Initial Study/Draft Environmental Assessment and Proposed Mitigated Negative Declaration

Eastside Bypass Improvements Project

SAN JOAQUIN RIVER RESTORATION PROGRAM

California Department of Water Resources

U.S. Department of the Interior
Bureau of Reclamation

December 2017
17-04-SJRRP

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Date: December 11, 2017

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

Subject: **Notice of Intent to Consider Adoption of a Proposed Mitigated Negative Declaration for the Eastside Bypass Improvements Project**

The California Department of Water Resources (DWR) has directed the preparation of an initial study (IS) and intends to adopt the proposed mitigated negative declaration (MND) for the Eastside Bypass Improvements Project (proposed project) in compliance with the California Environmental Quality Act (CEQA) and State CEQA Guidelines.

Project Title: Eastside Bypass Improvements Project

Lead Agency: DWR, South Central Region Office

Project Location: The proposed project is located between the Cities of Merced and Los Banos in Merced County on the Eastside Bypass just east of the San Joaquin River. The site is approximately 15-20 miles southwest of the City of Merced. The project area is located within the United States Geological Survey 7.5-minute Turner Ranch, Sandy Mush, and Santa Rita Bridge quadrangles.

Project Description: The proposed project is part of the San Joaquin River Restoration Program (SJRRP). DWR proposes to design, permit, and implement the following three project elements to facilitate fish migration and increased Restoration Flow capacity in the Eastside Bypass by 2019:

- Reinforce approximately 2 miles of levee along the Eastside Bypass to improve levee stability and reduce seepage (Reach O levee improvements).
- Modify the existing Eastside Bypass Control Structure to improve fish passage.
- Replace the existing culvert at the Dan McNamara Road crossing at the Eastside Bypass to improve fish passage.

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) proposes to design, permit, and implement the following project element to facilitate fish migration in the Eastside Bypass by 2020:

- Improve fish passage by removing two weirs located in the Eastside Bypass that the U.S. Fish and Wildlife Service operate to provide water to the Merced National Wildlife Refuge, and replace an existing non-operational well with a new well to provide replacement water supply for the Refuge, first drilling an exploratory well as a near-term action.

Environmental Review Process: DWR has directed the preparation of an IS/MND on the proposed project in accordance with the requirements of CEQA and the State CEQA Guidelines. The IS/MND describes the proposed project and provides an assessment of the proposed project's potential significant adverse impacts on the physical environment. It concludes that the proposed project would not have any significant adverse effects on the environment after adoption and implementation of mitigation measures.

Public Review Period: The IS/MND is being circulated for public review and comment for a review period of 30 days starting on December 11, 2017. Written comments must be submitted and received at one of the following addresses, by fax, or by email no later than close of business (5:00 p.m.) on January 9, 2018:

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To Review or Obtain a Copy of the Environmental Document: Copies of the IS/MND may be reviewed at the following locations:

1. Reclamation website: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=30741

2. Merced County Library
   2100 O Street
   Merced, CA 95340
   209-385-7484

3. DWR's Fresno office listed above.

4. Reclamation's Sacramento office listed above.

Proposed Mitigated Negative Declaration

PROJECT: Eastside Bypass Improvements Project

CEQA LEAD AGENCY: California Department of Water Resources (DWR), South Central Region Office

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FINDINGS: An initial study/proposed mitigated negative declaration (IS/MND) has been prepared to assess the proposed project's potential effects on the physical environment and the significance of those effects. Based on the analysis conducted in the IS, it has been determined that implementing the proposed project would not have any significant adverse effects on the environment after adoption and implementation of mitigation measures. This conclusion is supported by the following findings:

1. The proposed project would have a beneficial impact on socioeconomics.
2. The proposed project would have no impact on environmental justice, land use and planning, mineral resources, and population and housing.
3. The proposed project would have a less-than-significant impact on aesthetics, agriculture and forestry resources, cultural resources (including Tribal Cultural Resources), greenhouse gas emissions, public services, transportation and traffic, and utilities and service systems.
4. The proposed project would have a less-than-significant impact, with mitigation measures adopted and implemented, on air quality, biological resources (fisheries, vegetation and wildlife),

geology and soils, hazards and hazardous materials, hydrology and water quality, noise, paleontological resources, and recreation.

5. The proposed project would not have any mandatory findings of significance as the project would not have the potential to substantially degrade the quality of the environment; substantially reduce the habitat of a fish or wildlife species; cause a fish or wildlife population to drop below self-sustaining levels; threaten to eliminate a plant or animal community; substantially reduce the number or restrict the range of an endangered, rare, or threatened species; or eliminate important examples of the major periods of California history or prehistory.

6. The proposed project would not have the potential to achieve short-term environmental goals to the disadvantage of long-term environmental goals.

7. The proposed project would not have possible environmental effects that are individually limited but cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. The SJRRP Program Environmental Impact Statement/Environmental Impact Report adequately addressed cumulative impacts of the entire SJRRP.

8. The environmental effects of the proposed project would not cause substantial adverse effects on human beings, either directly or indirectly.

9. The proposed project incorporates all mitigation measures listed below and described in the IS.

MITIGATION MEASURES: The following mitigation measures will be implemented by DWR and/or Reclamation as part of the project to avoid, minimize, rectify, reduce or eliminate, or compensate for potentially significant environmental impacts. Implementation of these mitigation measures would reduce the potentially significant environmental impacts of the proposed project to less-than-significant levels:

Mitigation Measure AQ-1: Implement Construction Equipment NOx and PM Controls

The exhaust emissions for construction equipment greater than 50 horsepower used or associated with the proposed project will be reduced by the following amounts from the Statewide average as estimated by the California Air Resource Board:

- 20% of the total NOx emissions
- 45% of the total PM_{10} exhaust emissions

Emissions accounting methods will be as described in SJVAPCD Rule 9510.

Mitigation Measure FISH-1: Develop and Implement a Fish Rescue and Dewatering Plan

NMFS, USFWS, and CDFW will be consulted during the project permitting process to develop and approve a fish rescue and dewatering plan. Prior to construction site dewatering, fish will be captured and relocated to avoid potential impact. The plan will develop methods for removal, relocation, and exclusion of fish from areas of potential impact prior to construction or dewatering. At a minimum, the plan will describe capture and handling methods along with the identification of release locations. Methods for capture may include but are not limited to

electrofishing and seining. A trained biologist approved by NMFS, USFWS, and CDFW will be onsite during all dewatering activities and, in the event of any project-related special-status fish stranding events, the biologist will stop work and immediately contact resource agencies.

Dewatering and construction should only occur within designated work windows as to minimize the amount of exposure to listed species in potentially in the area. If fish are present, operate facilities to the extent practicable to create flow conditions adequate to provide for passage, water quality, and proper timing of life history stages, as well as to avoid juvenile stranding and redd dewatering. After dewatering, restore properly functioning channel, floodplain, and riparian conditions. If pumps are needed to dewater the area, they should be screened to NMFS fish screening criteria. Pumps should also be checked periodically to ensure the screens are working properly and fish are not being entrained. All equipment used to dewater the site should be removed at the end of the construction. If construction spans two construction seasons, it may be necessary to remove dewatering materials to allow for passage during the migration period.

Mitigation Measure FISH-2: Avoid Loss of Habitat and Risk of Take of Species

a) Impacts to habitat conditions (i.e. decrease in floodplain connectivity, removal of riparian vegetation, decreased in quality rearing habitat, etc.) will be analyzed in consultation with NMFS as part of the Biological Assessment to be prepared pursuant to Section 7 of the ESA, due to the potential to impact anadromous salmonids.

b) Before implementation of site-specific actions, Reclamation and/or DWR will conduct an education program for all agency and contracted employees relative to the special-status species that may be encountered within the study area of the action, and required practices for their avoidance and protection. An appointed representative will be identified to employees and contractors to ensure that questions regarding avoidance and protection measures are addressed in a timely manner.

c) Disturbance of riparian vegetation will be avoided and then minimized to the extent feasible. Any disturbed riparian vegetation will be replanted at 3:1 ratio in consultation with the San Luis National Wildlife Refuge (NWR) Complex, resource agencies, and permit requirements.

d) A biological monitor approved by NMFS, USFWS, and CDFW will be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction, to monitor implementation of conservation measures and water quality. As defined in FISH-1, a fisheries biologist will be onsite for all fish rescue, dewatering and anytime special-status fish could be present.

e) For pile driving that would occur during construction of Eastside Bypass Control Structure modifications, implement the following measures:

- When possible, avoid driving piles when salmon are present, especially the younger life stages and spawning adults.

- Avoid driving piles with an impact hammer when salmon or their prey are present and use alternatives such as vibratory hammers or press-in pile drivers.

- In cases where an impact hammer must be used, drive the piles as far as possible with a vibratory or other method that produces lower levels of sound before using an impact hammer.

- Select piles that are made of alternate materials that produce less-harmful sounds than those from hollow steel piles, such as concrete or untreated wood instead of steel.

- Implement feasible sound-attenuating measures, including use of a bubble curtain or a dewatered pile sleeve or coffer dam, and monitor the sound levels during pile driving to ensure that attenuation measures are functioning as expected.

- Monitor and report back to NMFS and CDFW the sound levels during pile driving to verify analysis assumptions were correct and any attenuation device is properly functioning. Monitoring and reporting protocols will be according to guidance provided by FHWG (2013). The report should be provided to NMFS and CDFW no later than 60 days after completion of pile driving.

Mitigation Measure BIO-1: Avoid and Minimize Effects to Special-status Plants.

a) Within 1 year before the commencement of ground-disturbing activities, habitat assessment surveys for special-status plants will be conducted by a USFWS- and CDFW-approved botanist, in accordance with the most recent USFWS and CDFW guidelines and at the appropriate time of year when the target species would be in flower or otherwise clearly identifiable. Survey results can be climate dependent, and survey timing will be coordinated with USFWS and CDFW.

b) Locations of special-status plant populations will be clearly identified in the field by staking, flagging, or fencing a minimum 50-foot-wide buffer (100-foot-wide buffer for any elderberry bushes) around them before the commencement of activities that may cause disturbance. No activity shall occur within the buffer area if feasible. If encroachment within the buffer is required, USFWS and/or CDFW will be consulted to determine appropriate compensation measures for the loss of special-status plants, as appropriate. Worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.

c) Some special-status plant species are annual plants, meaning that a plant completes its entire life cycle in one growing season. Other special-status plant species are perennial plants that return year after year until they reach full maturity. Because of the differences in plant life histories, all general conservation measures will be developed on a case-by-case basis and will include strategies that are species- and site-specific to avoid impacts to special-status plants.

Mitigation Measure BIO-2: Compensate for Temporary and Permanent Loss of Special-status Plants.

a) USFWS and/or CDFW will be consulted to determine appropriate compensation measures for the loss of special-status plants, as appropriate.

b) Appropriate mitigation measures may include the creation of off-site populations through seed collection or transplanting, preservation and enhancement of existing populations, restoration or creation of suitable habitat, or the purchase of credits at an approved mitigation bank. If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in the mitigation plan. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.

Mitigation Measure BIO-3: Avoid and Minimize Loss of Habitat and Individuals.

a) Historically, Delta button-celery was known to exist in the Eastside and Mariposa Bypasses (CNDDB). Before conducting project activities, comprehensive surveys will be conducted. Surveys will include remapping and re-census of the documented occurrences during at least 2 consecutive or nonconsecutive years when habitat conditions are favorable to detect the species to determine the population trend. Status updates for these occurrences will be provided to CDFW and USFWS, as appropriate.

b) A Delta button-celery conservation plan will be developed and implemented that includes a preservation and adaptive management strategy for existing occurrences within the Restoration Area. The conservation plan will be developed in collaboration with CDFW and other species experts, and be supported by review of the existing literature, including information on species' life history characteristics, historic and current distribution, and microhabitat requirements.

Mitigation Measure BIO-4: Avoid and Minimize Loss of Habitat and Risk of Take of Delta Button-celery for Implementation of Construction Activities.

a) If direct impacts to Delta button-celery could occur, DWR will consult with CDFW to determine specific minimization and mitigation measures.

Mitigation Measure BIO-5: Compensate for Temporary or Permanent Loss of Delta-button Celery Habitat.

a) If pre-construction surveys find populations that cannot be avoided, compensatory mitigation for Delta button-celery will be developed by DWR in consultation with CDFW. Mitigation may include the development and implementation of habitat creation and enhancement designs to incorporate habitat features for Delta button-celery (e.g., depressions within seasonally inundated areas) into floodplains with potentially suitable habitat conditions. Compensatory mitigation may also include efforts to establish additional populations in the Restoration Area or to enhance existing populations on or off site. Mitigation sites will avoid areas where future SJRRP construction activities are likely.

b) Establishment of new occurrences will be attempted by transplanting seed and plants from affected locations to created habitat or suitable, but unoccupied, existing habitat.

c) Monitoring, performance criteria, and protective measures will be applied to compensatory mitigation sites. The replacement requirements, and any additional conservation and mitigation measures will be determined in consultation with CDFW.

Mitigation Measure BIO-6: Avoid Effects to Vernal Pool Species.

a) Where vernal pools or vernal pool species occur within 250 feet of the project footprint, a biologist approved by USFWS and CDFW will identify and map vernal pool and seasonal wetland habitat potentially suitable for listed vernal pool plants, invertebrates, and western spadefoot toad within the project footprint.

b) Facility construction and other ground-disturbing activities will be sited to avoid core areas identified in the *Vernal Pool Recovery Plan* (USFWS 2005), where feasible, because conservation of these areas is a high priority for recovering listed vernal pool species. If encroachment within a core area is required, USFWS will be consulted and CDFW coordinated with to determine appropriate compensation measures for the loss of vernal pool species, as appropriate.

Mitigation Measure BIO-7: Minimize Effects to Vernal Pool Species.

a) Where vernal pools are present, a buffer around the micro-watershed or a 250-foot-wide buffer, whichever is greater, will be established if feasible before ground-disturbing activities around the perimeter of vernal pools and seasonal wetlands that provide suitable habitat for vernal pool crustaceans or vernal pool plants. This buffer will remain until ground-disturbing activities in that area are completed. Suitable habitat and buffer areas will be clearly identified in the field by staking, flagging, or fencing. If encroachment within the buffer is required, USFWS will be consulted and CDFW will be coordinated with to determine appropriate compensation measures for the loss of vernal pool species, as appropriate.

b) High-visibility fencing will be placed and maintained around all preserved vernal pool habitat buffers during ground-disturbing activities to prevent impacts from vehicles and other construction equipment.

c) Worker awareness training and on-site biological monitoring by USFWS- and CDFW-approved biologists will occur during ground-disturbing activities to ensure buffer areas are being maintained.

Mitigation Measure BIO-8: Compensate for Temporary or Permanent Loss of Vernal Pool Species Habitat.

a) If project activities occur within the micro-watershed or 250-foot-wide buffer for vernal pool habitat, a compensatory mitigation plan will be developed and implemented, consistent with USACE and EPA April 10, 2008, *Final Rule for Compensatory Mitigation for Losses of Aquatic Resources* (33 CFR Parts 325 and 332 and 40 CFR Part 230) and other applicable regulations and rules at the time of implementation, that will result in no net loss of acreage, function, and value of affected vernal pool habitat. Unavoidable effects will be compensated through a combination of creation, preservation, and restoration of vernal pool habitat or purchase of credits at a mitigation bank approved by the applicable regulatory agency/agencies.

b) Project effects and compensation will be determined in consideration of the *Vernal Pool Recovery Plan* goals for core areas, which call for 95 percent preservation for habitat in the Grasslands Ecological Area and Madera core areas, and 85 percent habitat preservation in the Fresno core area (USFWS 2005).

c) Appropriate compensatory ratios for loss of habitat both in and out of core areas will be determined during coordination and consultation with USFWS and coordination with CDFW, as appropriate.

d) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be and developed as part of the USFWS consultation and CDFW coordination process. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.

Mitigation Measure BIO-9: Avoid Effects to California Tiger Salamander.

a) Prior to project construction activities, a biologist approved by USFWS and CDFW will identify and map potential California tiger salamander habitat (areas within 1.3 miles of known or potential California tiger salamander breeding habitat) within the project footprint. Prior to ground-disturbing activities, the approved biologist will survey for and flag the presence of ground squirrel and gopher burrow complexes. Where burrow complexes are present, a 250-foot-wide buffer shall be placed to avoid and minimize disturbance to the species.

b) Facility construction and other ground-disturbing activities shall be sited to avoid areas of known California tiger salamander habitat and avoidance buffers will be implemented if feasible. If encroachment within a buffer is required, USFWS and CDFW will be consulted with to determine appropriate compensation measures for the loss of California tiger salamander, as appropriate.

c) To eliminate an attraction to predators of the California tiger salamander, all food-related trash items such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at least once every day from the entire project site.

Mitigation Measure BIO-10: Minimize Effects to California Tiger Salamander.

a) Before the start of construction activities, construction exclusion fencing will be installed just outside the work limit or around vernal pools where California tiger salamander may occur. This fencing will be maintained throughout construction and will be removed at the conclusion of ground-disturbing activities. No vehicles will be allowed beyond the exclusion fencing. A USFWS- and CDFW-approved biological monitor will be present on site, during intervals recommended by USFWS and CDFW, to inspect the fencing.

b) The approved biological monitor will be on site each day during any wetland restoration or construction, and during initial site grading or development of sites in suitable habitat for California tiger salamander.

c) Before the start of work each day, the biological monitor will check for animals under any equipment to be used that day, such as vehicles or stockpiles of items such as pipes. If California tiger salamanders are present, they will be allowed to leave on their own, before the initiation of construction activities for the day. To prevent inadvertent entrapment of California tiger salamanders 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 will be thoroughly inspected for trapped animals.

d) Plastic monofilament netting (erosion control matting) or similar material shall not be used at the project site because California tiger salamanders may become entangled or trapped. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

e) All ground-disturbing work will occur during daylight hours. Clearing and grading will be conducted between May 1 and October 1, where feasible, in coordination with USFWS and CDFW, and depending on the level of rainfall and site conditions. If infeasible, USFWS and CDFW will be consulted with to determine appropriate compensation measures for the loss of California tiger salamander habitat, as appropriate.

f) Revegetation of project areas temporarily disturbed by construction activities will be conducted with locally occurring native plants.

Mitigation Measure BIO-11: Compensate for Temporary or Permanent Loss of California Tiger Salamander Habitat.

a) If California tiger salamander, or areas within 1.3 miles of known or potential California tiger salamander breeding habitat, would be affected by the proposed project, a compensatory mitigation plan will be developed and implemented in coordination with USFWS and CDFW, as appropriate. Unavoidable effects will be compensated through a combination of creation, preservation, and restoration of habitat or purchase of credits at an approved mitigation bank.

b) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in and developed as part of the USFWS and CDFW coordination and consultation process. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.

