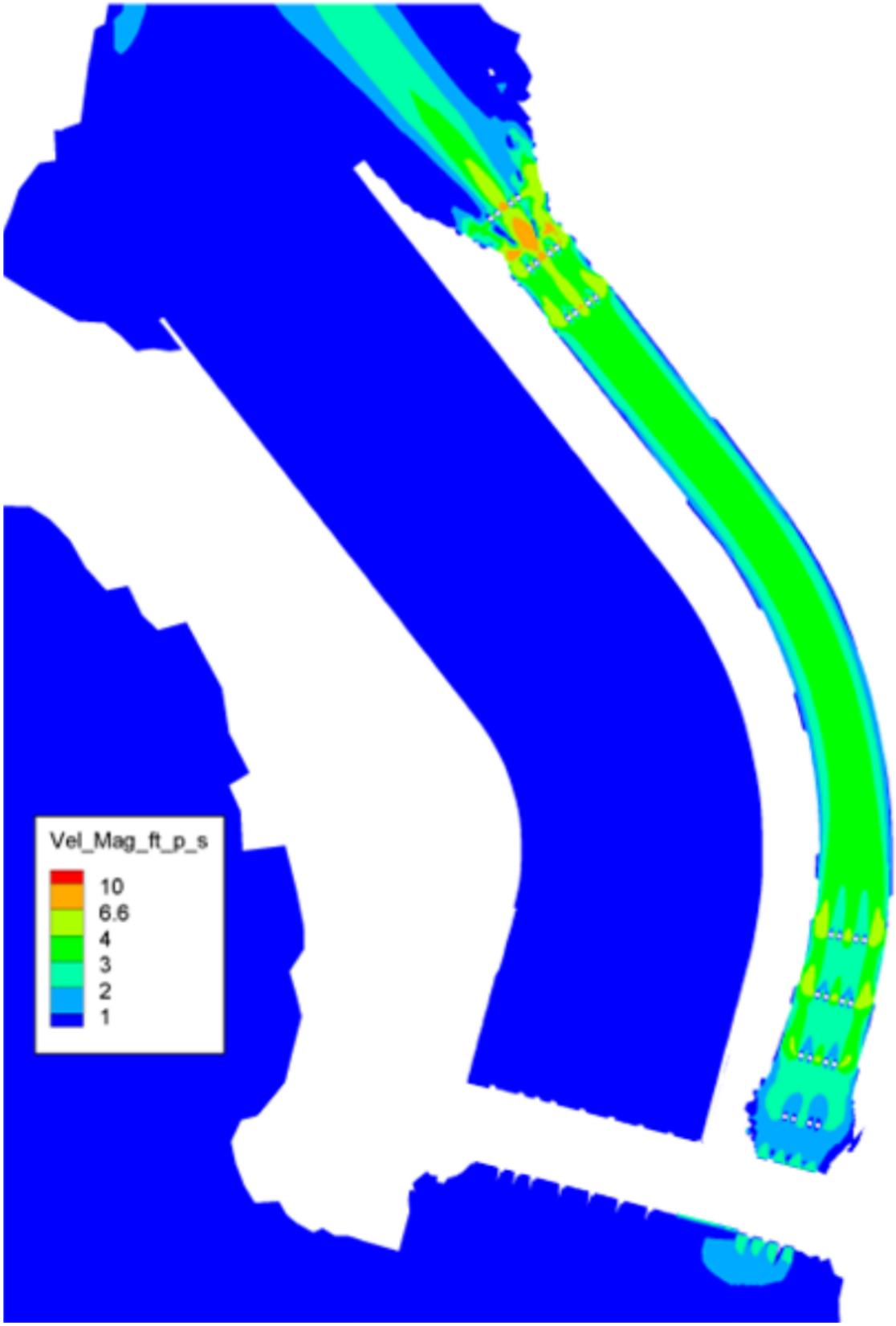

Figure 4. Hydraulic Modeling Scenario E

2.3 Maintenance

Daily/Weekly Maintenance – The downstream channel and headworks would be inspected when in operation daily to ensure there are not impingements or debris blocking the downstream pillars and gates from operating as expected.