Mitigation Measure BIO-12: Avoid and Minimize Loss of Giant Garter Snake Habitat.

a) Where suitable giant garter snake habitat occurs within the project area, preconstruction surveys by a qualified biologist approved by USFWS and CDFW will be completed within a 24-hour period before any ground disturbance of potential giant garter snake habitat. If construction activities stop on the project site for a period of 2 weeks or more, a new giant garter snake survey will be completed no more than 24 hours before the restart of construction activities. Avoidance of suitable giant garter snake habitat, as defined by USFWS and CDFW, will occur by demarcating and maintaining a 300-foot-wide buffer

around these areas. All potentially suitable burrows and crevices will be flagged and avoided by a minimum 50-foot, no-disturbance buffer.

b) For projects within potential giant garter snake habitat, all activity involving disturbance of potential giant garter snake habitat will be restricted to the period between May 1 and October 1, the active season for giant garter snakes, if feasible. The construction site will be reinspected if a lapse in construction activity of 2 weeks or greater has occurred. If disturbance of potential giant garter snake habitat cannot be avoided, USFWS will be consulted and CDFW coordinated with to determine appropriate compensation measures for the loss of giant garter snake habitat, as appropriate.

c) Clearing will be confined to the minimal area necessary to facilitate construction activities. Giant garter snake habitat within or adjacent to the project will be flagged, staked, or fenced and designated as an Environmentally Sensitive Area. No activity will occur within this area if feasible. If encroachment within this area is required, USFWS will be consulted and CDFW coordinated with to determine appropriate compensation measures for the loss of giant garter snake habitat, as appropriate.

d) USFWS-approved worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. Construction activities will be minimized within 200 feet of the banks of giant garter snake habitat if feasible. Movement of heavy equipment will be confined to existing roadways to minimize habitat disturbance. If disturbance of potential giant garter snake habitat cannot be avoided, USFWS will be consulted and CDFW coordinated with to determine appropriate compensation measures for the loss of giant garter snake habitat, as appropriate.

e) Vegetation shall be hand-cleared in areas where giant garter snakes are suspected to occur. Exclusionary fencing with one-way exit funnels shall be installed at least 1 month before activities to allow the species to passively leave the area and to prevent reentry into work zones, per USFWS and/or CDFW guidance.

f) If a giant garter snake is found during construction activities, USFWS, CDFW, and the project's biological monitor will immediately be notified. The biological monitor, or his/her assignee, will stop construction in the vicinity of the find and allow the snake to leave on its own. The monitor will remain in the area for the remainder of the work day to ensure the snake is not harmed. Escape routes for giant garter snake will be considered in advance of construction and snakes will be allowed to leave on their own. If a giant garter snake does not leave on its own within 1 working day, USFWS and CDFW will be consulted prior to resuming construction activity.

g) All construction-related holes will be covered to prevent entrapment of individuals. Where applicable, construction areas will be dewatered 2 weeks before the start of activities to allow giant garter snakes and their prey to move out of the area before any disturbance.

Mitigation Measure BIO-13: Compensate for Temporary or Permanent Loss of Giant Garter Snake Habitat.

a) Temporarily affected giant garter snake aquatic habitat will be restored in accordance with criteria listed in the USFWS *Mitigation Criteria for Restoration and/or Replacement of Giant*

Garter Snake Habitat (Appendix A to *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake Within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties, California* (USFWS 1997)), or the most current criteria from USFWS or CDFW.

b) Permanent loss of giant garter snake habitat will be compensated at a ratio and in a manner consulted on with USFWS and CDFW. Compensation may include preservation and enhancement of existing populations, restoration or creation of suitable habitat, or purchase of credits at an approved mitigation bank in sufficient quantity to compensate for the effect. Credit purchases, land preservation, or land enhancement to minimize effects to giant garter snakes should occur geographically close to the impact area. If off-site compensation is chosen, it may include dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, and the details of these measures as applicable will be included in the mitigation plan.

Mitigation Measure BIO-14: Avoid and Minimize Loss of Western Pond Turtle Individuals.

a) A biologist approved by CDFW will conduct surveys in aquatic habitats to be dewatered and/or filled during project construction. Surveys will be conducted immediately after dewatering and before fill of aquatic habitat suitable for western pond turtles. If western pond turtles are found, the biologist will capture them and move them to nearby CDFW-approved areas of suitable habitat that will not be disturbed by project construction.

Mitigation Measure BIO-15: Avoid and Minimize Impacts to Swainson's Hawk.

a) Preconstruction surveys for active Swainson's hawk nests will be conducted in and around all potential nest trees within 0.5 mile of project-related disturbance (including construction-related traffic). These surveys would follow the methodology developed by the Swainson's Hawk Technical Advisory Committee (SHTAC 2000).

b) If known or active nests are identified through preconstruction surveys or other means, a 0.5-mile no-disturbance buffer shall be established, if feasible, around all active nest sites if construction cannot be limited to occur outside the nesting season (February 15 through September 15). The no-disturbance buffer will be maintained around active nests until the breeding season has ended or until a CDFW-approved biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival. If encroachment into the buffer area is required, CDFW will be coordinated with to determine appropriate compensation measures for impacts to Swainson's hawk.

c) Worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.

Mitigation Measure BIO-16. Avoid and Minimize Loss of Individual Raptors.

a) Vegetation removal will only occur outside the typical breeding season for raptors (September 16 to February 14), if feasible.

b) Preconstruction surveys by a USFWS- and CDFW-approved biologist will be conducted in areas of suitable habitat to identify active nests in the project footprint.

c) If active nests are located in or adjacent to the project footprint, a no-disturbance buffer will be established if feasible until a USFWS- and CDFW-approved biologist determines that the nest is no longer active. The size of the buffer will be established by the approved biologist in coordination with USFWS and/or CDFW based on the sensitivity of the resource, the type of disturbance activity, and nesting stage. No activity shall occur within the buffer area, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. If encroachment into the buffer is required, USFWS and/or CDFW will be coordinated with to determine appropriate compensation measures to avoid and minimize loss of individual raptors.

Mitigation Measure BIO-17: Compensate for Loss of Raptor Nest Trees.

a) Native trees removed during project activities will be replaced with an appropriate number of native trees, in coordination with CDFW and USFWS, as appropriate.

Mitigation Measure BIO-18: Avoid and Minimize Effects to Migratory Bird Species.

a) Vegetation removal will only occur March 1 to August 31within the Merced NWR to avoid the overwintering season for migratory bird species, if feasible. In all other areas, vegetation removal will only occur September 1 to February14 to avoid the typical breeding season for migratory bird species, if feasible.

b) If species covered under the Migratory Bird Treaty Act and Fish and Game Code Sections 3503, 3503.5, and 3513 are determined to be present on the Merced NWR and if project activity will occur on the Merced NWR during the typical overwintering season, the Merced NWR will be coordinated with to determine appropriate measures to avoid and minimize effects to migratory bird species. In all other areas, USFWS and/or CDFW will be coordinated with to determine appropriate measures to avoid and minimize effects to migratory bird species. Measures may include establishing a no-disturbance buffer around any active migratory bird nests that are observed within or adjacent to the project footprint, and conducting biological monitoring until the biologist determines the nest is no longer active.

c) An Avian Protection Plan will be developed in coordination with USFWS and CDFW and implemented by the lead agencies, as appropriate.

d) The Merced NWR will be coordinated with to minimize potentially adverse impacts to wetland habitat attributed to the removal of the two weirs.

Mitigation Measure BIO-19: Avoid Loss of Burrowing Owl.

a) Preconstruction surveys by a CDFW-approved biologist for burrowing owls will be conducted in areas supporting potentially suitable habitat and within 30 days before the start of construction activities. If ground-disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site will be resurveyed.

b) Occupied burrows will not be disturbed during the breeding season (February 1 through August 31), if feasible. If feasible, a minimum 160-foot-wide buffer will be placed around occupied burrows during the nonbreeding season (September 1 through January 31), and a minimum 650-foot-wide buffer will be placed around occupied burrows during the breeding season. Ground-disturbing activities will not occur within the designated buffers, if feasible. If loss of burrowing owl cannot be avoided, CDFW will be consulted to determine appropriate compensation measures for the loss of burrowing owl, as appropriate.

Mitigation Measure BIO-20: Minimize Impacts to Burrowing Owl.

a) If a CDFW-approved biologist can verify through noninvasive methods that owls have not begun egg-laying and incubation, or that juveniles from occupied burrows are foraging independently and are capable of independent survival, a plan shall be coordinated with CDFW to offset burrow habitat and foraging areas on the project site if burrows and foraging areas are taken by the proposed project.

b) If destruction of occupied burrows occurs, existing unsuitable burrows will be enhanced (enlarged or cleared of debris) or new burrows created. This will be done in consultation with CDFW.

c) Passive owl relocation techniques will be implemented. Owls will be excluded from burrows in the immediate impact zone within a 160-foot-wide buffer zone by installing one-way doors in burrow entrances. These doors will be in place at least 48 hours before excavation to insure the owls have departed.

d) The project area will be monitored daily for 1 week to confirm owl departure from burrows before any ground-disturbing activities.

e) Where possible, burrows will be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe will be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.

Mitigation Measure BIO-21: Avoid and Minimize Effects to Fresno Kangaroo Rat.

a) Preconstruction surveys will be conducted by a USFWS- and CDFW-approved biologist per USFWS and CDFW survey methodology to determine if potential burrows for Fresno kangaroo rat are present in the project footprint. Surveys will be conducted within 30 days before ground-disturbing activities. The approved 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 shall be used to identify the presence of kangaroo rat burrows. When burrows are found within 100 feet of the proposed project footprint, focused live trapping surveys shall be conducted by the approved and permitted biologist, following a methodology approved in advance by USFWS and CDFW. Additional conservation measures may be developed pending the results of surveys, and in consultation with USFWS and CDFW.

Mitigation Measure BIO-22: Conduct Pre-construction Surveys for San Joaquin Kit Fox and Employee Education Program.

a) A USFWS-approved biologist will conduct pre-construction surveys no fewer than 14 days and no more than 30 days prior to the onset of any ground disturbing activity. The primary objective is to identify kit fox habitat features (e.g. potential dens and refugia) on the project site. If San Joaquin kit fox are detected at any time, all activities associated with the project will be halted immediately. The project will be placed on hold until consultation with the USFWS and CDFW is completed.

b) DWR and/or Reclamation will conduct an employee education program prior to the start of construction. The lead agency will retain a USFWS-approved biologist to conduct one brief presentation on the San Joaquin kit fox to train all construction staff that will be involved with the project. This training will include:

- A description of the San Joaquin kit fox and its habitat needs.
- Information on San Joaquin kit fox occurrence within the project vicinity.
- An explanation of the status of the species and its protection under the Endangered Species Act.
- A list of the measures being taken to reduce impacts to the species during construction.
- A "fact sheet" conveying all training information prepared and distributed to all construction personnel in attendance at the initial training and to be used by construction manager to train any additional construction staff not in attendance at the first meeting, prior to starting work on the project.
- Reclamation and/or DWR will provide a summary of the training provided, including a list of personnel attending to USFWS within 7 days of the training.

Mitigation Measure BIO-23: Conduct Construction Activities to Minimize Construction Impacts to San Joaquin Kit Fox.

a) Construction activities will be carried out in a manner that minimizes adverse effects to San Joaquin kit foxes, should they occur in the project area. Minimization measures will include:

- 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. Night-time work, such as equipment maintenance, will be minimized to the extent possible. However, if work does occur after dark, the speed limit will be reduced to 10 mph.
- Off-road project-related construction traffic outside of designated the project area will be prohibited.
- Construction work at night (half hour after sunset to half-hour before sunrise) will not be allowed.

- To prevent inadvertent entrapment of San Joaquin kit fox or other animals during construction, all excavated, steep-walled holes or trenches more than 1 foot deep will be covered with plywood or similar materials at the end of each workday. If the trenches cannot be closed, one or more escape ramps constructed of earthen fill or wooden planks will be installed. Before such holes or trenches are filled, they will be inspected for trapped animals.

- All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored at a construction site for one or more overnight periods will be thoroughly inspected for San Joaquin kit fox before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a San Joaquin kit fox is discovered inside a pipe, that section of pipe will not be moved until 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 fox has escaped.

- Before the start of work each day, the work site will be checked for animals under any equipment to be used that day, such as vehicles or stockpiles of items such as pipes. If a San Joaquin kit fox is found, it will be allowed to leave on its own volition. Work will be halted, and Reclamation and/or DWR contacted. Reclamation will notify USFWS and CDFW within 48 hours.

- All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in securely closed containers and removed at least once a day from a construction or project site.

- No firearms will be permitted on the project site.

- No pets will be permitted on the project site.

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

- Upon completion of the project, all areas subject to temporary ground disturbances, including staging areas, temporary roads, and borrow sites, will be re-contoured if necessary and revegetated with native seed to promote restoration of the area to pre-project conditions.

- Sightings of San Joaquin kit fox will be reported to the California Natural Diversity Data Base.

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

- All equipment will be washed prior to arriving at the project site to remove soil and seeds and to prevent spread of noxious weeds.

Mitigation Measure BIO-24: Avoid and Minimize Loss of Bat Species.

a) If suitable roosting habitat for special-status bats will be affected by project construction (e.g., removal of buildings, modification of bridges), surveys for roosting bats on the project site will be conducted by a qualified biologist. The type of survey will depend on the condition of the potential roosting habitat and may include visual surveys or use of acoustic detectors. Visual surveys may consist of a daytime pedestrian survey for evidence of bat use (e.g., guano) and/or an evening emergence survey for the presence or absence of bats. The type of survey will depend on the condition of the potential roosting habitat. If no bat roosts are found, then no further study is required.

b) If evidence of bat use is observed, the number and species of bats using the roost will be determined. Bat detectors may be used to supplement survey efforts.

c) If roosts are determined to be present and must be removed, the bats will be excluded from the roosting site before the facility is removed. A mitigation program addressing compensation, exclusion methods, and roost removal procedures will be developed in consultation with CDFW before implementation. Exclusion methods may include use of one-way doors at roost entrances (bats may leave, but not reenter), or sealing roost entrances when a site can be confirmed to contain no bats. Exclusion efforts may be restricted during periods of sensitive activity (e.g., during hibernation or while females in maternity colonies are nursing young).

Mitigation Measure BIO-25: Compensate for Loss of Bat Habitat.

a) The loss of each roost will be replaced, in consultation with CDFW, and may include construction and installation of bat boxes suitable to the bat species and colony size excluded from the original roosting site. Roost replacement will be implemented before bats are excluded from the original roost sites. Once the replacement roosts are constructed and it is confirmed that bats are not present in the original roost sites, the structure may be removed.

Mitigation Measure BIO-26: Avoid and Minimize Effects to Critical Habitat.

a) All proposed project actions will be designed to avoid direct and indirect adverse modifications to designated critical habitat, if feasible.

b) If critical habitat cannot be avoided, minimization measures, such as establishing and maintaining buffers around areas of designated critical habitat or primary constituent elements, shall be implemented if feasible. If not feasible, USFWS will be consulted to determine appropriate compensation measures to avoid and minimize effects to critical habitat, as appropriate.

Mitigation Measure BIO-27: Compensate for Unavoidable Adverse Effects on Federally Designated Critical Habitat.

a) If critical habitat may be adversely modified by the implementation of the proposed project actions, the area to be modified will be evaluated by a USFWS-approved biologist to determine the potential magnitude of the project effects (i.e., description of primary

constituent elements present and quantification of those affected) at a level of detail necessary to satisfy applicable environmental compliance and permitting requirements.

b) Compensatory conservation measures developed through Section 7 consultation with USFWS will be implemented. If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in and developed as part of the USFWS consultation process. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.

Mitigation Measure BIO-28: Avoid and Minimize Loss of Riparian Habitat and Other Sensitive Natural Communities.

a) Construction activities will be avoided in areas containing sensitive natural communities, as appropriate.

b) If effects occur to riparian habitat, managed and unmanaged wetlands (e.g., freshwater emergent marsh, seasonal wetlands, vernal pools, etc.), or other sensitive natural communities associated with streams, the State lead agency will comply with Section 1602 of the California Fish and Game Code; compliance may include measures to protect fish and wildlife resources during the project.

Mitigation Measure BIO-29: Compensate for Loss of Riparian Habitat and other Sensitive Natural Communities.

a) The Riparian Habitat Mitigation and Monitoring Plan for the SJRRP will be developed and implemented in coordination with CDFW and USFWS. The benefit of increased acreage or improved ecological function or riparian and wetland habitats resulting from the implementation of the SJRRP will be considered before additional compensatory measures are proposed.

b) If losses of other sensitive natural communities (e.g., recognized as sensitive by CNDDB, but not protected under other regulations or policies) would not be offset by the benefits of the SJRRP, then additional compensation will be provided through creating, restoring, or preserving communities at a sufficient ratio for no net loss of habitat function or acreage. The appropriate ratio will be determined in coordination with USFWS or CDFW.

Mitigation Measure BIO-30: Implement the Invasive Vegetation Monitoring and Management Plan.

a) The Invasive Vegetation Monitoring and Management Plan for the SJRRP (Appendix L of the SJRRP Draft PEIS/R) will be implemented, which includes measures to prevent, monitor, control, and where possible eradicate invasive plant infestations during flow releases and construction activities.

b) The implementation of the Invasive Vegetation Monitoring and Management Plan (Appendix L of the SJRRP Draft PEIS/R) will include monitoring procedures, thresholds for

management responses, success criteria, and adaptive management measures for controlling invasive plant species.

c) The control of invasive weeds and other recommended actions in the Invasive Vegetation Monitoring and Management Plan (Appendix L of the SJRRP Draft PEIS/R) will be consistent with recommendations in the Fish and Wildlife Coordination Act Report for the SJRRP (Appendix F of the SJRRP Draft PEIS/R).

Mitigation Measure BIO-31: Identify and Quantify Wetlands and other Waters of the United States.

a) A delineation of waters of the United States will be conducted and the delineation submitted to USACE for verification. The delineation will be conducted according to methods established in the USACE *Wetlands Delineation Manual* (USACE, Environmental Laboratory 1987) and *Arid West Supplement* (USACE, Environmental Laboratory 2008).

b) Construction and modification of road crossings, control structures, fish barriers, fish passages, and other structures will be designed to minimize effects on waters of the United States and waters of the State, and will employ BMPs to avoid indirect effects on water quality.

Mitigation Measure BIO-32: Obtain Permit and Compensate for any Loss of Wetlands and other Waters of the United States/Waters of the State.

a) In coordination with USACE, the acreage of effects on waters of the United States and waters of the State will be determined for the proposed project.

b) The proposed project will adhere to a "no net loss" basis for the acreage of wetlands and other waters of the United States and waters of the State that will be removed and/or degraded. Wetland habitat will be restored, enhanced, and/or replaced at acreages, types, and locations and by methods agreed on by USACE, USFWS, and the Central Valley RWQCB, as appropriate, depending on agency jurisdiction.

c) Section 404 and Section 401 permits will be obtained and all permit terms complied with. The acreage, location, and methods for compensation will be determined during the Section 401 and Section 404 permitting processes.

d) The compensation will be consistent with recommendations in the Fish and Wildlife Coordination Act Report for the SJRRP (Appendix F of the SJRRP Draft PEIS/R).

Mitigation Measure CR-1: Prepare and Implement a Memorandum of Agreement and Historic Properties Treatment Plan to Resolve Adverse Effects to P-24-001962 (Eastside Bypass/Levee and Associated Features) and PL-2823-11-01 (Irrigation Canal).

If it is determined that any of these resources qualify as Historical Resources/Historic Properties, and an adverse effect would occur to any such Historical Resources/Historic Properties, Reclamation will consult with the State Historic Preservation Officer and the Advisory Council on Historic Preservation under Section 106 of the National Historic Preservation Act to develop and execute a Memorandum of Agreement (MOA) pursuant to 36 CFR Part 800.6 (c) with an

appended Historic Properties Treatment Plan (HPTP). The MOA shall stipulate agreed-upon definitions, qualifications, and timing of implementation of agreed-upon mitigating measures. An HPTP shall be appended to the MOA and shall describe the measures that will be implemented to resolve the adverse effects to P-24-001962 and PL-2823-11-01. Implementation of the provisions of the Section 106 MOA and the appended HPTP shall constitute mitigation under NEPA that resolves the adverse effects to this resource.

If P-24-001962 and PL-2823-11-01 (irrigation canal) are determined to be ineligible for the CRHR/NRHP, then it will not be necessary to determine effects or to execute an MOA.

Mitigation Measure CR-2a: DWR will Implement Procedures for Inadvertent Discovery of Cultural Material.