Annual Maintenance – gate inspection and maintenance would occur in the summer months when downstream flow releases are low and can be released through the river bypass overshot gates. During gate isolation the slide gate is shut, then the upstream bulkhead is installed, followed by the downstream bulkhead. A visual inspection would be performed during gate closure and bulkhead placement to ensure fish are not being impinged or trapped in the isolation area. The downstream ramp would be inspected and cleared of any vegetation growth and debris impinging on the sidewalls of the channel.

3. River Bypass

3.1 Description

The river bypass is 93.5 feet wide and 15 feet deep over a length of 395 feet. The river bypass channel contains the fish ladder entrance and a low flow channel to provide the necessary depth and access to the fish ladder entrance for upstream passage of salmon in the lowest flow conditions. The river bypass is primarily designed to provide for conveyance of large flows and provides fish passage through the ladder and through the gates in high flow conditions. The bypass can move flow up to 4,000 cfs through eight gate bays (Figure 5). Gates 1 and 8 are 10-foot-wide overshot gates intended to provide supplemental flow for the fish ladder and be capable of passing debris downstream. Gates 2 and 3 are 4.5-foot-wide dual leaf slide gates to allow for fine-tuned flow changes and earlier through gate operation in the river bypass as flows ramp up. Gates 4 through 7 are 10-foot-wide dual leaf slide gates that will open from the bottom with a minimum 18-inch opening to move high flows through the system. The river bypass will be constructed to allow for an additional five feet of upstream water surface elevation to account for regional subsidence. The gates are dual leaf to reduce the overall structure height when all gates are in the open position.

The approach and exit of the river bypass headworks structure are confined by the river bypass on river right (east) and the fish ladder on river left (west). The fish ladder entrance is immediately adjacent to Gate 1, an overshot gate, on the downstream end, to allow for the gate to provide supplemental attraction flow. Each gate bay in the river bypass allows for independent isolation with upstream and downstream stoplog slots. Each gate bay is separated by a two-foot-thick wall to allow for the support of the overhead drive deck. The gates are located on the upstream end of the drive deck allowing for access with cranes and/or by foot.

The apron downstream of the river bypass gates collects the fish ladder flow and river bypass flow into a single concrete channel (low flow channel). During low flow

conditions flows will be in the low flow channel on the river left (west). The low flow channel is 18 inches deep and is lined with engineered streambed material (ESM). The ESM provides a more fish-friendly bottom surface for the approach to the fish ladder entrance. The remainder of the river bypass is concrete lined with vertical walls to provide the capacity needed to pass 4,000 cfs without incurring significant erosion or scour given the shear stress applied by the high flows. The transition from the river bypass to the natural river channel will be made with a rounded rock-filled outlet section that is 15 feet long and four feet deep. The bank of the Poso Canal and downstream berms are lined with rip rap to prevent scouring and erosion during high flows.