If an inadvertent discovery of archaeological cultural materials (e.g., unusual amounts of shell, animal bone, any human remains, bottle glass, ceramics, building remains) is made at any other time during project-related construction activities or project planning, DWR, with input from other interested parties, will develop and implement appropriate protection and avoidance measures where feasible.

These procedures will be developed in accordance with 36 CFR 800.13, which specifies procedures for post-review discoveries, as well as in accordance with requirements for discoveries on Federal lands. Additional measures, such as development of a Memorandum of Agreement and a Historic Property Treatment Plan, may be necessary if avoidance or protection is not possible. All the steps identified above will be detailed in an accidental-discovery plan developed before construction so that all parties are aware of the process that must be implemented should buried archaeological resources be uncovered during construction.

Mitigation Measure CR-2b: DWR will Conduct Cultural Resource Awareness and Sensitivity Training.

DWR will hold a pre-construction training session for all construction personnel before the beginning of construction for each ground-disturbing project activity. All training sessions will be conducted in the field, in person, and in English. Participants will sign a form acknowledging that they have received the training and agree to keep resource locations confidential and to stop work within 100 feet of any unanticipated discovery. Topics to be addressed in training sessions will include but are not limited to: the purpose for monitoring (if being conducted); regulations protecting cultural resources, including archaeological sites and Tribal Cultural Resources (TCRs); basic identification of archaeological resources and potential TCRs; and proper discovery protocols. Training, to be provided by DWR and a qualified archaeologist who meets the Secretary of the Interior's Standards for Archaeology (36 CFR Part 61), will include a presentation developed in coordination with culturally affiliated Tribal representatives. Topics will include the potential presence and type of Native American and non-Native American resources potentially found during construction or other activities, required procedures in the event of a discovery, proper behavior in the presence of sacred remains and human remains, and necessary reporting protocols. Written materials will be provided to trained personnel, as appropriate.

Mitigation Measure CR-3: DWR will Implement Procedures for Inadvertent Discovery of Human Remains.

If an inadvertent discovery of human remains is made at any other time during project-related construction activities or project planning, DWR will implement the procedures listed below, as well as in accordance with requirements for discoveries on Federal lands. Should human remains be identified in the project area, the following performance standards shall be met prior to implementing or continuing actions such as construction that may result in damage to or destruction of human remains. Avoiding or substantially lessening potential impacts to human remains or implementation of the procedures described below may be considered to avoid or minimize inadvertent discovery impacts and constitute the standard by which an impact conclusion of less than significant would continue to be reached:

- In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, DWR will immediately halt potentially damaging excavation in the area of the burial and notify the Merced County Coroner and a professional archaeologist to determine the nature of the remains. The Coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or State lands (California Health and Safety Code Section 7050.5[b]). If the Coroner determines that the remains are those of a Native American, he or she must contact the NAHC by phone within 24 hours of making that determination (California Health and Safety Code Section 7050[c]). After the Coroner's findings have been made, the archaeologist and the NAHC-designated Most Likely Descendant (MLD), in consultation with the landowner, shall determine the ultimate treatment and disposition of the remains. The responsibilities of DWR for acting upon notification of a discovery of Native American human remains are identified in California PRC Section 5097.9 et seq.

- Upon the discovery of Native American human remains, DWR will require that all construction work must stop within 100 feet of the discovery until consultation with the MLD has taken place. The MLD will have 48 hours to complete a site inspection and make recommendations to the landowner after being granted access to the site. A range of possible treatments for the remains, including nondestructive removal, preservation in place, relinquishment of the remains and associated items to the descendants, or other culturally appropriate treatment may be discussed. California PRC Section 5097.98(b)(2) suggests that the concerned parties may mutually agree to extend discussions beyond the initial 48 hours to allow for the discovery of additional remains. Site-protection measures that DWR will employ are as follows:

    - Record the site with the NAHC or the appropriate Information Center, and
    - Record a document with the County in which the property is located.

- If agreed to by the MLD and the landowner, DWR or their authorized representative will rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance. If the NAHC is unable to identify an MLD, or if the MLD fails to make a recommendation within 48 hours after being granted access to the site, DWR or their authorized representative may also reinter the remains in a location not subject to further disturbance if he or she rejects the recommendation of the MLD and mediation by the NAHC fails to provide measures

acceptable to DWR and/or Reclamation. DWR will implement mitigation to protect the burial remains. Construction work in the vicinity of the burials shall not resume until the mitigation is completed.

If the human remains are of historic age and are determined to be not of Native American origin, DWR will follow the provisions of the California Health and Safety Code Section 7000 (et seq.) regarding the disinterment and removal of non-Native American human remains. If human remains are encountered on Federal lands and are determined to be Native American, then implementation of Native American Graves Protection and Repatriation Act (NAGPRA) protocols will be initiated by Reclamation and/or USFWS, as the landowner.

Mitigation Measure CR-4: If Tribal Cultural Resources are Discovered during Construction, DWR will Implement Procedures to Evaluate Tribal Cultural Resources and Implement Avoidance and Minimization Measures to Avoid Significant Impact.

California Native American Tribes that are traditionally and culturally affiliated with the geographic area in which the proposed project is located may have expertise concerning their TCRs (California PRC Section 21080.3.1). As was done during consultation pursuant to PRC 21080.3.1 (AB 52), culturally affiliated Tribes will be further consulted concerning TCRs that may be impacted if these types of resources are discovered during construction. (The USFWS Regional Archaeologist will also be notified for TCRs discovered on refuge lands.) Further consultation with culturally affiliated Tribes will focus on identifying measures to avoid or minimize impacts on any such resources discovered during construction. Should TCRs be identified in the project area during construction, the following performance standards will be met prior to continuance of construction and associated activities that may result in damage to or destruction of TCRs:

Each identified TCR will be evaluated for California Register of Historical Resources (CRHR) eligibility through application of established eligibility criteria (California Code of Regulations 15064.636), in consultation with consulting Native American Tribes.

If a TCR is determined to be eligible for listing on the CRHR, DWR will avoid damaging effects to the TCR in accordance with California PRC Section 21084.3, if feasible. If DWR determines that the project may cause a significant impact to a TCR, and measures are not otherwise identified in the consultation process, the following are examples of mitigation capable of avoiding or substantially lessening potential significant impacts to a TCR or alternatives that would avoid significant impacts to a TCR. These measures may be considered to avoid or minimize significant adverse impacts and constitute the standard by which an impact conclusion of less than significant may be reached:

i. Avoid and preserve resources in place, including, but not limited to, planning construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

ii. Treat the resource with culturally appropriate dignity taking into account the Tribal cultural values and meaning of the resource, including, but not limited to, the following:

    1. Protect the cultural character and integrity of the resource.

2. Protect the traditional use of the resource.

3. Protect the confidentiality of the resource.

4. Establish permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or using the resources or places.

5. Protect the resource.

Mitigation Measure GEO-1: Prepare and Implement a Stormwater Pollution Prevention Plan that Minimizes the Potential Contamination of Surface Waters, and Complies with Applicable Federal Regulations during Construction Activities.

Construction activities may be subject to construction-related stormwater permit requirements of the Federal Clean Water Act's NPDES program. Any required permits through the Central Valley RWQCB will be obtained by DWR and Reclamation before any ground-disturbing construction activity. A SWPPP will be prepared that identifies BMPs to prevent or minimize the introduction of contaminants into surface waters. BMPs for the proposed project could include, but would not be limited to, silt fencing, straw bale barriers, fiber rolls, storm drain inlet protection, hydraulic mulch, and a stabilized construction entrance. The SWPPP will include development of site-specific structural and operational BMPs to prevent and control impacts on runoff quality, measures to be implemented before each storm event, inspection and maintenance of BMPs, and monitoring of runoff quality by visual and/or analytical means.

Mitigation Measure: HAZ-1a: Implement a Spill Prevention Control and Countermeasures Plan and Other Measures to Reduce the Potential for Environmental Contamination during Construction Activities.

In addition to compliance with all applicable Federal, State, and local regulations, DWR and Reclamation will implement the measures described below to further reduce the risk of accidental spills and protect the environment.

- **Prepare and Implement a Spill Prevention Control and Countermeasures Plan.** A written spill prevention control and countermeasures plan (SPCCP) will be prepared and implemented. The SPCCP and all material necessary for its implementation will be accessible on site prior to initiation of project construction and throughout the construction period. The SPCCP will include a plan for the emergency cleanup of any spills of fuel or other material. Employees/construction workers will be provided the necessary information from the SPCCP to prevent or reduce the discharge of pollutants from construction activities to waters and to use the appropriate measures should a spill occur. In the event of a spill, work will stop immediately and CDFW, RWQCB, USFWS, NMFS, and Merced County will be notified within 24 hours.

- **Dispose of All Construction-related Debris and Materials at an Approved Disposal Site.** All debris, litter, unused materials, sediment, rubbish, vegetation, or other material removed from the construction areas that cannot reasonably be secured will be removed daily from the project work area and deposited at an appropriate disposal or storage site.

- **Use Safer Alternative Products to Protect Streams and Other Waters.** Every reasonable precaution will be exercised to protect streams and other waters from pollution with fuels, oils, and other harmful materials. Safer alternative products (such as biodegradable hydraulic fluids) will be used where feasible.

- **Prevent Any Contaminated Construction By-products from Entering Flowing Waters, and Collect and Transport Such By-products to an Authorized Disposal Area.** Petroleum products, chemicals, fresh cement, and construction by-products containing, or water contaminated by, **any** such materials will not be allowed to enter flowing waters and will be collected and transported to an authorized upland disposal area.

- **Prevent Hazardous Petroleum or Other Substances Hazardous to Aquatic Life from Contaminating the Soil or Entering Waters of the State or and/or Waters of the United States.** Gas, oil, other petroleum products, or any other substances that could be hazardous to aquatic life and resulting from project-related activities, will be prevented from contaminating the soil and/or entering waters of the State and/or waters of the United States.

- **Properly Maintain All Construction Vehicles and Equipment and Inspect Daily for Leaks, and Remove and Repair Equipment/Vehicles with Leaks.** Construction vehicles and equipment will be properly maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease. Vehicles and equipment will be checked daily for leaks. If leaks are found, the equipment will be removed from the site and will not be used until the leaks are repaired.

- **Refuel and Service Equipment at Designated Refueling and Staging Areas.** Equipment will be refueled and serviced at designated refueling and staging sites located on the crown or landside of the levee and at least 50 feet from active stream channels or other water bodies. All refueling, maintenance, and staging of equipment and vehicles will be conducted in a location where a spill will not drain directly toward aquatic habitat. Appropriate containment materials will be installed to collect any discharge, and adequate materials for spill cleanup will be maintained on-site throughout the construction period.

- **Store Heavy Equipment, Vehicles, and Supplies at Designated Staging Areas.** All heavy equipment, vehicles, and supplies will be stored at the designated staging areas at the end of each work period.

- **Install an Impermeable Membrane between the Ground and Any Hazardous Material in Construction Storage Areas.** Storage areas for construction material that contains hazardous or potentially toxic materials will have an impermeable membrane between the ground and the hazardous material and will be bermed as necessary to prevent the discharge of pollutants to groundwater and runoff water.

- **Use Water Trucks to Control Fugitive Dust during Construction.** Water (e.g., trucks, portable pumps with hoses) will be used to control fugitive dust during temporary access road construction.

- **Use Only Nontoxic Materials and Materials with No Coatings or Treatments Deleterious to Aquatic Organisms for Placement in any Waters.** All materials placed in streams, rivers, or other waters will be nontoxic and will not contain coatings or treatments or

consist of substances deleterious to aquatic organisms that may leach into the surrounding environment in amounts harmful to aquatic organisms.

Mitigation Measure HAZ-1b: Coordinate with Landowners and Farm Managers.

The impacts from aerial spraying will be reduced by coordinating with landowners and farm managers to avoid scheduling conflicts between restoration and construction workers and scheduled farm work, including aerial spraying. Coordination will minimize conflicts between farm operations and restoration activities and prevent construction worker exposure to aerial herbicide/pesticide spray or drift.

Mitigation Measure HAZ-1c: Implement Herbicide Restrictions.

Impacts from herbicide use will be reduced by using the minimum amount of the herbicide needed to remove the infestation and using herbicide formulations approved for aquatic applications. Spraying will be avoided during windy conditions to prevent herbicide migration to offsite areas or non-target species. Spraying of foliage will be minimized within 60 feet of standing or flowing water, and within this 60-foot buffer, herbicides will only be applied directly to stumps, using herbicides approved for use near water. Herbicides will not be used in the 60-foot buffer within 24 hours after rain or when the chance of rain within 24 hours is greater than 40 percent. To prevent airborne drift of herbicide mist into the 60-foot buffer, herbicides will not be applied to foliage outside the buffer when wind speed is greater than 10 miles per hour (mph) or less than 2 mph.

To reduce worker exposure to herbicides, DWR and Reclamation will comply with State and Federal OSHA standards for exposure to hazardous materials in the workplace. To minimize potential exposure of workers and the public, the amount of herbicide used will be the minimum amount required to achieve the needed results. Only licensed or certified pest control operators registered to apply the herbicides will be allowed to conduct the chemical applications. The operators will be required to maintain accurate and calibrated application equipment to ensure that the amounts of herbicides applied are as proposed.

To reduce public exposure to herbicides, procedures for public notification and education regarding the herbicide application will be followed at least 24 hours in advance of application. Landowners and irrigation districts will be notified. Personnel at the Merced NWR will also be notified to inform recreational visitors.

Mitigation Measure HAZ-2: Prepare a Phase I Environmental Site Assessment and Remediate any Hazardous Site Adversely Affected by Project Construction According to Existing and Applicable Laws and Regulations.

A Phase I Environmental Site Assessment will be prepared for the project site by a certified Environmental Professional to evaluate past and current land uses that may have potentially contributed to site contamination that could impact Project construction or have longer-term impacts on project operation. The purpose of the assessment is to examine the site for potential hazardous materials and conditions, including but not limited to petroleum products or containers, underground storage tanks, pools of noxious liquids, potential polychlorinated biphenyl (PCB) containing equipment, pits, ponds or lagoons, stained soil and/or pavement, wastewater discharges, or wells. Remediation of any hazardous material or contaminant found

during the Phase I Assessment would be enforced through existing applicable laws and regulations.

Mitigation Measure HAZ-3: Prepare and Implement a Fire Prevention Plan.

A fire prevention plan will be prepared and implemented by DWR and Reclamation in coordination with the appropriate emergency service and/or fire suppression agencies of the applicable local, State, or Federal jurisdictions before the start of any construction activities. The plan shall describe emergency contact numbers and fire prevention and response methods, including fire precaution, requirements for spark arrestors on equipment, and suppression measures that are consistent with the policies and standards of the affected jurisdictions. When heavy equipment is used for construction during the dry season, a water truck shall be maintained on the construction site. Materials and equipment required for implementation of the plan will be available on the construction site. Training shall be provided to all construction personnel regarding fire safety, and all personnel shall be made familiar with the contents of the plan before the start of construction activities.

Mitigation Measure HAZ-4a: Integrate Best Management Practices for Mosquito Control and Implement Workplace Precautions Against Vector-borne Diseases.

Construction activities will incorporate applicable Best Management Practices (BMPs) identified in the *Best Management Practices for Mosquito Control on California State Properties* (California Department of Public Health 2008); and other guidelines such as the Central Valley Joint Venture's *Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands* (Kwasny et al. 2004) and *Best Management Practices for Mosquito Control in California* (California Department of Public Health and Mosquito and Vector Control Association of California 2012) to reduce the public risk from exposure to West Nile Virus. DWR and/or Reclamation will also inform the Merced County Mosquito Abatement District about implementation of the project, and will provide information requested to support vector control activities along the Eastside Bypass at project construction sites. In addition, DWR and/or Reclamation will implement the following workplace precautions:

- Conduct construction worker personnel training that covers the potential hazards and risks associated with exposure to and protection from vector-borne diseases such as West Nile virus. Instruct personnel in the use of proper construction apparel and warn them against handling any dead animals (particularly birds) with bare hands.

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

- Provide insect repellent for worker use at construction sites. As recommended by the Centers for Disease Control and Prevention (CDC), the insect repellent should contain active ingredients that have been registered with EPA for use as insect repellents on skin or clothing such as diethyl(meta)toulamide (DEET) or picaridin.

- Notify the Merced County Public Health Department about dead birds found at any project site.

Mitigation Measure HAZ-4b: Implement Best Management Practices to Prevent Health Hazards Associated with Exposure to Valley Fever.

To the extent feasible, construction activities in the project area will be modified to reduce construction workers' and the public's risk from exposure to valley fever and will incorporate applicable Best Management Practices (BMPs) as detailed in the project Dust Control Plan (see Section 3.3, "Air Quality"). Additionally, prior to construction, DWR and/or Reclamation will:

- Conduct employee training that covers the potential hazards and risks of Valley Fever exposure and protection, including proper construction apparel.

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

Mitigation Measure SWQ-1: Develop and Implement a Stormwater Pollution Prevention Plan

Construction activities associated with the proposed project are subject to construction-related stormwater permit requirements of the Federal Clean Water Act's NPDES program. Reclamation and/or DWR will obtain any required permits through the Central Valley RWQCB before any ground-disturbing construction activity. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared and implemented to comply with applicable Federal regulations concerning construction activities.

The SWPPP will include BMPs that minimize the potential contamination of surface waters. The SWPPP will detail the construction-phase erosion and sediment control BMPs, housekeeping measures for control of contaminants other than sediment, and treatment measures and post-construction BMPs to be implemented to control pollutants once the project has been constructed. Erosion control BMPs will include source control measures such as scheduling construction activities with regard to the rainy season; wetting dry and dusty surfaces to prevent fugitive dust emissions; preserving existing vegetation; and providing effective soil cover (e.g., geotextiles, straw mulch, hydroseeding) for inactive areas and finished slopes to prevent sediments from being dislodged by wind, rain, or flowing water. Sediment-control BMPs will include measures such as street sweeping transportation corridors and installing fiber rolls and sediment basins to capture and remove particles already dislodged. The SWPPP will establish good housekeeping measures such as construction vehicle storage and maintenance, handling procedures for hazardous materials, and waste management BMPs. These BMPs include procedural and structural measures to prevent release of wastes and materials used at the site. BMPs associated with installing removable cofferdams and temporary flow diversions around the work area will be described.

In addition to site-specific and operation BMPs, the SWPPP will include measures to be implemented before any storm event, inspection and maintenance of BMPs, and monitoring of runoff quality by visual and/or analytical means. Implementing the SWPPP will avoid or mitigate runoff pollutants at the construction sites to the maximum extent practicable.

For levee modification work, DWR will develop and implement a Bentonite Slurry Spill Prevention and Clean-up Plan, and will ensure that all construction workers at the levee modification site understand and comply with it. The plan will include:

- Procedures for responding to any inadvertent release of the slurry into wetlands, waterbodies, or other sensitive areas;

- Procedures that will be used to contain, clean up, and dispose of any inadvertent releases of the slurry.

- Spill containment and clean-up supplies available on all vehicles, at staging areas and borrow sites where bentonite is present and are directly adjacent to wetlands, waterbodies, or other sensitive areas.

- Notification of NMFS and CDFW of any major releases of bentonite into any wetlands, waterbodies, or other sensitive areas.

Mitigation Measure SWQ-2: Develop and Implement a Turbidity Monitoring Program.

The Basin Plan for the Sacramento River and San Joaquin River Basins (RWQCB 2016) contains turbidity objectives. Specifically, the plan states that where natural turbidity is less than 1 nephelometric turbidity unit (NTU), controllable factors shall not cause downstream turbidity to exceed 2 NTUs; where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU; where natural turbidity is between 5 and 50 NTUs, turbidity levels may not be elevated by 20 percent above ambient conditions; where ambient conditions are between 50 and 100 NTUs, conditions may not be increased by more than 10 NTUs; and where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

During construction in the wetted channel when water is flowing through the project area, turbidity shall be monitored approximately 300 feet downstream of construction activities to determine whether turbidity is being affected by construction. Grab samples will be collected at a downstream location representative of the flow near the construction site, as well as upstream of project effects to serve as a control. If there is a visible sediment plume being created from construction, the sample shall represent this plume. A sampling plan shall be developed and implemented based on site-specific conditions and in consultation with RWQCB.