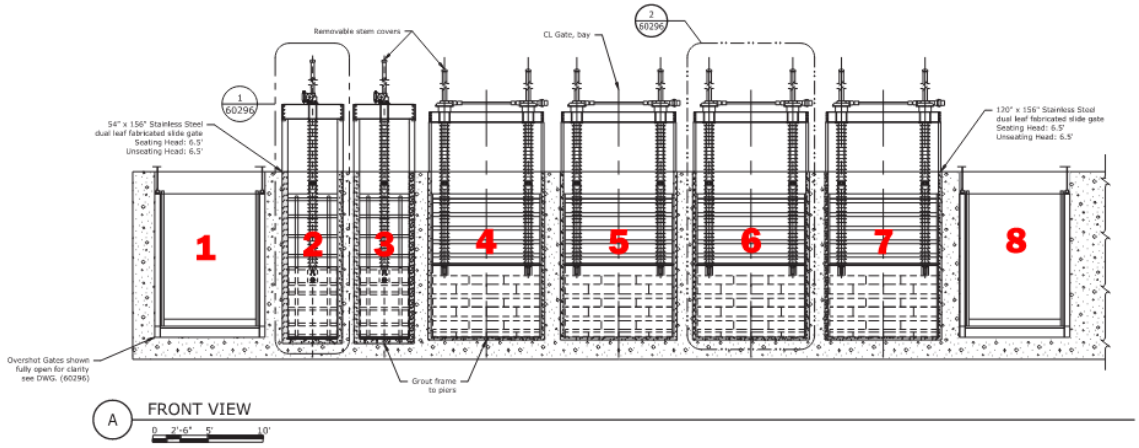

Figure 5. River Bypass Headworks Plan View

3.2 Operations

The hydraulic modeling results (Scenario J) show that the river bypass is effective at moving all flows (up to 4,500 cfs) and retaining an additional five feet of water surface elevation if subsidence continues (Figure 6). The river bypass provides supplemental flows during low flow conditions to promote attraction to the fish ladder and can move medium flows through smaller slide gates and the overshot gates. As the structure is transitioned into high flows, additional slide gates will be opened in conjunction with the fish ramp to move flood water downstream. The river bypass meets the required depth and velocity for salmon passage to the entrance of the fish ladder and often meets criteria for salmon to move upstream through the river bypass gates in high flow conditions, providing multiple fish passage route opportunities.

The river bypass is intended to promote passage via the fish ladder and provide supplemental flow for the ladder in low flow conditions. As flows increase, the overshot gates would be used until the point where the fish ramp is activated, and the river bypass provides supplemental flow. As flows increase, the slide gates will be operated from river left to river right, maintaining the minimum openings to meet NMFS criteria as ramping up in flows continues. The overshot gates would be used during wet up and for consistently passing supplemental flows. The overshot gates will be used to manage flow variations, and the slide gates will be set within the criteria and remain consistent with the desired flows. Gates would be opened from river left (west) to river right (east) for slide gates. Overshot gates can be used interchangeably, but Gate 1 would be used when the fish ladder is the primary passage route. For additional details, see gate operations under Flow Descriptions in Operation Details.

Draw down will entail the reverse of wet-up operations when flows are decreasing. Gates will be closed from river right (east) to river left (west). Visual observations would be made during gate closures to prevent potential impacts to fish waiting downstream of the gates. Each gate would be closed one at a time during the transition period to prevent potential stranding downstream.

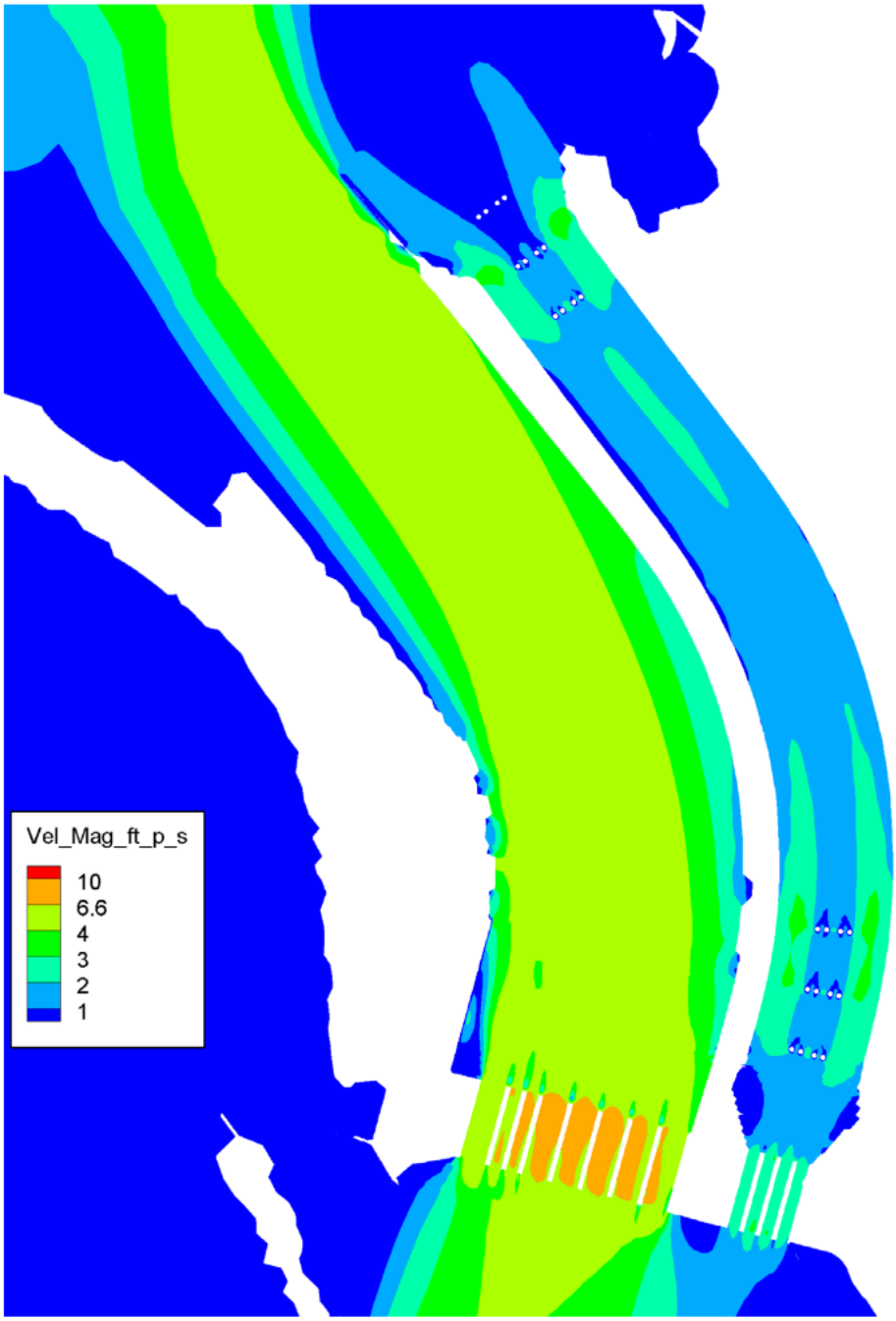

Figure 6. Hydraulic Modeling Scenario J

3.3 Maintenance

Daily/Weekly Maintenance – Each gate would be visually inspected when coming in and out of operation to ensure that gates are in good operational condition. Each gate bay has an upstream and downstream stop log slot to allow for independent isolation and maintenance while the structure is still operational. A visual inspection of the low flow channel and confluence with the natural river channel would be done when a change in operation is made to ensure the rock and material installed at those locations is performing as expected. Floating aquatic vegetation would be moved downstream through the overshot gate(s) as frequently as necessary to prevent mats/buildup from forming.

Aquatic Vegetation – When aquatic vegetation is present, the operations of the bypass facility would include the opening of the overshot gates to encourage the passage of the vegetation downstream. Debris booms would be placed in locations consistent with the above operations to best pass vegetation and should additional intervention be needed; mats would be broken into pieces capable of moving through open gates and downstream.

Roads, fences, door locks and gates – At least twice a year, the entire facility would be inspected for repairs, and all repairs performed within 30 days. During regular operations, crews would visually inspect the roads, fences, and gates for proper function and issues. If there are major issues identified that prevent functionality of the item (i.e. gate doesn't open, fence has a hole in it, or road is unsafe to drive on) these would be repaired as soon as possible. Minor repairs would be noted and fixed during the next scheduled repair.

Levees - At least twice a year, the entire facility would be inspected for needed repairs and all repairs performed within 30 days of identification. Levee repairs would be performed with engineering oversight. During regular operations, crews would visually inspect the levees. If there are major issues identified that prevent functionality or threaten the functionality of the levee, they would be repaired as soon as possible. Minor repairs would be noted and fixed during the next scheduled repair period.

4. Fish Screen

4.1 Description

The fish screen foundation measures 400 feet in length and has a cutoff wall measuring five feet deep to prevent undercutting and differential settlement issues. The total screen length is 376 feet and ten inches with the additional 14 feet being used for transition pieces, structures for screen maintenance, and access including monorails and platforms. The screen measures a total height of 15 feet with seven feet being screen and eight feet being blank panels (Figure 7). The screen area would always be submerged, maximizing

the screen's ability to meet fish flow criteria and deliveries to the Arroyo Canal under all current and subsided conditions. The fish screen is separated into two sections with two blanking panels in the center of the screen area. Above the fish screen is the walking deck for maintenance staff and employees inspecting the fish screen. This deck is made of steel supports with a metal grating and guard rails on both sides. Overhead is a monorail sitting 30 feet above the foundation for removing and replacing screen and/or blank panels as necessary. Power will run along the entire screen length for the cleaning mechanism. The cleaning mechanism is two brush cleaners that move up and down each panel, working from the center of the screen toward each end.