If sampled turbidity levels exceed basin plan standards, construction-related earth-disturbing activities shall immediately slow to a point that would alleviate the immediate problem. RWQCB shall be notified and consulted with, as well as agreed-to measures being implemented, prior to continuing the activity causing the increased turbidity.

Mitigation Measure NOI-1: Implement Measures during any Weekend and Night-time Construction to Reduce Temporary and Short-term Noise Levels from Construction-related Equipment Near Sensitive Receptors.

DWR and/or Reclamation will ensure that the following noise-reduction protocol measures (excerpted from the SJRRP PEIR) are implemented during any construction activities that occur on weekends or between the hours of 6 p.m. and 7 a.m. to reduce temporary and short-term construction-related noise impacts near sensitive receptors:

- Construction equipment will be used as far away as practical from noise-sensitive uses.

- Construction equipment will be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools will be shrouded or shielded, and all intake and exhaust ports on power equipment will be muffled or shielded.

- Construction site and haul road speed limits will be established and enforced.

- The use of bells, whistles, alarms, and horns will be restricted to safety and warning purposes only.

- Construction equipment will not idle for extended periods of time when not being used during construction activities.

- When construction activities are conducted within 2,000 feet of noise sensitive uses, noise measurements will be taken at the nearest noise-sensitive land uses relative to construction activities with a sound-level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2). This would allow that construction noise levels associated with the proposed project to comply with applicable daytime and nighttime noise standards. When construction noise exceeds applicable daytime and nighttime standards, berms, or stockpiles will be used in an attempt to lower noise levels to within acceptable nontransportation standards. If noise levels are still determined to exceed noise standards, temporary barriers will be erected as close to the construction activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards. All acoustical barriers would be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission Class (STC) rating of 25 or greater, as defined by Test Method E90 of the American Society for Testing and Materials. Placement, orientation, size, and density of acoustical barriers will be specified by a qualified acoustical consultant.

- A disturbance coordinator will be designated to post contact information in a conspicuous location near the construction site entrance so that it is clearly visible to nearby receivers most likely to be disturbed. The coordinator will manage complaints resulting from the construction noise. Reoccurring disturbances will be evaluated by a qualified acoustical consultant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby noise-sensitive receptors, advising them of the construction schedule.

Mitigation Measure PAL-1: Implement Construction Worker Personnel Training, Stop Work if Paleontological Resources are Encountered during Earthmoving Activities, and Implement a Recovery Plan.

To minimize the potential for destruction of or damage to potentially unique, scientifically important paleontological resources during project-related earthmoving activities, the following measures shall be implemented:

- Before the start of any earthmoving activities in the project area, all construction personnel involved with earthmoving activities, including the site superintendent, will be trained regarding the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction, and proper notification procedures should fossils be

encountered. The training program may be administered by a qualified archaeologist or paleontologist.

- If paleontological resources are discovered during earthmoving activities, the construction crew will immediately cease work in the vicinity of the find. A qualified paleontologist will be retained to evaluate the resource and prepare a recovery plan in accordance with SVP guidelines (SVP 1995). The recovery plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recommendations in the recovery plan will be implemented before construction activities can resume at the site where the paleontological resources are discovered.

- If any substantially complete fossil skeletons are recovered from the project site, DWR and/or Reclamation (as appropriate) will consider donating the fossil remains for public display at the Fossil Discovery Center in Chowchilla.

Mitigation Measure REC-1: Implement Construction and Hunting Closures during Waterfowl Hunting Season.

Project-related construction activities are currently planned from April 1 through November 15. To provide for continued waterfowl hunting activities on both public and private lands, and to ensure the safety of project-related construction workers, project-related construction activities on the Merced NWR weir removal element and the levee improvements element will not be allowed on Saturdays during waterfowl hunting season. However, as determined in consultation with Merced NWR, hunting during Wednesdays may be closed at the Merced NWR at specific units adjacent to ongoing construction activities. The exact date of the start of waterfowl hunting may vary and is determined by CDFW, but it generally begins the last weekend in October. In addition, if any project-related construction is planned to occur in close proximity to privately-owned waterfowl hunting clubs such that construction worker safety would be an issue, agreements with each club will be negotiated to facilitate both construction and private hunting during the waterfowl hunting season.

Mitigation Measure UTIL-1: Conduct Mandatory Utility Surveys and Avoid Existing Utility Infrastructure.

A power line investigation will be completed during project design and before project construction to reduce the likelihood of construction equipment encountering unknown utility infrastructure. Also, the construction contractor will coordinate with local utilities before and during construction to ensure completion of mandatory underground service alert surveys. Existing utilities will be avoided or relocated as needed prior to ground-disturbing activities that could affect these utilities. These mandatory actions would eliminate the potential for any local service interruptions.

Adoption of Mitigated Negative Declaration and Approval of Proposed Project

Certification by Those Responsible for Preparation of This Document:
The California Department of Water Resources (DWR), as lead agency, was responsible for preparation of this Proposed Mitigated Negative Declaration and the incorporated Initial Study. I believe this document meets the requirements of the California Environmental Quality Act and provides an accurate description of the Eastside Bypass Improvements Project (proposed project), and that DWR, in coordination with the U.S. Department of the Interior, Bureau of Reclamation, has the means and commitment to implement the mitigation measures to assure that the proposed project would not cause any significant impacts on the environment. In accordance with Section 21082.1 of the California Environmental Quality Act, DWR staff, including myself, have independently reviewed and analyzed the Initial Study and Proposed Mitigated Negative Declaration for the proposed project and find that the Initial Study and Proposed Mitigated Negative Declaration reflect the independent judgment of DWR staff. Furthermore, I have reviewed and considered all comments received during the public comment period for the document.

I hereby adopt this mitigated negative declaration:

_____ _____

Kevin Faulkenberry, P.E., Region Manager Date
California Department of Water Resources

*(*To be signed on completion of the public review process and consideration of all public comments and the whole of the administrative record.)*

Approval of the Proposed Project by the Lead Agency:
In compliance with Section 21082.1 of the California Environmental Quality Act, the California Department of Water Resources has independently reviewed and analyzed the Initial Study and Proposed Mitigated Negative Declaration for the proposed project and finds that they reflect the independent judgment of DWR staff. The lead agency finds that the project design features would be implemented as stated in the Mitigated Negative Declaration.

I hereby approve this project:

_____ _____

Kevin Faulkenberry, P.E., Region Manager Date
California Department of Water Resources

*(*To be signed on completion of the public review process and consideration of all public comments and the whole of the administrative record.)*

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CEQA Guidelines Appendix G: Environmental Checklist Form

1. Project title:	Eastside Bypass Improvements Project
2. Lead agency names and addresses:	California Department of Water Resources (for CEQA) South Central Region Office 3374 E. Shields Avenue Fresno, CA 93726 Bureau of Reclamation, Mid-Pacific Region (for NEPA) San Joaquin River Restoration Program 2800 Cottage Way Sacramento, CA 95825
3. Contact persons and phone numbers:	Karen Dulik Chief, Environmental Compliance and Statewide Planning Branch California Department of Water Resources South Central Region Office karen.dulik@water.ca.gov (559) 230-3361 Elizabeth A. Vasquez San Joaquin River Restoration Deputy Program Manager – Restoration Goal Bureau of Reclamation, Mid-Pacific Region evasquez@usbr.gov (916) 978-5460
4. Project location:	The project area includes the Middle and Lower Eastside Bypass, Merced National Wildlife Refuge (NWR), Grasslands Wildlife Management Area, Merced NWR Weir #1 and Upper Merced NWR Weir #2, Dan McNamara Road crossing, Eastside Bypass Control Structure, and three levee improvement segments along the Eastside Bypass north levee between Sand Slough and the Mariposa Bypass. The Eastside Bypass (Middle and Lower) is located just west of Reach 4B of the San Joaquin River between the Cities of Merced and Los Banos in Merced County. The project area is located within the United States Geological Survey 7.5-minute Turner Ranch, Sandy Mush, and Santa Rita Bridge quadrangles.
5. Project sponsors' names and addresses:	See lead agency names and addresses above
6. General plan designation:	Rural Agricultural
7. Zoning:	Agricultural Use

8. Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)	See Chapter 2 of this Initial Study/Draft Environmental Assessment
9. Surrounding land uses and setting: Briefly describe the project's surroundings:	Surrounding land uses include agriculture and open space. Some project elements are located on or near a unit of the National Wildlife Refuge System.
10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)	The proposed project may require permits or approvals from the following: United States Army Corps of Engineers, National Marine Fisheries Service, United States Fish and Wildlife Service, California Department of Fish and Wildlife, California Office of Historic Preservation, Central Valley Flood Protection Board, State Water Resources Control Board or Central Valley Regional Water Quality Control Board, San Joaquin Valley Air Pollution Control District.
11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun? Note: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (See Public Resources Code section 21083.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per Public Resources Code section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that Public Resources Code section 21082.3(c) contains provisions specific to confidentiality.	Consultation with California Native American Tribes has been initiated by the Department of Water Resources and Bureau of Reclamation

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☐ Cultural Resources	☐ Environmnetal Justice
☒ Geology /Soils	☐ Greenhouse Gas Emissions	☒ Hazards & Hazardous Materials
☒ Hydrology / Water Quality	☐ Land Use / Planning	☐ Mineral Resources
☒ Noise	☐ Population / Housing	☐ Public Services
☒ Recreation	☐ Socioeconomics	☐ Transportation/Traffic
☐ Tribal Cultural Resources	☒ Utilities / Service Systems	☒ Mandatory Findings of Significance

Determination (To be Completed by the CEQA Lead Agency)

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

12/6/2017

Date

Kevin Faulkenberry, P.E.

Print Name

Region Manager

Title

California Department of Water Resources

Agency

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Eastside Bypass Improvements Project Initial Study/Draft Environmental Assessment

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Abbreviations and Acronyms

°F	Fahrenheit
AB	Assembly Bill
AB 52	Assembly Bill 52
ACHP	Advisory Council on Historic Preservation
af	acre-feet
AHPA	Archaeological and Historic Preservation Act
ARPA	Archaeological Resources Protection Act
Basin Plans	water quality control plans
BMOs	basin management objectives
BMPs	best management practices
BO	Biological Opinion
BPS	best performance standards
CAA	Clean Air Act
CalEPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CB	cement bentonite
CCIC	Central California Information Center
CCR	California Code of Regulations
CDC	Centers for Disease Control and Prevention
CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CDPR	California Department of Pesticide Regulation
Central Valley RWQCB	Central Valley Regional Water Quality Control Board
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGC	California Government Code
CGS	California Geological Survey
CH_4	methane
CIWMA	California Integrated Waste Management Act
CNPS	California Native Plant Society
CO_2	carbon dioxide

CO_2e	CO_2 equivalents
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CT	Census Tract
CTR	California Toxic Rule
CUPAs	Certified Unified Program Agencies
CVFMP	Central Valley Flood Management Planning
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CVJV	Central Valley Joint Venture
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
Central Valley RWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationships
cy	cubic yards
dB	decibels
dBA	A-weighted dB
Delta	Sacramento-San Joaquin Delta
DOC	Department of Conservation
DOF	Department of Finance
DOGGR	Division of Oil, Gas, and Geothermal Resources
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EDD	Employment Development Department
EDR	Environmental Data Resources
EFH	Essential Fish Habitat
EIR	environmental impact report
EIS/R	Environmental Impact Statement and Environmental Impact Report
EMs	engineering manuals
EMS	Emergency Medical Services
EO	Executive Order
ER	Engineering Regulation
ESM	Engineered Streambed Material
ESU	evolutionarily significant unit
ETL	engineering technical letter
FEMA	Federal Emergency Management Agency
FFDCA	Federal Food, Drug, and Cosmetic Act
FHWA	Federal Highway Administration

FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FMMP	Farmland Mapping and Monitoring Program
FONSI	finding of no significant impact
fps	feet per second
FQPA	Food Quality Protection Act of 1996
GAMAQI	Guidance for Assessing and Mitigating Air Quality Impacts
GGERP	Greenhouse Gas Emissions Reduction Plan
GHGs	Greenhouse gases
GMP	groundwater management plans
gpm	gallons per minute
GSAs	groundwater sustainability agencies
HFCs	hydrofluorocarbons
HHW	household hazardous waste
HPS	Hantavirus Pulmonary Syndrome
HPTP	Historic Properties Treatment Plan
I-5	Interstate 5
IRWM	Integrated Regional Water Management
IS/EA	initial study and draft environmental assessment
IS/ND	initial study/negative declaration
ISO	Independent Service Operator
LSJLD	Lower San Joaquin Levee District
LSJRFCP	Lower San Joaquin River Flood Control Project
LTMWC	Lone Tree Mutual Water Company
LUST	Leaking Underground Storage Tank
MAF	million acre-feet
MBTA	Migratory Bird Treaty Act
MCLs	maximum contaminant levels
MCMAD	Merced County Mosquito Abatement District
MCRWMA	Merced County Regional Waste Management Authority
MID	Merced Irrigation District
MIRWMP	Merced County Integrated Regional Water Management Plan
MLD	Most Likely Descendant
MND	mitigated negative declaration
MOA	Memorandum of Agreement
mph	miles per hour
MRZ	mineral resource zone
$MTCO_2e$/year	metric tons CO_2e per year
N_2O	nitrous oxide
NAGPRA	Native American Graves Protection and Repatriation

	Act
NAHC	Native American Heritage Commission
ND	negative declaration
NEHRP	National Earthquake Hazards Reduction Program
NEHRPA	National Earthquake Hazards Reduction Program Act
NEPA	National Environmental Policy Act
NF_3	Nitrogen trifluoride
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI	notice of intent
NOP	notice of preparation
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NTU	nephelometric turbidity unit
NWR	National Wildlife Refuge
O&M	operation and maintenance
OHP	Office of Historic Preservation
OPR	Office of Planning and Research
OPT	One Pass Trench
PCB	polychlorinated biphenyl
PCE	passenger car equivalent
PEIS/R	Program EIS/EIR
PFCs	perfluorocarbons
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
PRC	California Public Resources Code
proposed project or project	Eastside Bypass Improvements Project
RCNM	Roadway Construction Noise Model
RCRA	Resource Conservation and Recovery Act
Reclamation	United States Department of the Interior, Bureau of Reclamation
Region	Great Valley ecological region
RHJV	Riparian Habitat Joint Venture
RM	River Mile
ROD	Record of Decision
ROW	right-of-way
RWQCB	Central Valley Regional Water Quality Control
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCS	Soil Conservation Service

SDWA	Safe Drinking Water Act
SF_6	sulfur hexafluoride
SGMA	Sustainable Groundwater Management Act
SHPO	State Historic Preservation Officer
SJRA	San Joaquin River Agreement
SJRMP	San Joaquin River Management Program
SJRRP	San Joaquin River Restoration Program
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMARA	Surface Mining and Reclamation Act of 1975
SPCCP	spill prevention control and countermeasures plan
SPFC	State Plan of Flood Control
SR	State Route
SSIA	State Systemwide Improvement Approach
State Water Board	State Water Resources Control Board
STC	Sound Transmission Class
SVP	Society of Vertebrate Paleontology
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TCRs	Tribal Cultural Resources
TIWD	Turner Island Water District
TMDLs	Total Maximum Daily Loads
UCMP	University of California Museum of Paleontology
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VAMP	Vernalis Adaptive Management Plan
µS/cm	microSiemens per centimeter

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Chapter 1. Introduction

This joint initial study and draft environmental assessment (IS/EA) was prepared by the California Department of Water Resources (DWR) and the United States Department of the Interior, Bureau of Reclamation (Reclamation) to assess the potential environmental effects of implementing the proposed Eastside Bypass Improvements Project (proposed project or project). DWR is the State lead agency under the California Environmental Quality Act (CEQA), and Reclamation is the Federal lead agency under the National Environmental Policy Act (NEPA). The proposed project is part of the San Joaquin River Restoration Program (SJRRP). This document was prepared in compliance with CEQA and the State CEQA Guidelines; and NEPA regulations, Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500–1508), and Department of the Interior Regulations (43 CFR Part 46) (United States Department of the Interior Implementation of NEPA, Final Rule).

This chapter provides a project overview and describes the project area, project background, purpose of and need for the project, intended uses of this document, anticipated approvals required for the project, and the organization of this IS/EA. The proposed project, as used herein, is the same as the proposed action under NEPA.

1.1 Project Overview

DWR proposes to design, permit, and implement the following three project elements to facilitate fish migration and increased Restoration Flow capacity in the Eastside Bypass by 2019:

- Reinforce approximately 2 miles of levee along the Eastside Bypass to improve levee stability and reduce seepage (Reach O Levee Improvements).
- Modify the existing Eastside Bypass Control Structure to improve fish passage.
- Replace the existing culvert at the Dan McNamara Road crossing at the Eastside Bypass to improve fish passage.

Reclamation proposes to design, permit, and implement the following project element to facilitate fish migration in the Eastside Bypass by 2020:

- Improve fish passage by removing two weirs located in the Eastside Bypass that the U.S. Fish and Wildlife Service (USFWS) operate to provide water to the Merced National Wildlife Refuge (Merced NWR), and replace an existing non-operational well with a new well to provide replacement water supply for the Refuge, first drilling an exploratory well as a near-term action.

1.2 Project Area

The project area is presented in **Figure 1-1** and is located between the Cities of Merced and Los Banos in Merced County on the Eastside Bypass just east of the San Joaquin River. The site is approximately 15-20 miles southwest of the City of Merced. The project consists of fish passage and levee

improvements in the Eastside Bypass, which is part of the Lower San Joaquin River Flood Control Project (LSJRFCP) that provides flood control for the region and is operated and maintained by the Lower San Joaquin Levee District (LSJLD). **Figure 1-2** shows the locations of the four elements that comprise the proposed project, which is located within the United States Geological Survey (USGS) 7.5-minute Turner Ranch, Sandy Mush, and Santa Rita Bridge quadrangles.

The Eastside and Mariposa Bypasses are flood control channels that convey flood flows and reduce flooding to surrounding lands. The portion of the Eastside Bypass within the project area is called the Middle Eastside Bypass, which begins at the Sand Slough Control Structure and ends at the Eastside Bypass Control Structure **(Figure 1-1)**. Flood flows reaching the Sand Slough Control Structure are diverted to the Eastside Bypass via the Sand Slough Control Structure. Currently, all irrigation flows in the San Joaquin River are diverted at Sack Dam to the Arroyo Canal. No irrigation flows make it to the Eastside Bypass.

Other than some ponding in low-lying areas, the bypasses generally remain dry until they are required to convey high flows during the flood season although they carry agricultural tail-water during July through October that the Merced NWR may divert at its weirs. The flood season for the LSJLD typically lasts from November 15 to June 15 of each water year, with rainfall contributing to high flows during the early part of the flood season, and snowmelt contributing to flows at the later part of the flood season.

1.3 Project Background

1.3.1 Stipulation of Settlement

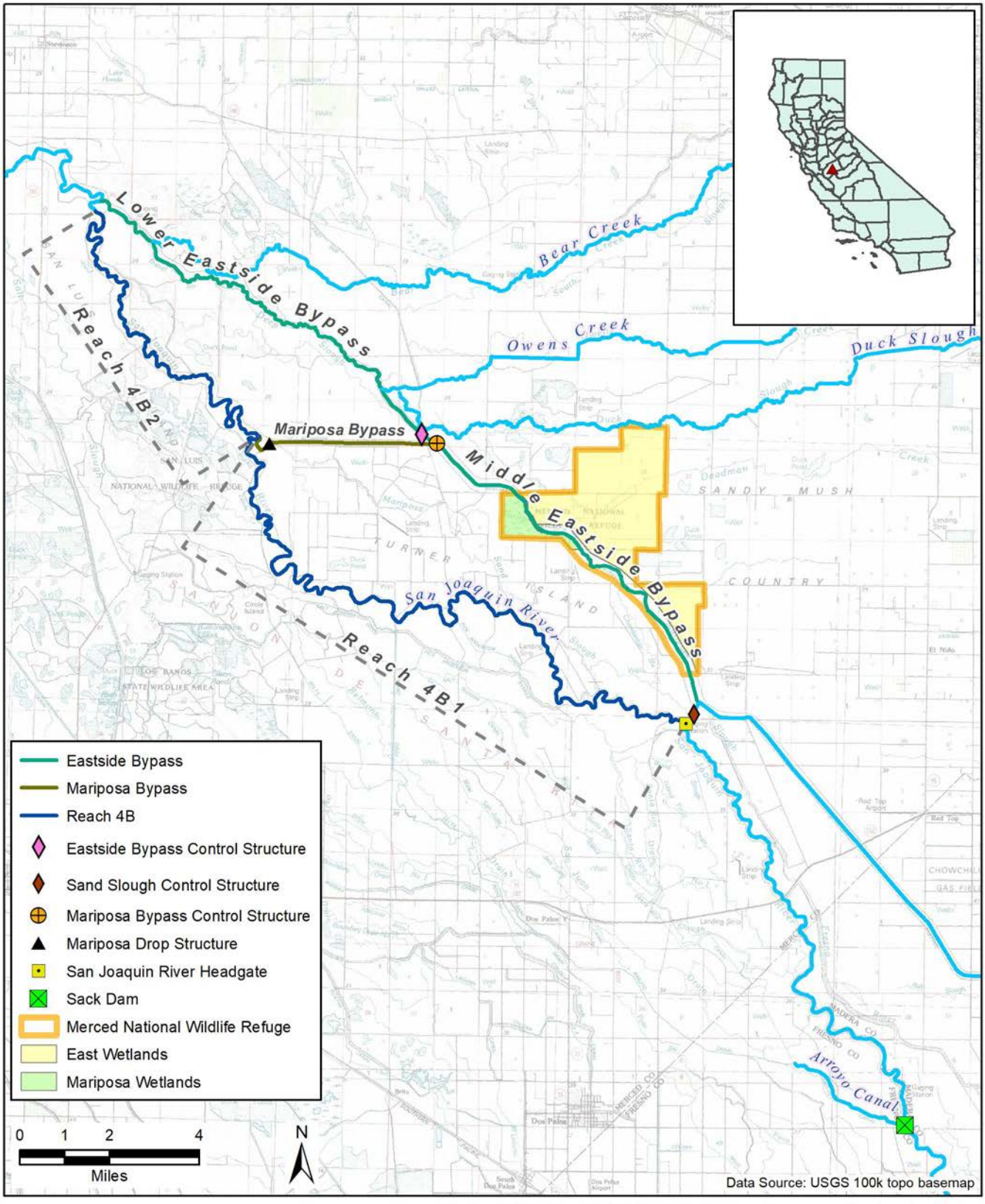
In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit, known as *NRDC, et al., v. Kirk Rodgers, et al.*, challenging the renewal of long-term water service contracts between the United States and the Central Valley Project (CVP) Friant Division contractors. On September 13, 2006, after more than 18 years of litigation, the Settling Parties, including NRDC, Friant Water Authority (FWA), and the United States Departments of the Interior and Commerce, agreed on the terms and conditions of the Settlement subsequently approved by the United States Eastern District Court of California on October 23, 2006. The San Joaquin River Restoration Settlement Act, signed into law on March 30, 2009, authorizes and directs the Secretary of the Interior to implement the Settlement. The Settlement establishes two primary goals:

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

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

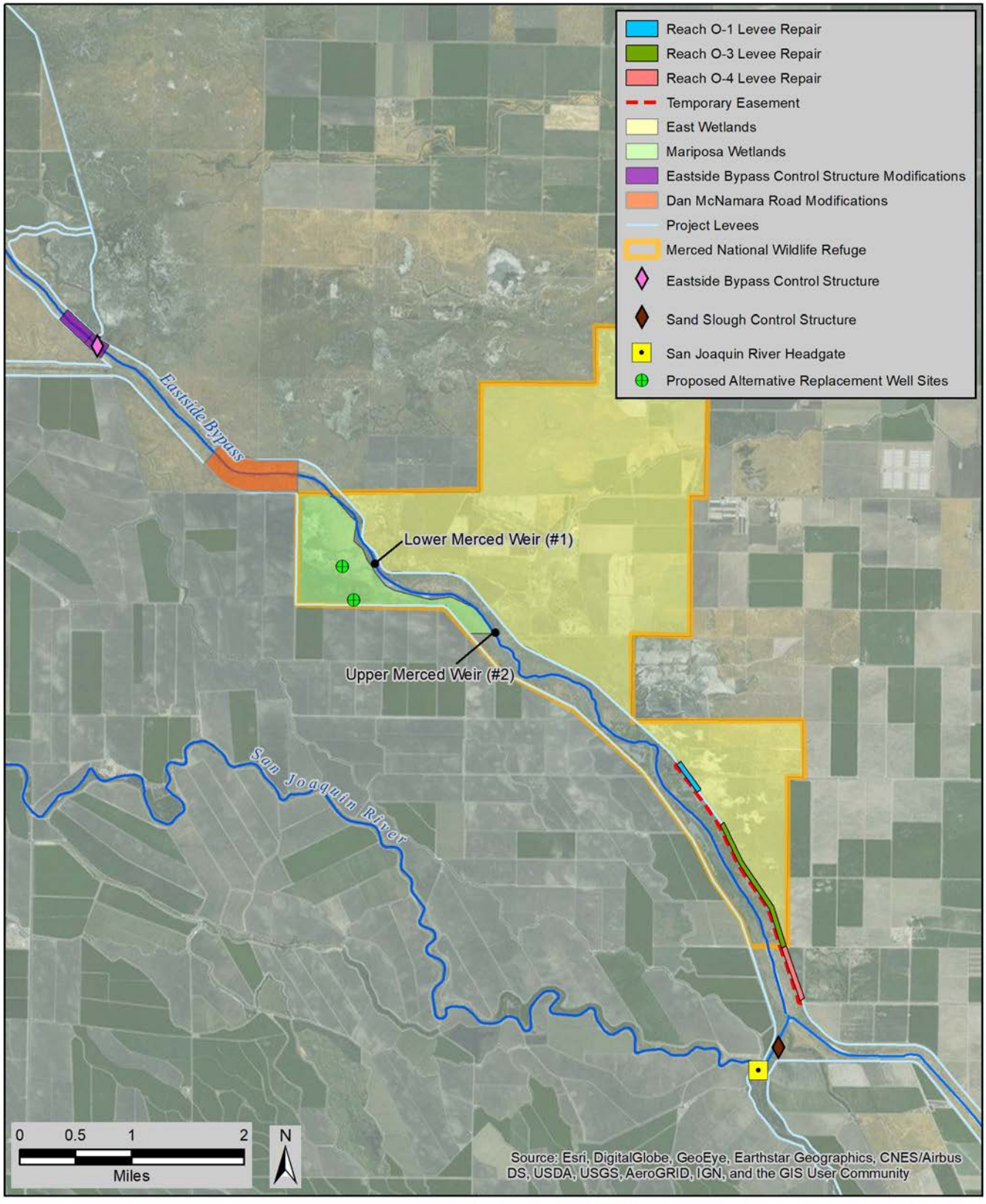
To achieve the Restoration Goal, the Settlement calls for releases of water from Friant Dam to the confluence of the Merced River (referred to as Restoration Flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. Restoration Flows are specific volumes of water to be released from Friant Dam during different year types, according to Exhibit B of the Settlement; Restoration Flows started on January 1, 2014 and were interrupted by the severe drought in 2014-2015 and flood flows in 2017.

Figure 1-1. Project Location



Source: GEI Consultants, Inc., 2017

Figure 1-2. Proposed Eastside Bypass Improvements Project Location



Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

1.3.2 San Joaquin River Restoration Program

The SJRRP was established to implement the Settlement, consistent with the Act. Implementing Agencies include Reclamation, USFWS, the National Marine Fisheries Service (NMFS), DWR, and the California Department of Fish and Wildlife (CDFW).

1.3.3 Relationship Between Proposed Project and Reach 4B/ESB Project

The Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and Structural Improvements Project (Reach 4B/ESB Project) is a project under the SJRRP which would implement specific channel and structural modifications required by the Settlement in the area of Reach 4B of the San Joaquin River and the associated flood bypass system. The Reach 4B/ESB Project includes several near- and long-term elements which are a key component to achieving the SJRRP's Restoration Goal. A notice of intent (NOI) and notice of preparation (NOP) to prepare a joint Environmental Impact Statement and Environmental Impact Report (EIS/R) was released to the public for the Reach 4B Project (now called the Reach 4B/ESB Project) in 2009, with a revised NOI and NOP released in 2010.

In 2016, Reclamation and DWR decided to separate the near-term elements (to be completed by 2020) and long-term elements of the Reach 4B/ESB Project (to be completed by 2029) of the Reach 4B Project for environmental review to meet the SJRRP's Framework for Implementation (SJRRP 2012) schedule, and because of the independent utility of the four early implementation actions and the "ripeness" of these actions for project-level environmental analyses, given the current level of planning and design.

The proposed project is not dependent on the future Reach 4B/ESB Project actions and has independent utility from the future Reach 4B/ESB Project actions by reducing flood risk and facilitating fish passage under existing flood and Restoration Flows even without further Reach 4B/ESB Project or other SJRRP actions. However, the Reach 4B/ESB Project and other SJRRP actions are necessary to meet the SJRRP's Restoration Goal. The Eastside Bypass Improvements Project would not preclude implementation of additional long-term actions through the Reach 4B/ESB Project and other SJRRP actions that would be necessary in the future to eventually convey 4,500 cfs by the end of 2029.

Because the Reach 4B/ESB Project as now configured does not have a State action ready for environmental analysis under CEQA, DWR is not participating in the Reach 4B/ESB Project as the CEQA lead agency; DWR's program-level actions in Reach 4B were covered in the SJRRP PEIS/R (SJRRP 2011) and DWR's project-level actions in Reach 4B would be covered in this IS/EA. Therefore, following guidance in CEQA Guidelines Section 15385(b), DWR has focused on its CEQ issues which are ripe for decision (i.e., Early Implementation Actions), excluded from consideration its issues that are not yet ripe for decision (future levee improvement projects 10 or more-15 years in the future), and withdrew as the Lead Agency under CEQA for the larger Reach 4B/ESB Project. However, as a SJRRP Implementing Agency, DWR continues to support Reclamation and the Reach 4B/ESB Project goals and objectives. The Reach 4B EIS is under development and will include information relevant to making a long-term routing decision for Restoration Flows in the Reach 4B and Eastside Bypass area.

The four elements of the proposed project consist of the following:

- Modifications to structures in the Eastside Bypass channel (Eastside Bypass Control Structure, Dan McNamara Road crossing, and Merced NWR weirs) to the extent needed to provide anadromous fish passage on an interim basis until completion of later Phase 2 improvements, and

- Improvements to specific Eastside Bypass levee reaches to improve levee stability and reduce seepage to increase Restoration Flow capacity up to approximately 2,500 cubic feet per second (cfs) in the bypass.

1.4 Project Purpose, Objectives, and Need

1.4.1 Project Purpose

The primary purpose of the proposed project is to facilitate fish migration and increased Restoration Flow capacity in the Eastside Bypass by 2020.

The proposed project in conjunction with other future site-specific projects in the SJRRP would contribute to meeting the Restoration Goal as described in Paragraph 11 of the Settlement.

1.4.2 Project Objectives

The following project objectives have been established to meet the project purpose:

- Improve levee stability, reduce seepage, and increase Restoration Flow capacity up to 2,500 cfs in the Eastside Bypass.
- Provide enhanced fish passage opportunities for Federally and State-listed salmonids and other native fish at the Eastside Bypass Control Structure and Dan McNamara Road.
- Provide fish passage opportunities by removing weirs within the Merced NWR and provide alternative replacement water supply for the Merced NWR.
- Implement the proposed project by the end of 2020 to meet SJRRP objectives.

1.4.3 Need for Project

The Eastside Bypass between Sand Slough and the Mariposa Bypass has been identified by DWR as the most limiting channel reach with regards to levee seepage and stability at higher SJRRP Restoration Flows (SJRRP 2017). Without strengthening specific levee reaches, Restoration Flows in the Eastside Bypass up to approximately 2,500 cfs cannot safely be conveyed, and are limited to approximately 300 cfs at present, to approximately 580 cfs when Reclamation addresses seepage concerns in 2018, and until additional seepage and system improvements in other SJRRP reaches are implemented.

The Eastside Bypass Control Structure is a gated structure that works in conjunction with the Mariposa Bypass Control Structure to direct flood flows into the Mariposa Bypass and Lower Eastside Bypass. The structure is a partial barrier to fish migration. The Eastside Bypass Control Structure must be modified to improve fish passage for anadromous fish migration and is vital in progressing towards the SJRRP's Restoration Goal.

Dan McNamara Road is a gravel-armored low-flow crossing in the Eastside Bypass about 1 mile downstream of Sandy Mush Road. The crossing has a 30-inch circular corrugated metal pipe culvert that passes flood flows up to about 25 cfs; however, the culvert severely restricts fish passage. The culvert needs to be replaced and the low-flow channel regraded to improve fish passage.

There are two weirs in the Eastside Bypass operated by USFWS as part of the Merced NWR. The two weirs were constructed to divert water from the bypass into the Merced NWR to irrigate wetlands. The weirs are a partial barrier to fish passage. The weirs must be removed and the low-flow channel regraded to allow for fish passage, which then requires a replacement water supply to maintain irrigated wetlands.

1.5 Purpose and Intended Uses of this IS/EA

The purpose of this IS/EA is to describe potential environmental impacts (the equivalent of "environmental consequences" in NEPA documentation) of the proposed project, and to describe measures that would avoid or mitigate potentially significant environmental impacts. This document is intended to meet the requirements of both CEQA and NEPA. Under CEQA, an IS helps a lead agency determine whether a project would have a significant effect on the environment and, in turn, determine whether a negative declaration (ND), mitigated negative declaration (MND), or environmental impact report (EIR) should be prepared.

This IS/EA is a project-level document that tiers from the SJRRP Program EIS/EIR (PEIS/R, SJRRP 2011). When specific information from the PEIS/R is incorporated by reference in this IS/EA, the information is summarized with the sections and/or page number(s) from the PEIS/R noted when applicable.

This IS/EA is a required environmental document, and the proposed project can be implemented with 1) DWR's public circulation of this IS/MND, consideration of all comments received on the IS/MND, adoption of an MND and a Mitigation Monitoring and Reporting Program (MMRP), approval of the project, and obtaining all required non-Federal permits and approvals; and 2) Reclamation's public circulation of this Draft EA and a Final EA, signing of a Finding of No Significant Impact (FONSI), and obtaining all required Federal permits and approvals.

1.5.1 Other Public Agencies Whose Approval May Be Required

CEQA requires that State and local government agencies consider the potential environmental effects of projects over which they have discretionary authority before taking action on those projects (PRC Section 21000 et seq.). CEQA also requires that each public agency avoid or mitigate to less-than-significant levels, wherever feasible, the significant environmental effects of projects it approves or implements.

Several Federal, State, regional, and local agencies, as well as decision-making bodies, may have jurisdiction over resources that may be affected by the proposed project, or have other permitting or regulatory authority over certain aspects of the project. The following agencies and decision-makers may consider information in this IS/EA during their decision-making processes:

- United States Army Corps of Engineers (USACE),
- NMFS,
- USFWS (including the NWR, Ecological Services, and Fisheries divisions),
- CDFW,
- Central Valley Flood Protection Board (CVFPB),
- California Office of Historic Preservation (OHP),
- Central Valley Regional Water Quality Control Board (Central Valley RWQCB),
- California Department of Transportation (Caltrans),
- State Water Resources Control Board (State Water Board), and
- San Joaquin Valley Air Pollution Control District (SJVAPCD).

Reclamation will obtain all required Federal permits and approvals, including those Federal permits and approvals delegated to State agencies by Congress (i.e., Section 401 of the Clean Water Act and the Clean Air Act). The SJRRP Conservation Strategy (see pages 2-52 to 2-79 of the SJRRP Draft PEIS/R [SJRRP2011]) includes specific conservation measures to conserve listed and sensitive species and habitats affected by SJRRP project- and program-level actions. Reclamation will defer to DWR regarding implementation of relevant SJRRP Conservation Strategy commitments specific to State agencies and State permits. At a minimum, however, Reclamation will coordinate with CDFW on potential effects to State-listed species, consistent with the SJRRP Conservation Strategy.

1.6 Document Organization

This IS/EA includes the following chapters and appendices:

- **Chapter 1, "Introduction."** This chapter describes the purpose, need, and location of the proposed project; provides the project background; explains the intended use of this IS/EA; and lists other public agencies whose approval may be required for the proposed project.

- **Chapter 2, "Description of the Proposed Project and No Action Alternative."** This chapter describes the existing structures to be modifiedproposed project (equivalent of "proposed action" under NEPA) and the no action alternative (similar to "no project" under CEQA). For the proposed project, project components evaluated in this IS/EA and the construction, operation, and maintenance activities associated with implementation of the proposed project are described.

- **Chapter 3, "Environmental Setting, Impacts, and Mitigation Measures."** This chapter describes the environmental setting (the equivalent of "affected environment" under NEPA) for each resource, and discusses the potential environmental impacts associated with implementing the proposed project. It also identifies mitigation measures to reduce potentially significant impacts to less-than-significant levels.

- **Chapter 4, "Other Required Analyses."** This chapter presents the cumulative impact analysis and summarizes past, present, and probable (reasonably foreseeable) projects with the potential to affect the same resources as the proposed project and the potential for the proposed project to cause cumulatively considerable incremental contributions to significant cumulative impacts. This chapter also evaluates growth-inducing impacts.

- **Chapter 5, "Consultation and Coordination."** This chapter describes the agencies and organizations consulted throughout the development of the environmental documentation for the proposed project.

- **Chapter 6, "List of Preparers."** This chapter lists the preparers of the IS/EA and other agency staff who contributed to the preparation of this document.

- **Chapter 7, "References."** This chapter lists references and personal communications used to prepare this IS/EA.

- **Appendices.** This section presents technical information supporting the analyses in the main document.

Chapter 2. Description of the Proposed Project and No Action Alternative

This chapter describes the construction, operation, and maintenance activities associated with proposed modifications to existing facilities within the project area (the proposed project) and the no action alternative. It has three primary sections:

- Section 2.1, "Existing Structures to be Modified," provides photographs and background information on the existing structures proposed for modification under the proposed project.
- Section 2.2, "No Action Alternative," describes the no action alternative, which would not modify the existing project structures. The no action alternative reflects probable (reasonably foreseeable) future conditions without the proposed project. (The existing conditions and reasonably foreseeable conditions under the no action alternative are considered sufficiently similar to meet both CEQA and NEPA requirements as the basis of comparison for determining project-related impacts, with the exception of certain flow-related impacts.)
- Section 2.3, "Proposed Project," describes the proposed project, which modifies several existing structures in the Eastside Bypass and constructs a new replacement well. This section describes the specific modifications to be made under the proposed project including construction, operations, and maintenance details.