Panels – The fish screen panels are made of two-inch-thick stainless steel. The panels slide into slots that hold them in place. The fish screen slots sit in front (upstream) of the blanking panel slots to allow for the insertion of blanking panels, if a screen panel becomes damaged and needs replacement. Two I beams support the blanking panels, baffles, and screen panels. Each panel spans five feet wide between the supports with a total of 66 panels and two spares for replacement in case some become damaged. The total height of the screen structure stands at 30 feet tall from the river bottom, with each screen panel standing at seven feet from river bottom, and a blanking panel above each screening panel that is also seven feet. Each panel screens flow with porosity panels behind the screens, setting the opening area to equalize the sweeping and approach velocities across the screen. The current water surface elevation of 116 feet above sea level will leave the fish screen submerged by 0.5 feet and the future water surface elevation, with subsidence, will have the screen submerged by 5.5 feet.

Brush Cleaner – The fish screen brush cleaner consists of two drive motors mounted on dedicated platforms on both the upstream and downstream ends of the fish screen. Each motor drives a cleaning brush and trolley mounted to a cable. The drive motors will include tensioning systems with return sheaves located on the opposite end, at the center of the fish screen structure. There are position sensors at the upstream and downstream ends of each fish screen brush cleaner. The cleaner travel speed will be adjustable from 0.1 foot per second to 1.0 foot per second. The fish screen brush cleaner moves in both the upstream and downstream directions along a travel beam in front of the fish screens. The cleaner is designed to operate against a water velocity of five feet per second. The brush cleaner has a control panel for setting the automated cleaning cycle and can also be operated manually.

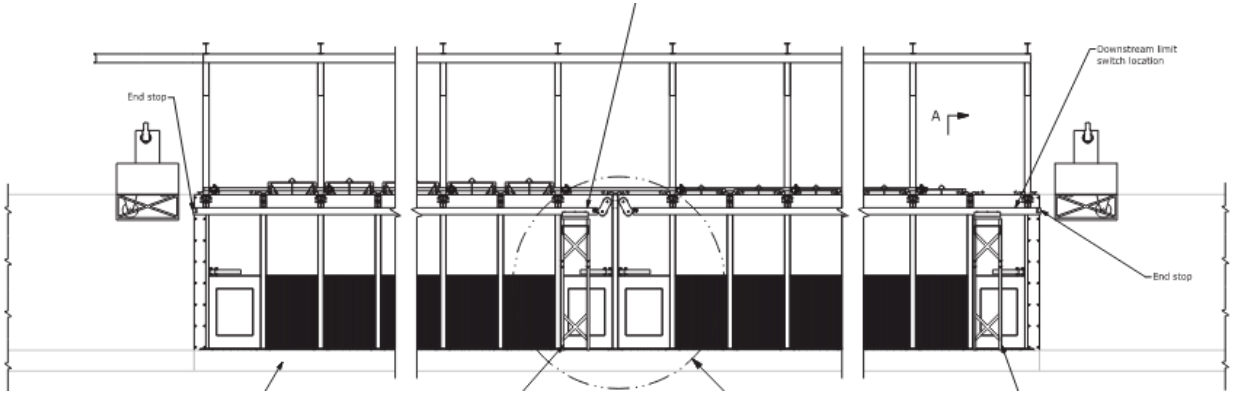

Figure 7. Fish Screen Section View

There are level sensors on the upstream and downstream face of the fish screen to determine the differential pressure across the fish screen to trigger an automatic cleaning cycle. The brush cleaner cycle can be adjusted manually to ensure screen performance. At the maximum brush speed of 1.0 foot per second, the brushes will take approximately three minutes to complete a pass from upstream to downstream and another three minutes for the return pass (8.5.5.1, Appendix E). Each brush cleaner (two total) cleans about 183 feet of screened length in six minutes. The brushes will be strip brushes with polypropylene bristles and will span the height of the screen (7 feet). There will be two brushes required per trolley/brush cleaner assembly, for a total of four brush heads. An additional four brush heads will be located in the O&M building for replacement. The additional brush heads will be kept out of sun light and indoors until used to preserve their lifespan and effectiveness at brushing the screen when installed.