2.1 Existing Structures to be Modified

2.1.1 Eastside Bypass Levees

The Eastside Bypass includes project levees that were constructed as part of the LSJRFCP or Lower San Joaquin River and Tributaries Project. The Lower San Joaquin Levee District (LSJLD) is responsible for operation and maintenance (O&M) of project levees within the project area. The Lower San Joaquin River Flood Control Project Operation and Maintenance Manual provides guidance for project levee O&M (Reclamation Board 1967). Channel design capacity was originally authorized as the amount of water that can pass through a given reach with a levee freeboard of 4 feet. Design capacities are generally considered to be safe carrying capacities, though some flood damages to adjacent land developments can occur even within design flows (USACE 1993). These damages can occur because of levee under-seepage, through-seepage, and backwater effects on local storm drainage systems. Levee subsidence and sediment accumulation can decrease channel capacities, increasing these damages. The Middle Eastside Bypass and Lower Eastside Bypass are bypasses within the project area. The design capacities for the Middle Eastside Bypass and Lower Eastside Bypass within the project area are currently 16,500 cfs, and 8,000 cfs, respectively.

Levees in the project area were constructed in the early 1960s. Based upon available information, levee construction was as follows: an inspection trench at least 12 feet wide was excavated to variable depths

beneath the levee and centered along the waterside hinge point; prior to levee construction, the foundation was stripped to a depth of at least 0.2 feet; where the levee construction crossed drainage channels, the foundation was stripped to variable depths; and Eastside Bypass channel excavation spoils were used to construct the levees. Levee heights within this project area are about 10-14 feet above the landside toe elevation. Crest widths are 10-12 feet, the landside slopes range from about 2 horizontal to 1 vertical (H:V) and 3H:1V and the waterside slopes range from approximately 2H:1V to 4H:1V. The levees in the project area were raised 2-3 feet in 2000 by DWR to mitigate impacts of regional subsidence.

The Eastside Bypass between Sand Slough and the Mariposa Bypass has been identified by the SJRRP as the most limiting channel reach with regards to levee seepage and stability. Geotechnical analysis has further showed that the uppermost 3 miles of the right bank of the reach (Reach O) is the critical segment of the reach that will limit the release of Restoration Flows within the next 10-20 years (SJRRP 2017). DWR's Division of Flood Management performed geotechnical evaluations in the reach and identified three segments of the approximately 3-mile levee segment that need improvements. "Then-existing" channel capacity for the Middle Eastside Bypass is approximately 580 cfs. "Then-existing" channel capacity is the channel capacity that corresponds to flows that would not significantly increase flood risk from Restoration Flows, based on the current levee evaluations. As part of the SJRRP, the Middle and Lower Eastside Bypass may be used for Restoration Flows, but its overall design flood capacity will not be increased.

Based on the boring data, foundation soils in Reach O generally consist of 1-20 feet of lean clay or silty clay with varying amounts of sand. The clay is underlain by layers of clayey sand, silty sand, or poorly graded sand. The thickness of the sand layer is about 2-10 feet. The foundation clay soils are generally classified as low to medium plasticity and stiff to hard consistency.

The following existing infrastructure near the levee improvements would be modified by DWR as described below:

- Irrigation canal penetrating the existing levee (**Figure 2-1**). This feature would be modified or replaced in kind.
- At least five drains penetrate the existing levee. These drains would be modified or replaced in kind.
- A siphon owned and operated by Lone Tree Mutual Water Company on the landside of levee moves water from the east to the west side of the bypass depending on conditions. Headworks of the siphon would be modified by extending the headworks or replaced in kind.

2.1.2 Eastside Bypass Control Structure

The Eastside Bypass Control Structure is at the upstream end of the Lower Eastside Bypass and works with the Mariposa Bypass Control Structure to split flood flows between the two flood facilities. These flows are subject to O&M rules set forth by the LSJRFCP. The Eastside Bypass Control Structure is approximately 200 feet wide across the Eastside Bypass, with six 20-foot gated bays. It is nearly 70 feet long measured longitudinally within the Eastside Bypass (**Figure 2-2**). The bays have radial gates, operated manually, with notches on the bay walls at the inlets for board placement. Boards are placed into the bays to control the water surface elevation upstream of the control structure to route flood flows into the Mariposa Bypass Control Structure. These boards are currently in place at each bay inlet at a height of approximately 4 feet.

Figure 2-1. Irrigation Canal and Culvert Crossing at Existing Levee

Source: California Department of Water Resources 2017

Figure 2-2. Eastside Bypass Control Structure (looking downstream)

Source: California Department of Water Resources 2017

The bays are 45.5 feet in length, measured from upstream to downstream, with a 15-foot concrete apron measured from the bay outlet to the channel downstream. In each bay, there are six 2-by-2-by-4-foot concrete block baffles about 45 feet from the bay inlet. The Eastside Bypass Control Structure has a maintenance road that crosses over the downstream end of the gate bays. At the downstream end of the concrete apron is a short sill that is about 2 feet tall and 1 foot wide. The channel is armored with riprap just downstream of the sill. Beyond the riprap, approximately 30 feet downstream of the sill, is a pool with a depth of 8 feet.

The Eastside Bypass channel downstream of the control structure was constructed as a flood control facility with a design capacity of 8,000 cfs (DWR 1969). The bypass was designed as a trapezoidal channel with a low-flow channel at the centerline with levees on the banks to contain flood flows. Levees within this section of the bypass vary in height from about 10 feet upstream of the control structure to around 7 feet downstream of the structure.

The Eastside Bypass Control Structure currently does not meet fish passage criteria for adult Chinook salmon at flows less than 700 cfs (DWR 2012). At these lower flows, water velocities and depths through the structure bays meet the passage criteria for adult Chinook salmon, but there are large hydraulic drops at the sill and the boards that impede passage for juvenile Chinook salmon during outmigration. Once flows exceed 700 cfs, the sill and boards have sufficient depth for migrating adult salmonids to pass. The control structure also does not meet passage conditions for many native fish including sturgeon at lower flows and the slower swimming, non-jumping species such as Pacific lamprey, Sacramento pikeminnow, and hitch.

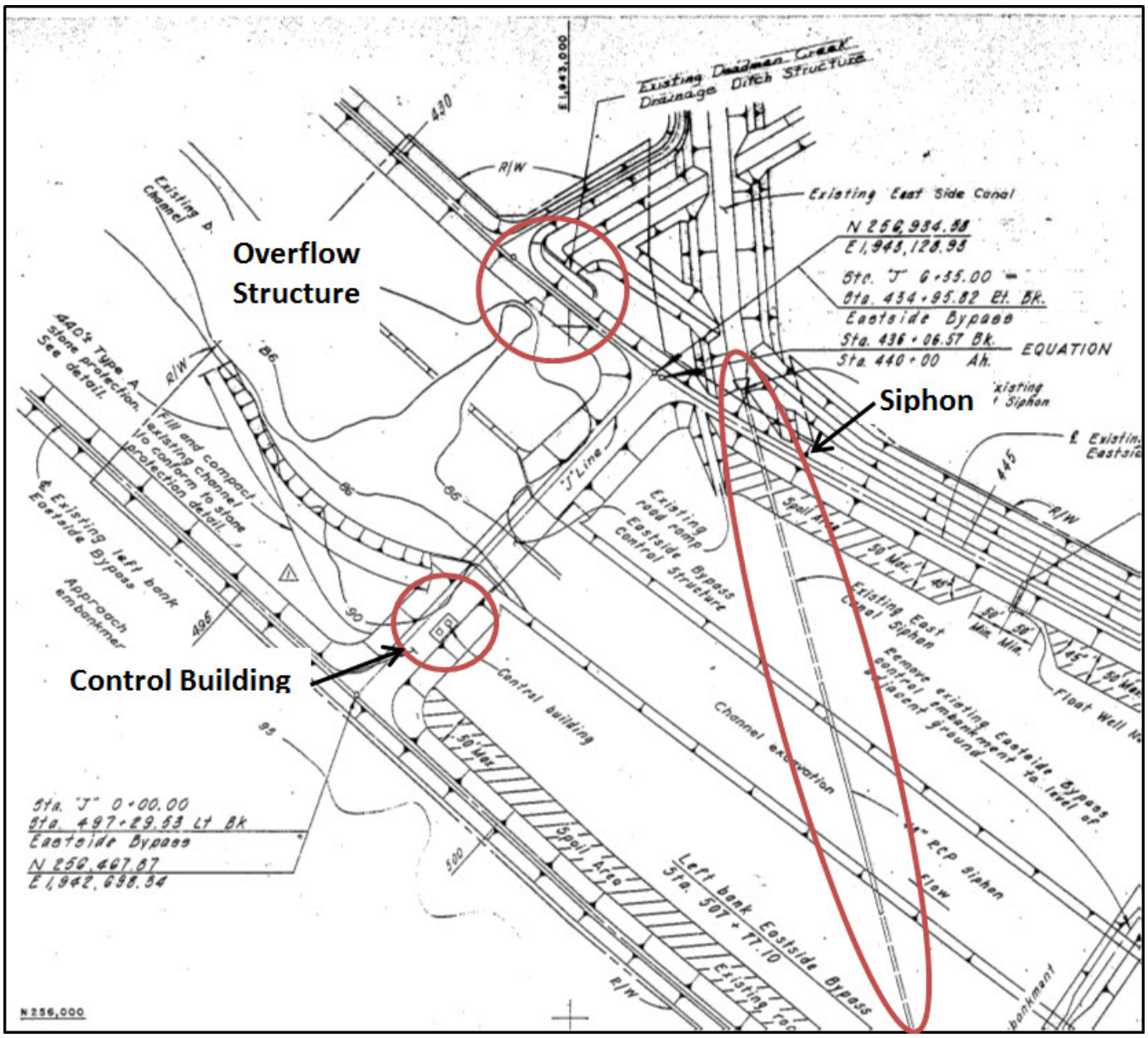
Existing infrastructure at the Eastside Bypass Control Structure is presented in **Figure 2-3**. Infrastructure associated with the structure that would not be modified as part of the proposed project include an underground siphon that conveys water in the Eastside Canal, a gated overflow structure that is operated by LSJLD for drainage from Owens and Deadman Creeks approximately 180 feet downstream within the right levee (**Figure 2-4**), and a control building on the left bank that houses the control equipment for the control structure gates and the utilities for the building. An existing stream gage approximately 550 feet downstream could also be replaced or relocated during construction.

2.1.3 Dan McNamara Road Crossing

Dan McNamara Road is a county-owned, publicly accessible gravel-armored low-flow crossing approximately 12 miles southwest of the City of Merced. The road crown is approximately 30 feet wide and sits on a 60-foot county right-of-way (ROW). The properties in the Eastside Bypass upstream and downstream of the county road ROW are privately owned, and access is restricted by barbed wire fencing. In July 2010, the road was partially submerged at a flow of approximately 40 to 80 cfs (**Figure 2-5**).

There are two culverts under the road crossing, one at the low-flow channel within the center of the road, and another within the floodplain closer to the right levee (looking downstream). The one located within the low-flow channel and the center of the road is a single circular corrugated metal pipe culvert that is 50 feet long and 30 inches in diameter (**Figure 2-6**). The culvert does not include an apron. It protrudes approximately 10 feet on each side of the road. The culvert inlet and outlet are armored with cobble and concrete riprap with no flared end sections. The culvert outlet is perched with an approximate 3-foot drop to an incised 175-foot-wide, low-flow channel just downstream. The culvert capacity is approximately 20-25 cfs. Flows within the Eastside Bypass that exceed 25 cfs would begin to overtop the road as the culvert currently operates.

Figure 2-3. Existing Infrastructure at Eastside Bypass Control Structure



Source: DWR 2017

Figure 2-4. Gated Outflow Structure at Eastside Bypass Control Structure

Source: California Department of Water Resources 2017

Figure 2-5. Dan McNamara Road during Inundation

Source: California Department of Water Resources 2017

Figure 2-6. Low-flow Culvert within the Main Channel at Dan McNamara Road

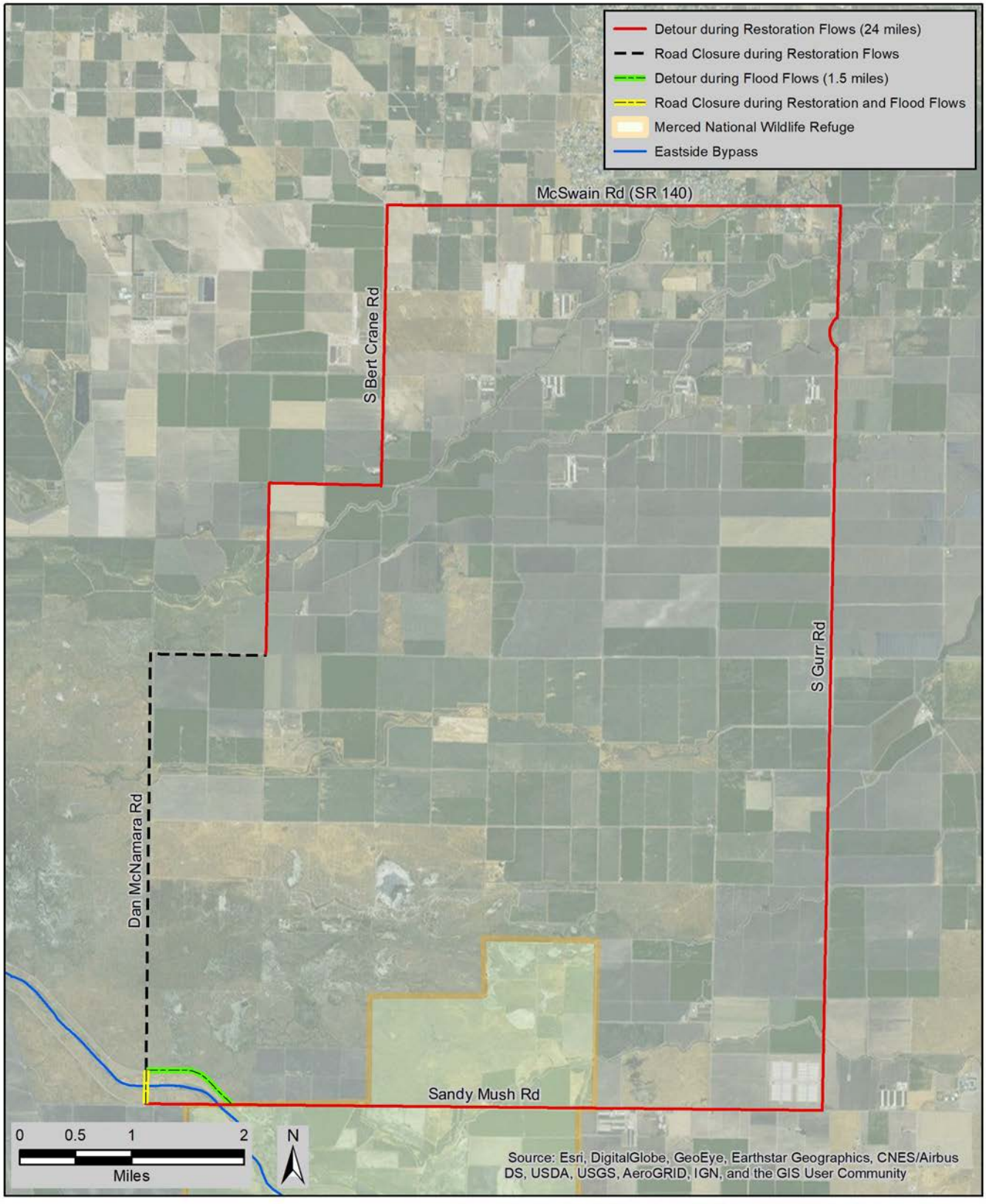
Source: California Department of Water Resources 2017

The second culvert within the floodplain is a circular reinforced concrete culvert that is 24 inches in diameter. This culvert is silted in part way, and does not appear to effectively convey flows.

At the intersection of Dan McNamara Road and the Eastside Bypass, vehicle passage may be restricted across the Eastside Bypass when the Dan McNamara Road is overtopped due to the low capacity of the culverts, making it unsafe to cross. High flood flows (which occur on average approximately 1 out of every 4 to 5 years) close the road. However, an agreement was signed by the LSJLD and the County of Merced which allows for traffic to use an approximately 1.5-mile-long detour which directs traffic onto the right bank levee of the Eastside Bypass either from Sandy Mush Road or from Dan McNamara Road (**Figure 2-7**). The detour consists of signs and gates to direct the traffic and metal cattle guards were installed to prevent livestock from straying onto the levee road (DWR 1969). From discussions with Reggie Hill, the General Manager for the LSJLD, the Merced County Road Department coordinates with LSJLD staff on the current detour operation for Dan McNamara Road.

Restoration Flows in the Eastside Bypass are currently permitted up to about 300 cfs. When Restoration Flows exceed approximately 25 cfs in the Eastside Bypass, the flows spread over the road and make it impassable at higher flows. When the road becomes impassable, traffic is required to detour on public roads; the 1.5-mile detour permitted during flood flows through agreement between LSJLD and the County of Merced is not permitted during Restoration Flows. **Figure 2-7** illustrates the 1.5-mile detour used during flood flows.

Figure 2-7. Dan McNamara Road Crossing Detours during Flood and Restoration Flows



Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

The Dan McNamara Road crossing is a partial barrier for juvenile and adult Chinook salmon because of insufficient depths over the road and high velocity in the existing culvert. The crossing is not passable for juvenile and adult Chinook salmon until the road is overtopped and has sufficient flow depth over the road to allow for passage. Hydraulic models indicate that this occurs at flows of more than 600 cfs (DWR 2012).

The Dan McNamara Road crossing also does not meet passage conditions for many native fish at lower flows including sturgeon and the slower swimming, non-jumping species such as Pacific lamprey, Sacramento pike minnow, and hitch.

Existing fencing and gates to prevent access to private lands and to ensure segregation of livestock exists at the Dan McNamara Road crossing of the Eastside Bypass. This infrastructure would either be considered for redesign and construction, or replaced during construction.