Air Burst System – The air burst cleaning system is a controlled release of compressed air to aid in clearing sediment from the travel path of the fish screen brush cleaners. The air burst cleaning system consists of a 10-horsepower air compressor, a 120-gallon receiver tank, stainless steel piping, and solenoid valves to provide adequate air volume to clear sediment from in front of the fish screen panels for the fish screen brush cleaner travel path. The system is divided into 35 zones, each zone including two fish screens (or relief panel) and each zone controlled by a single solenoid valve. The air compressor and receiver tank are sized to provide three times the estimated cleaning volume (area in front of the screen) times the pressure of the maximum river water surface elevation. The air compressor will provide a minimum full-load air inlet capacity of 35 cfs at a discharge pressure of 125 pounds per square inch (gage) at an elevation of 125 feet above sea level.

4.2 Operations

Hydraulic modeling results for the screen are provided in the hydraulics report depicting the screen conditions at 116 feet above sea level and future screen condition with subsidence at various flow scenarios to demonstrate how the screen will perform when different gate operations at the headworks are occurring. The left bank screen length of 376 feet and ten inches exceeds a 60-second contact time and therefore falls under the criteria of approach velocity less than 0.33 feet per second and sweeping velocity greater than the approach velocity (8.5.1 and 8.5.3 Appendix E). The 2-D hydraulic modeling demonstrates that the differing operational conditions impact the screen performance and sometimes can cause the approach velocity to exceed the sweeping velocity and fall outside of the criteria. The screen calibration and continued learning on site over time will allow for the operations to improve the screen's effectiveness in meeting the criteria. The sweeping velocities are lowest when Restoration Flows are at their lowest. Restoration Flows will be low during the summer months and drought years. Typically, special status fish species are not at this location during the summer and therefore the potential for impacts during this time would be discountable.

The operation of the air burst cleaning system can be either manual or automatic. Manual operation is implemented by selecting the air burst to operate at the human-machine interface. Automatic mode will be by timer. For either mode, the system will start by cleaning the two most upstream fish screens first (zone 1), then continue cleaning the next two fish screens (zone 2) until all of the fish screens have been cleaned. The cleaning system will be operated by the controller located within the O&M building. After installation and testing, each solenoid valve adjustable timer will be set to 15 seconds and the cleaning interval timer set for 12 hours for automatic operation. The interval timer setting can be adjusted once operators gain field experience and determine the debris loads in the river. Operators will also be able to adjust the number of zones to clean at once, although the system may only accommodate cleaning one to two zones at a time.

Based on the hydraulic modeling and the screen design, flow constraints are not expected under any flow conditions following the calibration of the fish screen. The screen hydraulic modeling demonstrates that the screen performance is ideal when Restoration Flows exceed the delivery to the Arroyo Canal. This is a typical operation for the SJRRP from the fall through the spring when not in a critical dry year type. The anticipated summer operations will likely have the screen outside of criteria; however, this is during a period of the year when the species of concern are not present. The screen length allows for the full delivery or a smaller delivery to the Arroyo Canal from day one of operation and through the future anticipated subsidence condition. Screen openings are controlled by a set of baffles behind the screen to allow for equalization of the approach and sweeping velocities across the screen. It is anticipated that initial screen calibration will occur in lower flow conditions or typical Restoration Flows, and a future calibration will occur in high flow conditions to allow for baffle position settings in both typical and high flow conditions. The screen area would always be wet and submerged in the water column.

4.3 Maintenance

If a panel needs to be replaced or removed, the operator or maintenance personnel would install a backup screen panel behind one of the current blanking panel slots. They would then remove the blanking panel, effectively adding a section of screen. Using the monorail, the operator or maintenance staff would then move the blanking panel into the section of screen to be replaced and place it into the blanking panel tracks. Following the installation of the blanking panel, the operator would move the baffles on the screen into the closed position before pulling the screen panel out. The screen panels would only be removed after the blanking panels are installed in front of them and after a screen panel has been inserted to where one of the existing blank panels sits.

Weekly Maintenance – A lifting beam that is interchangeable with all panel types for removal, replacement, and installation (i.e., fish screen, blocking, relief, control baffles) would be on site. There would be periodic inspections to pull panels to inspect for any damage or material failure in accordance with NMFS criteria. Two spare panels of each

type would be provided by the contractor, and routine inspection would be required for the structure. Baffles would only be moved into a closed position for the installation of a blanking panel and removal of that screen section for repair or replacement. The blanking panel would be inserted in front of the screen section to be removed prior to removal of the screen panel. If the screen panel needs to be replaced it would be done in the reverse order. Screen panels would be continuously cleaned by a brush moving up and down as well as left to right across the screen to maintain the open area and keep it free of debris. To ensure screen cleaning mechanisms are performing correctly, weekly inspections will record head differential across the screen by subtracting stream gauge measurements in front of and behind the screen to ensure the differential does not exceed 0.3 feet, as per NMFS criteria (8.5.5.1, Appendix E). Maintenance activities would include routine inspections, lubricating, and adjustments of the fish screen brush cleaning system (i.e., gearmotors, bearings, brush head, wire rope sheaves, wire rope, and the overall assembly), which would all be completed in accordance with the instructions of the individual component manufacturers. O&M/service manuals will be provided for all equipment purchased from vendors or secondary contractors. Spare parts including motors, bearings, strip brushes, gear motor lubricating oil, and limit position switches will be maintained on site.

Sediment Management – Maintenance of the fish screen includes the removal and potential excavation of sediment depositions behind the fish screen. The maintenance of the area behind the fish screen is the responsibility of Henry Miller Reclamation District (HMRD) to ensure that the delivery water is able to freely move through the screen into the Arroyo Canal.

5. Debris Boom

5.1 Description

The debris boom will be anchored with concrete and offset from the screen face to allow for fluctuations in water surface without modifications to the screen face. The debris boom will be purchased by the contractor and will be like other floating debris barriers that have been successful at retaining aquatic vegetation. Anchors will be concrete blocks on the floor of the channel to allow for boom movement up and down with water surface changes under different flow delivery conditions. Anchors on the bank will be installed with similar concrete blocks to allow for a flood condition or change in water surface.

5.2 Operation

The purpose of the debris boom is to keep floating debris from hitting or collecting on the fish screen and the gates on the headworks structure. The debris boom will guide floating debris to one or both overshot gates to pass all debris through the headworks instead of allowing vegetation and other debris to continue to collect upstream of the structure.

5.3 Maintenance

Debris boom would be visually inspected during each inspection of the facility. If there are signs of wear or damage, the debris would be pulled and repaired as soon as possible. At least once a year, the debris boom would be removed, inspected, repaired, and then replaced if needed.

Operation Details

Flow Descriptions

Table 1 demonstrates gate operation order by flow rate.

Table 1. Gate Operations by Flow Rate

Flow (cfs)	Fish Ladder and River Bypass Gates	Fish Ramp Gates (when opera onal)
0-250	1, 8	0
250-450	1, 8	9, 10
450-900	1, 2, 3, 8	9, 10, 11
900-1200	1, 2, 3, 4, 5, 8	9, 10, 11
1200-2200	1-8	9, 10, 11, 12
2200-4500	1-8	9, 10, 11, 12

0-250 cfs: Releases will be made via the fish ladder and Gate 1 (overshot gate) adjacent to the fish ladder. River left debris boom deployed from the upstream end of the fish screen to the left (west) support wall of Gate 1. River right (east) debris boom will be deployed to the right support wall of Gate 8.

250-450 cfs: Primary releases will be made via the fish ramp slide gates. The fish ladder will remain open when fish are present and will be closed when outside of the migratory windows. The overshot gate adjacent to the fish ladder (Gate 1) will be utilized for moderate daily flow changes to avoid changing slide gate(s) position in the fish ramp. River left debris boom would be deployed from the upstream end of the fish screen to the left support wall of Gate 9. River right debris boom will be deployed to the right support wall of gate 12.

450-900 cfs: Primary releases will be made via the fish ramp slide gates. The fish ladder will remain open when fish are present and will be closed when outside of the migratory windows. The river bypass will be used to increase flows from above 300 cfs using Gate 1 (overshot gate), Gates 2, 3 (4.5-foot-wide slide gates), and Gate 8 (overshot gate) to provide supplemental flow. Minor changes in flow would be made through use of the overshot gates to prevent regular changes to the fish ramp, allowing for continuous passage opportunities. River left debris boom would be deployed from the upstream end

of the fish screen to the left support wall of Gate 1. River right debris boom will be deployed to the right support wall of Gate 8.