2.1.4 Merced National Wildlife Refuge Weirs

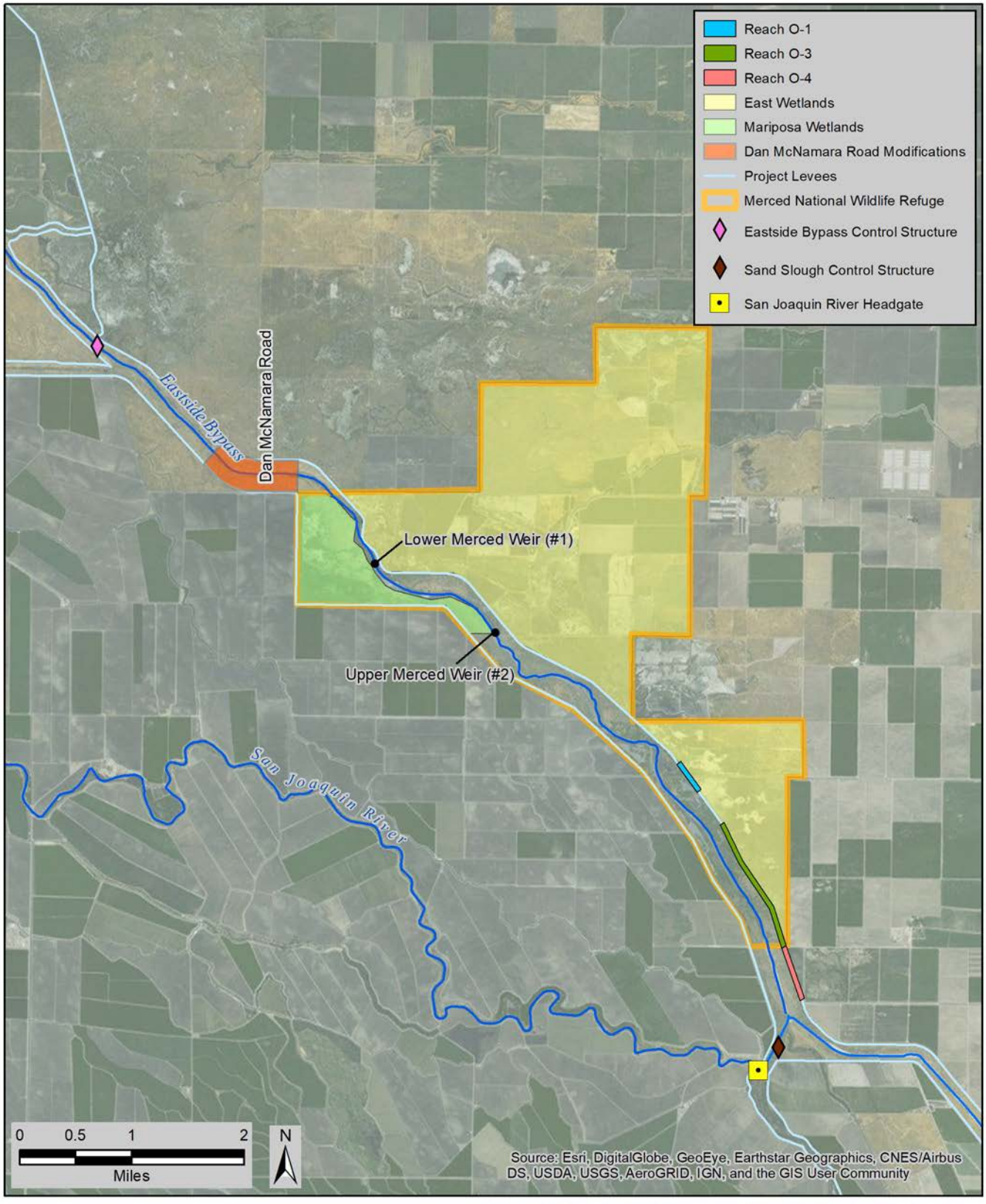
A section of the Eastside Bypass overlays the Merced NWR. Just south of Sandy Mush Road, two weirs have been constructed in the Eastside Bypass that facilitate water diversions to support seasonal wetlands and pools for migratory birds (**Figure 2-8**). The Lower Merced Weir #1 (lower weir) is less than 1 mile south of the West Sandy Mush Road (**Figure 2-9**) and approximately 1.4 river miles downstream of the Upper Merced Weir #2 (upper weir) (**Figure 2-10**).

The lower weir is used to divert flows from the bypass into Merced NWR wetlands located within the bypass levees on the left overbank. This area is known as the Mariposa Wetlands (west side of the refuge). Flows are diverted into the wetlands by manually installing wooden boards to raise water surface elevations in the pool upstream of the weir. Boards are inserted during low-flow periods, which typically occur September through March. The upper weir prevents water from flowing upstream, thereby creating a small lake between the two weirs.

The length of the lower weir, from the right bank toward the left bank, is approximately 62 feet, and the total height is approximately 6.5 feet. The weir has a 3-foot-wide metal grate on top for pedestrian access to the metal I-beams designed to accommodate the boards. The weir has a total of 14 bays averaging 4.5 feet wide. A concrete apron at the bottom of the weir structure extends about 6 feet downstream. There are also two concrete sills on the apron. The most downstream is a short 1-foot-tall by 10-inch-wide sill. This small concrete sill is typically submerged at all flows. The second sill is about 2 feet higher than the concrete apron and is located where the boards are placed. The structure has concrete abutments on the right bank and cobble armoring on the left bank. The cobble bank, on the west toward the left overbank, is overtopped before the weir is overtopped when the boards are inserted to the elevation of the metal grate.

The length and height of the upper weir are approximately 60 feet and 6 feet, respectively. The weir is capped by wooden planks for access while installing the wooden boards. The weir has 12 bays averaging 4 feet wide. A concrete apron extends about 4 feet but more could be buried under sediment. The weir has concrete abutments that tie into the channel banks. There is an existing stream gage, which could also be relocated during and following construction.

Figure 2-8. Merced National Wildlife Refuge Wetlands and Weir Facilities



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Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

Figure 2-9. Lower Merced Weir #1 Looking Downstream

Source: California Department of Water Resources 2017

Figure 2-10. Upper Merced Weir #2 Looking East at the Right Bank

Source: California Department of Water Resources 2017

The lower and upper weirs currently impede the upstream migration of adult Chinook salmon at varying flows depending on whether the boards are installed (DWR 2012). Because the weirs work together to create a pool/lake when the boards are installed, the lower weir is the primary barrier and controls the water surface elevation at the upper weir. When the boards are in at both weirs, unimpeded passage is possible when flows exceed about 3,000 cfs. The upper weir is completely submerged when the boards are in at the lower weir, so passage at the upper weir is unimpeded. The weirs also do not meet passage conditions for many native fish at lower flows including sturgeon and the slower swimming, non-jumping species such as Pacific lamprey, Sacramento pike minnow, and hitch.

2.2 No Action Alternative

Under the no action alternative, no construction activities would occur to improve levees along the Eastside Bypass or to enhance fish passage at the Eastside Bypass Control Structure, Dan McNamara Road, or at the two weirs in the Merced NWR. Beneficial effects of levee stability and reduced seepage, and enhanced fish passage in the Eastside Bypass would not occur, as well as any adverse impacts from proposed project implementation.

Restoration Flows are restricted by seepage concerns to a maximum of approximately 300 cfs in the Eastside Bypass under existing conditions. Under the no action alternative, Restoration Flows would increase up to a maximum of approximately 580 cfs in the Eastside Bypass because it is reasonably foreseeable that seepage concerns would be alleviated by Reclamation in 2018 as described in Reclamation's *Seepage Management Actions Environmental Assessment and Finding of No Significant Impact* (reference https://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=27373); seepage easement acquisitions in 2017 and 2018 should allow Restoration Flows up to approximately 580 cfs in the Eastside Bypass *without the proposed project.* Additional seepage constraints and system improvements in other SJRRP reaches must be addressed to release Restoration Flows up to 2,500 cfs and then ultimately up to 4,500 cfs in the Restoration Area to meet the Restoration Goal.

Under the no action alternative, the Restoration Goal of the Settlement, including conveying up to 4,500 cfs throughout the Restoration Area, would not be completely implemented. Restoration Flow releases from Friant Dam would continue to follow a complex release schedule that varies by restoration/water year type and month, ranging from 100 to 230 cfs during critical-low flow periods to 350 to 4,000 cfs during wet year periods (see Figure ES-4 on page 23 of the Draft PEIS/R in SJRRP 2011), although Restoration Flows would be limited to approximately 580 cfs in the Eastside Bypass under the no action alternative.

2.3 Proposed Project

DWR proposes to design, permit, and implement the following three project elements to facilitate fish migration and increased Restoration Flow capacity in the Eastside Bypass by 2019:

- Reinforce approximately 2 miles of levee along the Eastside Bypass to improve levee stability and reduce seepage (Reach O levee improvements).
- Modify the existing Eastside Bypass Control Structure to improve fish passage.
- Replace the existing culvert at the Dan McNamara Road crossing at the Eastside Bypass to improve fish passage.

Reclamation proposes to design, permit, and implement the following project element to facilitate fish migration in the Eastside Bypass by 2020:

- Improve fish passage by removing two weirs located in the Eastside Bypass that USFWS operate to provide water to the Merced NWR. Reclamation would replace an existing non-operational well with a new well to provide replacement water supply for the Refuge, first drilling an exploratory well as a near-term action. (Reclamation would coordinate with the Merced NWR to offset the additional expense the Merced NWR is expected to incur from operating a new well.)

2.3.1 Project Design Considerations

Flood Operations

Reclamation and DWR are committed to meet performance standards that minimize increases in flood risk in the Restoration Areas as a result of Restoration Flows. Furthermore, the CVFPB requires that new or modified structures do not result in a 0.1-foot rise or more in flood elevations at the design-flow capacity of 16,500 cfs. The existing flood flow capacity for the structures to be improved is listed in **Table 2-1**, by reach and structure. Flood capacities are based on the schematic of design-flood capacity flows from the O&M manual for the LSJRFCP (Reclamation Board 1967 [amended in 1978]).

Table 2-1. Flood Flow Capacity for Structural Improvements

Reach	Structure	Flood Flow Capacity (cfs)
Middle Eastside Bypass	Eastside Bypass Control Structure	8,000[1]
Middle Eastside Bypass	Dan McNamara Road	16,500
Middle Eastside Bypass	Lower Merced Refuge Weir	16,500
Middle Eastside Bypass	Upper Merced Refuge Weir	16,500

Notes: cfs = cubic feet per second
[1] Flood flows have reached 10,000 cfs through the Eastside Bypass Control Structure

Fish Passage Design Criteria

The proposed project includes provision of fish passage at the Eastside Bypass Control Structure and Dan McNamara Road for salmonids and other native fish. The designs for structures with fish passage components would be based on the criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001). Specifically, the improvements would provide suitable hydraulic conditions (when fish are present) for passage of up-migrating adult salmonids, out-migrating juvenile salmonids, and some migration of 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 animal.

The Lead Agencies worked in conjunction with the Fisheries Management Work Group and other experts of the Implementing Agencies 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 fall and spring-run Chinook salmon and winter steelhead and the downstream movement of juvenile life stages spawned from these runs. Recommended criteria are based on a combination of swimming ability of the fish species as reported in scientific papers and criteria in agency design guidelines. **Table 2-2** presents

Table 2-2. Fish Passage Design Criteria

Species	Life-stage	Migration Timeframe	Frequency (years)	Maximum Velocity[1] (fps)	Minimum Water Depth[2] (feet)	Maximum Jump Height[3] (feet)	Minimum Pool Depth (feet)
Chinook salmon	Adult	Spring and fall pulse	All years except CL	4.0	1.0	1.0	[4]
Chinook salmon	Juvenile (downstream)	Dec-May	All years except CL	n/a	1.0	n/a	[4]
Steelhead	Adult	Spring and fall pulse	All years except CL	4.0	1.0	1.0	[4]
Steelhead	Juvenile (downstream)	Nov-May	All years except CL	n/a	1.0	n/a	[4]
Sturgeon	Adult	Spring pulse	W and NW years	6.6	3.3	None-swim through	n/a
Lamprey	Adult	Spring pulse	All years except CL	[5]	[5]	[5]	[5]
Other native fish	Adult	Spring pulse	W, NW, and ND years	2.5	1.0	None-swim through	n/a

Notes:
W=wet; NW=normal wet; ND=normal dry; CL=critical low; cfs=cubic feet per second; fps=feet per second

[1] Recommended maximum velocities shown are for grade control structures or structures with short longitudinal lengths based on *Anadromous Salmonid Passage Facility Design* (NMFS 2011) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001). For structures with longer lengths (e.g., culverts and bifurcation structures under certain conditions), maximum velocities would be developed based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001).

[2] Minimum water depth criteria based on 1.5 times body depth or 1 foot depth, whichever is greater based on *Anadromous Salmonid Passage Facility Design* (NMFS 2011) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001).

[3] Maximum jump height criteria based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001).

[4] Pool depths to be based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001).

[5] Lamprey designs to be based on criteria in *Best Management Practices to Minimize Adverse Effects to Pacific Lamprey* (USFWS 2010).

existing fish passage design criteria used in the project design process. The criteria include passage conditions for salmon and other native fishes that may be present. All fish passage designs meet passage criteria for Chinook salmon and steelhead at flows from 45 to 4,500 cfs and enhance fish passage for other species at a range of flows. Fish passage designs were intended to meet criteria up to the maximum 4,500 cfs Restoration Flows allowed under the seepage easements obtained by Reclamation along the Eastside Bypass. For sturgeon, lamprey, and other native fish, criteria would be met for some portion of the applicable fish migration period. NMFS, USFWS, and CDFW are in the process of refining the fish passage criteria; any changes to the criteria would be incorporated by DWR and Reclamation into the next phase of design.

In addition to the design criteria specified in **Table 2-2**, additional hydraulic criteria specific to certain types of fish passage facilities were also considered for the improvements at the Eastside Bypass Control Structure and Dan McNamara Road. Discussions of each of those specific criteria are summarized in the description of the improvements.

Agricultural Seepage Measures

The levee improvement design process included a constraint that any material adverse effects due to groundwater seepage must be reduced or avoided. Appendix D, Part 2 of the SJRRP Draft PEIS/R, the

Seepage Monitoring and Management Plan, requires Reclamation to reduce Restoration Flows to the extent necessary to address any material adverse impacts to third parties (SJRRP 2011).

Subsidence

Ground subsidence in the project area has caused the ground elevation to decrease over time. Recent monitoring conducted by Reclamation shows that subsidence rates within the vicinity of the San Joaquin River and bypass system have ranged from approximately 0.15 foot to 0.75 foot per year from December 2011 through December 2013 (SJRRP 2015). The proposed project is located on the boundary of the subsidence area, with the greatest impacted areas upstream within the Upper Eastside Bypass and Chowchilla Bypass. Subsidence has caused the channel near the area of the proposed project to flatten. Subsidence may also cause more sediment erosion from the upstream portion of the bypass to deposit near the proposed project and for capacity in localized areas to be reduced. Because of this, the proposed project considered future subsidence in its design. Total subsidence assumed for design purposes for the proposed project is 1.25 feet based on long-term monitoring, which results in a change in water depth of approximately 0.5–1 foot over the next 25 years. Implementation of the Sustainable Groundwater Management Act (SGMA) would also minimize subsidence impacts over the long term.

Minimize Flood Risk from Restoration Flows

An objective of the SJRRP during implementation is to minimize increases in flood risk due to the release of Restoration Flows (SJRRP 2011). To achieve this objective, the PEIS/R included the levee design criteria developed by USACE in *Design and Construction of Levees Engineering and Design Manual* (Manual No. 1110-2-1913) (USACE 2000), *Engineering Manual: Slope Stability* (Manual No. 1110-2-1902) (USACE 2003), and *Design Guidance for Levee Underseepage* (Engineering Technical Letter No. 1110-2-569) (USACE 2005). The levee design criteria and guidelines are to be applied throughout the Restoration Area.

The levee criteria are included in the PEIS/R commitments to reduce the risk of levee failure to less-than-significant levels by meeting levee slope stability and underseepage Factors of Safety. The PEIS/R states that Restoration Flows should not cause the levee slope stability Factor of Safety to be below 1.4, or the underseepage Factor of Safety to be reduced below the value corresponding to an exit gradient at the (landside) toe of the levee of 0.5. The levee slope stability Factor of Safety is defined as the ratio of available shear strength of the top stratum of the levee slope to the necessary shear strength to keep the slope stable (USACE 2003). The application of the levee slope stability Factor of Safety of 1.4 is required for Federally authorized flood control projects. The underseepage Factor of Safety is defined as a ratio of the critical hydraulic gradient to the actual exit gradient of seepage on the levee. USACE design guidance recommends that the allowable underseepage Factor of Safety used in evaluations and/or design of seepage control measures should correspond to an exit gradient at the toe of the levee of 0.5 (in general this would provide a Factor of Safety of 1.6), but states that deviation from recommended design guidance is acceptable when based and documented on sound engineering judgment and experience (USACE 2005). The proposed levee improvements are designed to meet the criteria summarized above from pages 2-22 through 2-28 of the SJRRP Final PEIS/R, “Minimize Flood Risk from Interim and Restoration Flows,” (SJRRP 2012), which are incorporated by reference.

SJRRP Physical Monitoring and Management Plan

The SJRRP Physical Monitoring and Management Plan (Appendix D in SJRRP 2012, and incorporated by reference) provides guidelines for observing and adjusting to changes in physical conditions within the Restoration Area. The Physical Monitoring and Management Plan consists of five component plans

addressing interrelated physical conditions, including flow, groundwater seepage, channel capacity, propagation of native vegetation, and suitability of spawning gravel. Each component plan identifies objectives for the physical conditions within the Restoration Area and provides guidelines for the monitoring and management of those conditions. The plans identify potential actions that could be taken to enhance further the achievement of the objectives. Three of these component plans are relevant to the proposed project:

- **Seepage** – Reduce or avoid adverse or undesirable seepage impacts.
- **Channel capacity** – Maintain flood conveyance capacity.
- **Native vegetation** – Establish and maintain native riparian habitat.

These three components of the SJRRP Final PEIS/R Appendix D, Chapter 3 (seepage), Chapter 4 (channel capacity), and Chapter 5 (native vegetation) (SJRRP 2012) are incorporated by reference and would be complied with by DWR and Reclamation during project implementation.

SJRRP Conservation Strategy

The Draft PEIS/R (SJRRP 2011) Conservation Strategy describes a comprehensive strategy to conserve listed and sensitive species and habitats to be implemented in coordination with USFWS, NMFS, and CDFW. The Conservation Strategy is incorporated by reference (SJRRP 2011, pages 2-52 to 2-79) and summarized below. The proposed project includes implementation of the Conservation Strategy (as applicable), which would be implemented in a manner consistent with adopted conservation plans for sensitive species and for wetland and riparian ecosystems of the SJRRP Restoration Area.

The Conservation Strategy's purpose is to avoid potential impacts to sensitive species and habitats during SJRRP implementation. The Conservation Strategy guides development and implementation of specific conservation measures for project-level actions. The Conservation Strategy includes conservation goals and measures for species and communities (such as avoidance, minimization, monitoring, and management measures) consistent with adopted recovery plans, as described below. If avoidance and minimization measures are impractical or infeasible, then further consultation actions and mitigation measures will be pursued and developed in coordination with the appropriate regulatory agency.

The Conservation Strategy includes management actions that would result in a net benefit for riparian and wetland habitats in the project area to avoid reducing the long-term viability of sensitive species and to be consistent with adopted conservation plans. The goals of the strategy are to:

- Conserve riparian vegetation and waters of the State and of the United States, including wetlands,
- Control and manage invasive species, and
- Conserve special-status species.

The Conservation Strategy measures address all potentially affected Federally listed and/or State-listed species and all other species identified by USFWS, NMFS, or CDFW as candidates, sensitive, or special-status in local or regional plans, policies, or regulations. The mitigation measures identified in this IS/EA are consistent with the Conservation Strategy measures with some modifications as necessary to address site- and project-specific conditions.

2.3.2 Proposed Project Elements

Levee Improvements

A total of approximately 2 miles of levees within three segments of a 3-mile reach of the existing east levee in the Eastside Bypass between Sand Slough and the Mariposa Bypass would be improved to meet levee seepage and stability criteria (summarized in SJRRP Draft PEIS/R Section "Minimize Flood Risk from Restoration Flows"). The three levee improvement segments (Reach O-1, Reach O-3, and Reach O-4) are shown in **Figure 2-11** with levee improvements described below.

Levee improvements would include reinforcing approximately 1,500 linear feet of levee in Reach O-1, 5,900 linear feet of levee in Reach O-3, and 2,600 linear feet of levee in Reach O-4 with cutoff walls. Sand or gravelly soils of higher permeability in the levee or levee foundation can transmit water via seepage during high-water stages. Cutoff walls are designed to reduce levee through-seepage and underseepage by providing a lens of low-permeability material through the higher permeability materials in the levee and levee foundation to essentially cut off the flow. Cutoff walls would be installed to depths sufficient to minimize seepage through the levee and/or beneath it to meet or exceed USACE levee design criteria. For cutoff walls designed to block through-seepage, the intent is to construct a wall deep enough to block flow through the levee and alter the flow path of seepage to reduce landside impacts. Cutoff walls for underseepage are generally installed to depths that would tie into existing lower permeability soil layers in the levee foundation below the permeable material. The depths for cutoff walls necessary to limit underseepage and through-seepage at the design water surface elevation to gradients specified by USACE are determined by geotechnical modeling and analyses. For the proposed levee improvements, the top portion of the existing levee would be degraded, a bentonite cutoff wall up to approximately 35-feet deep would be placed in the middle of the levee crown for improved stability, and then the top portion of the existing levee would be reconstructed using select levee fill material. The improvement would allow conveyance of up to 2,500 cfs. A conceptual design schematic of a cutoff wall installed along the levee centerline is shown in **Figure 2-12**.