900-1200 cfs: Primary releases will be made via the river bypass slide Gates 1, 2, 3, 4, 5, and 8. The fish ladder will remain open during primary releases of the river bypass. The fish ramp will be used to pass a minimum of 300 cfs using Gates 9, 10, and 11, all of which are 4.5-foot slide gates and are intended to provide the primary route of passage for all native species. Minor changes in flow would be made through use of the overshot gates and river bypass to prevent regular changes to the fish ramp gates. River left debris boom deployed from the upstream end of the fish screen to the left support wall of Gate 1. River right debris boom will be deployed to the right support wall of Gate 8.

1200-2200 cfs: Primary releases will be made via the river bypass slide Gates 1 through 8. The fish ladder will remain open during primary releases of the river bypass. The fish ramp will be used to pass a minimum of 300 cfs using Gates 9, 10, and 11, all of which are 4.5-foot slide gates and are intended to be opened for a flow through condition as often as possible and provide the primary route of passage for all native species. Minor changes in flow would be made through use of the overshot gates and river bypass to prevent regular changes to the fish ramp gates. River left debris boom would be deployed from the upstream end of the fish screen to the left support wall of Gate 1. River right debris boom would be deployed to the right support wall of Gate 8.

2200-4500 cfs: Primary releases would be made via the river bypass slide Gates 1 through 8. The fish ladder will remain open during primary releases of the river bypass. The fish ramp will be used to pass at a minimum 300 cfs using Gates 9, 10, 11, and 12 all of which are 4.5-foot slide gates and are intended to be opened for a flow through condition as often as possible and provide the primary route of passage for all native species. Minor changes in flow would be made through use of the overshot gates and river bypass to prevent regular changes to the fish ramp gates. River left debris boom would be deployed from the upstream end of the fish screen to the left support wall of Gate 1. River right debris boom will be deployed to the right support wall of Gate 8.

6.2 Operating Criteria

The slide gates on the fish ramp and river bypass will be opened a minimum of 18 inches when in operation, exceeding criteria for Headworks Control Gates, as per NMFS criteria. Operations staff will be present and observe the last 18 inches of gate closure to ensure fish are not being impinged when the fish ramp gates are closed, and flows are transitioning to between 0-250 cfs. The fish ladder will be operational when flows are below 250 cfs during periods of fish migration. The fish ladder will be operational in high flows to provide an additional passage opportunity while the river bypass is operating. Staff would be present to observe the fish ladder in operation and ensure lamprey orifices are clear of debris and functioning as intended at a minimum once a day. Visual observation of the fish screen would occur any time a staff is present on site to ensure the screen cleaning mechanism and air burst system are operating as designed and field calibrated. Fish screen baffles will be set following commissioning of the fish

screen and would remain in place unless recalibration of the baffle locations is conducted to ensure uniform velocities across the face of the fish screen.

HMRD Deliveries

HMRD deliveries are expected to remain mostly unchanged with the construction and operation of the project. The fish screen is designed to be capable of delivering the full delivery of water to the mouth of the Arroyo Canal consistent with existing water rights. The headworks structure of the Arroyo Canal currently operates in a flow control condition, setting the flow and moving the gates to accommodate that flow into the canal. The proposed new facility will operate in level control, maintaining the water surface elevation while passing all Restoration Flows downstream of the new facility. This is intended to avoid impacts to HMRD operations and maintain the existing deliveries.

Emergency Operations

Electricity – In the event of a power failure or outage, the facility will be powered with a generator located outside of the O&M building. Facility light, controls, gates, and brush cleaner system are all installed on backup power to allow for continuity of operations for the facility. The backup power is expected to last for 48 hours, at which point it will need additional fuel and oversight to continue operation. Gates will be capable of moving one at a time while on backup power and capable of being manually lifted and lowered as needed if the backup power is insufficient to move the gates.

Gate Operation – Gates will remain in the position they are currently in when a power outage is incurred until a manual change is made at the O&M building interface or with a manual shift at the gate. Gates can be moved one at a time on the backup power, or multiple can be operated with manual gate shifts on site (wheel crank).

Fish Screen Cleaning – The fish screen brushes, and airburst system will be installed on backup power and continue operation to prevent a power outage from impacting the fish screen. In addition to the fish screen cleaning mechanisms, should the screen become impacted with sediment or debris, there are two shear pin panels installed on the structure that will fail, allowing water to flow behind the screen without causing a failure of the structure and allow for expedited repairs. Level alarms will be installed to prevent the shear pin failure from occurring and maintain the screen operation as intended.