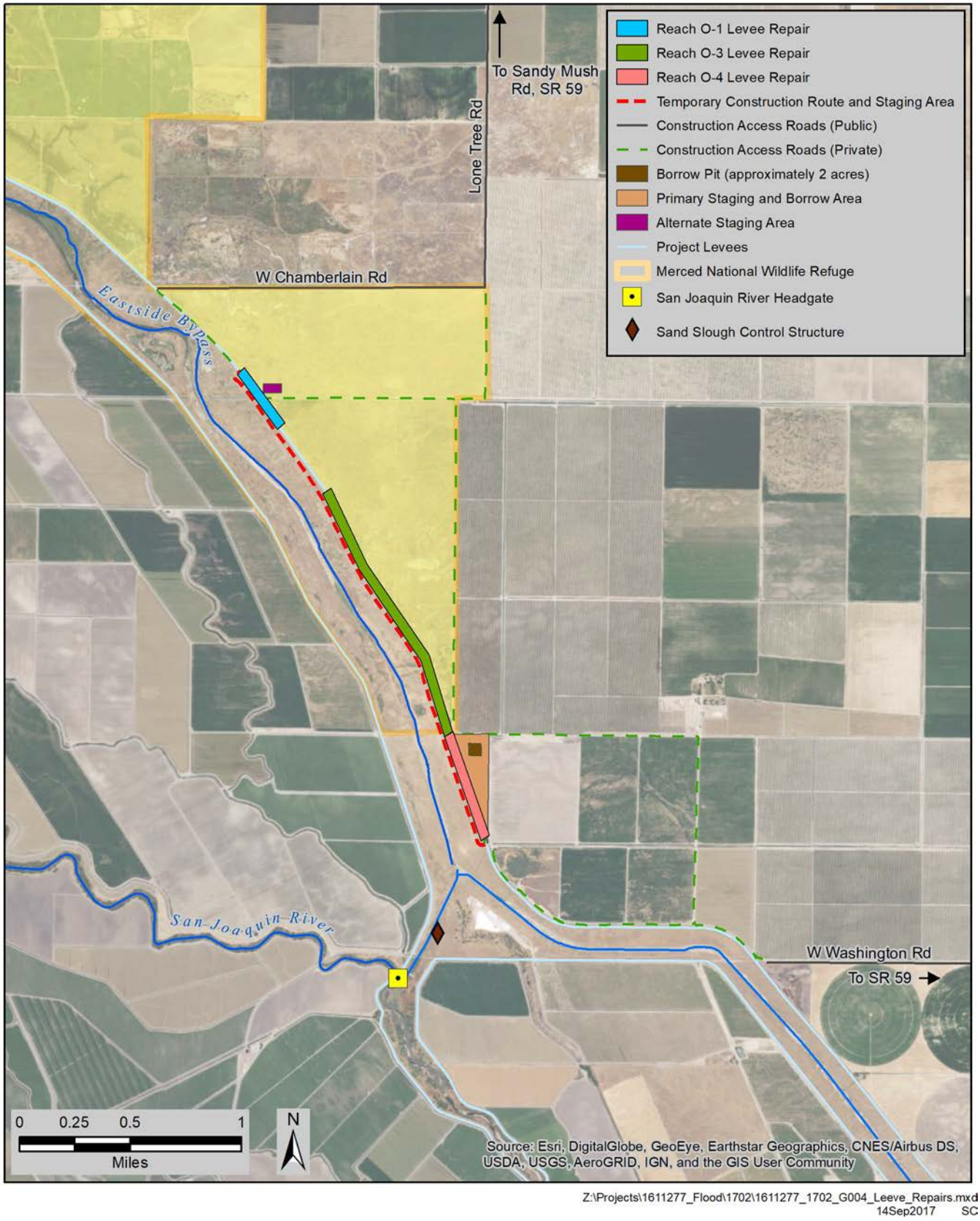
Eastside Bypass Control Structure Modifications

To provide fish passage, the Eastside Bypass Control Structure would be modified by removing the sill, boards, and energy dissipation blocks. In addition, an approximately 380-foot-long rock ramp would be constructed downstream of the structure to provide easy passage from the downstream pool to the structure (**Figure 2-13**). The ramp would extend from bank to bank. It would be constructed by filling the large pool downstream of the structure with approximately 13,000 cubic yards of compacted fill up to subgrade elevation, and then adding a 2.5- to 3.5-foot-thick top layer of approximately 11,500 tons of Engineered Streambed Material (ESM) comprised of rock mixes with particle sizes ranging from boulders to sand and silt.

Currently, the channel downstream of the structure is incised. Fill for the base of the ramp would come from excavating benches in the channel downstream, if the material is suitable. Approximately 100-foot-wide benches with 3:1 side slopes, starting at the end of the ramp to approximately 1,000 feet downstream, would be constructed, inundating at flows around 1,000 cfs. If the existing material is not suitable, the benches would not be excavated, and fill would need to be imported.

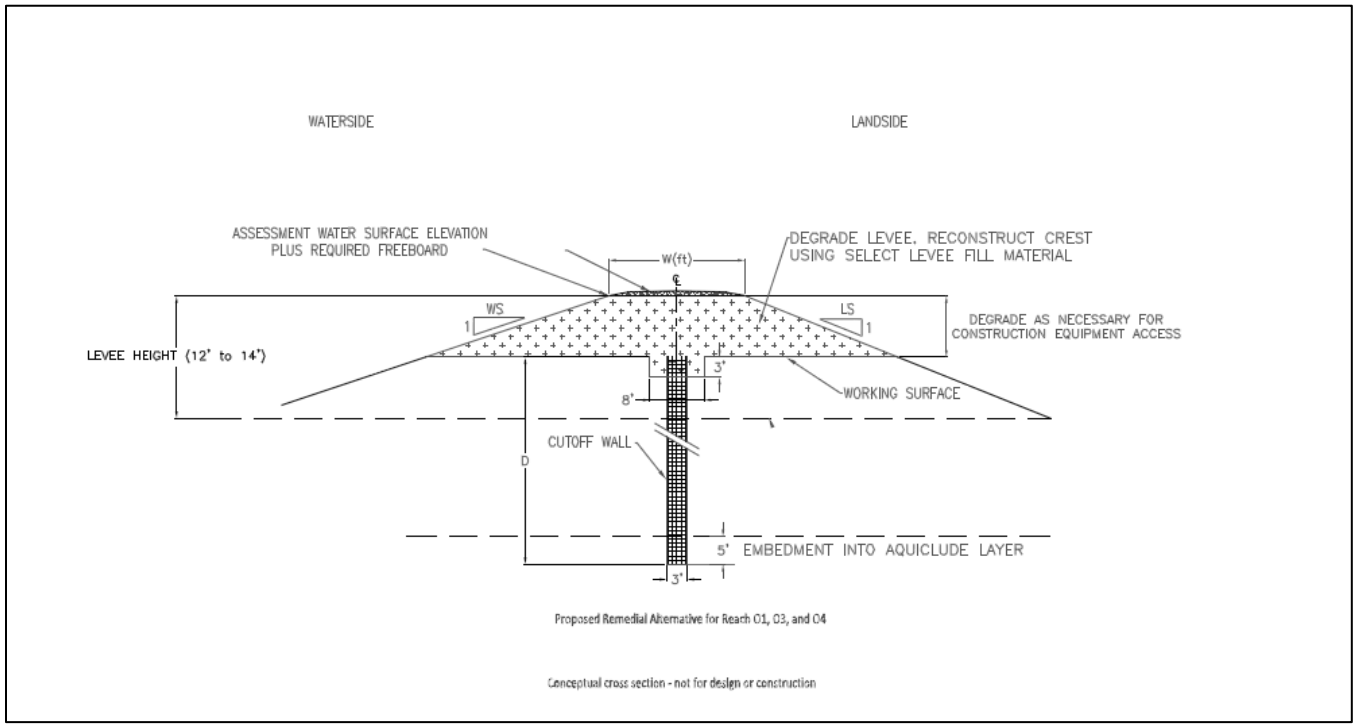
There is currently a stream gage site dedicated to collecting stream flow data approximately 550 feet downstream of the Eastside Bypass Control Structure. To make sure the gage is outside of the influence of the new rock ramp and can accurately measure stage, the gage would be replaced and relocated up to 1,000 feet downstream of the rock ramp.

Figure 2-11. Levee Improvement Segments



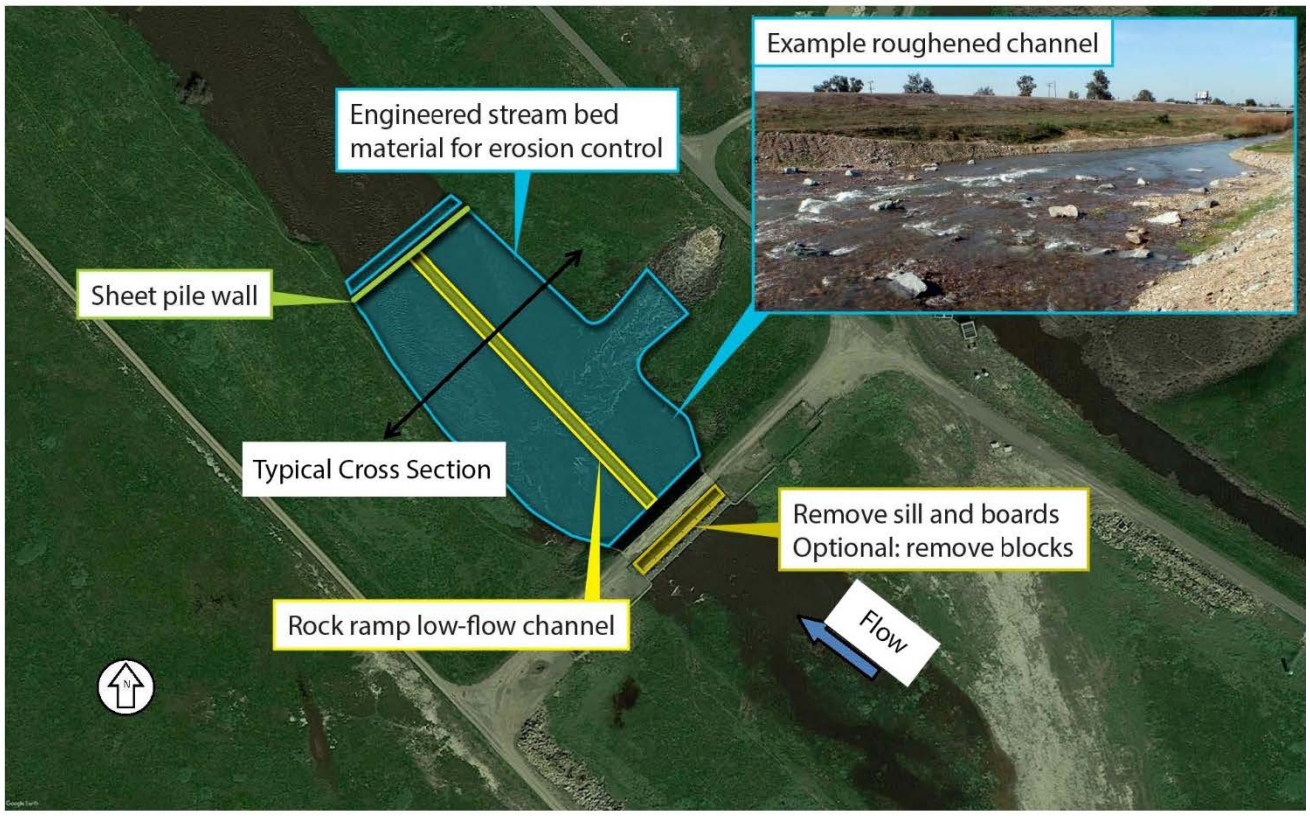
Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

Figure 2-12. Typical Levee Improvement Cross Section



Source: California Department of Water Resources 2017

Figure 2-13. Eastside Bypass Control Structure Rock Ramp Plan View



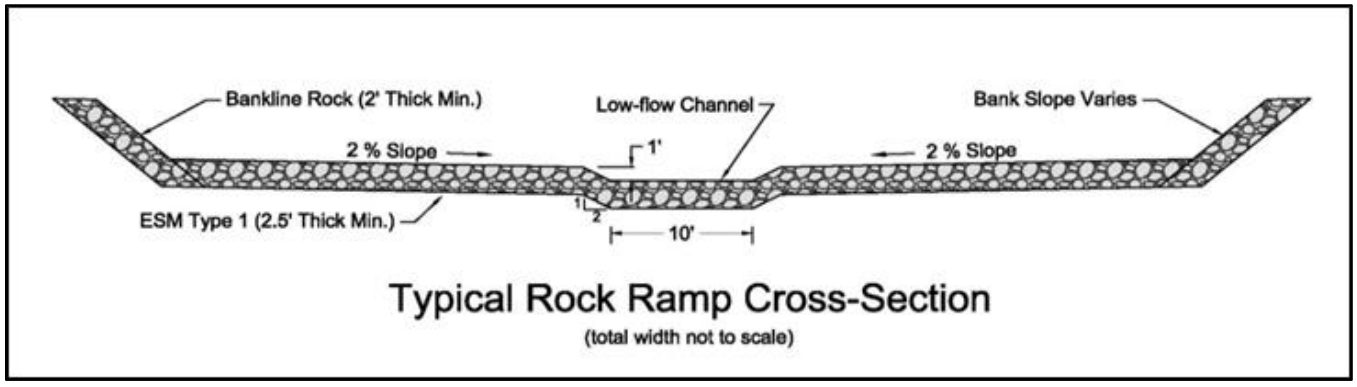
Source: California Department of Water Resources 2017

The slope of the rock ramp would be about 1 percent. To stabilize the ramp, approximately 30-foot-long sheet piles would be driven approximately 20 feet into the existing ground, so the top of the sheet pile matches the final grade elevation of the ramp. The piles would then be backfilled with ESM. Hydraulic controls downstream of the ramp cause the bottom end of the ramp to be backwatered at low flows.

The ramp would be constructed of rock mixes with two different gradations. The upper 50 feet features a larger rock mix to help protect the ramp from potential high velocities if the gates are operated on the structure to divert flows into the Mariposa Bypass during flood flows, or to allow for maintenance downstream of the structure. Gradation of the ESM for this upper portion of the ramp ranges from light class riprap (1.8-foot diameter) down to silt and sand. The top portion of the ramp also features a boulder weir, set slightly higher than the invert of the control structure, that helps stabilize the ramp and creates backwater conditions to provide fish passage through the control structure. All boulders are approximately 3 feet in diameter. If necessary, the upper 50 feet of the ramp between the end of the existing structure and boulder weir may be grouted to prevent erosion from high velocities, with the top upper most layer of material that would not be grouted to mimic a more natural channel, if possible. The remaining part of the ramp has a gradation featuring slightly smaller size boulders (3-foot diameter) down to silt and sand. A larger rock gradation may also be placed near the gated culvert outflow structure (see Figure 2-3) downstream of the structure to help alleviate erosion.

The ramp also features a 1-foot-deep low-flow channel that has a 10-foot bottom width and 2:1 side slopes, making its top width 14 feet (**Figure 2-14**). Hydraulic modeling determined that the low-flow channel has a depth of 1 foot of water depth at a flow of less than 45 cfs to meet the minimum flow depth criterion for fish passage. The water surface profiles at 8,000 cfs for the existing and design conditions, as well as a profile of the ramp and sheet pile wall, are shown in **Figure 2-15**.

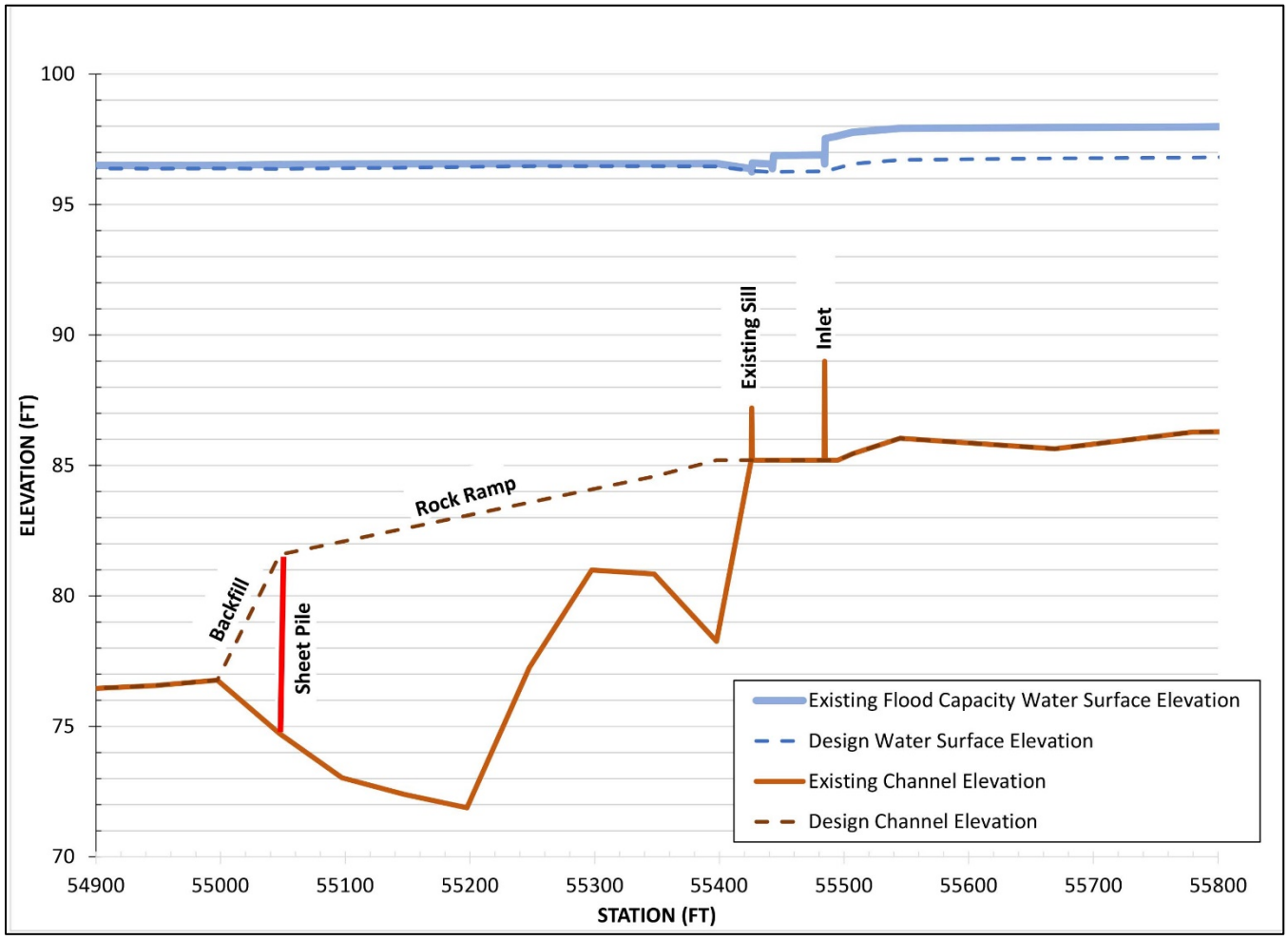
Figure 2-14. Eastside Bypass Control Structure Typical Cross Section



Source: California Department of Water Resources 2017

Average design velocities for SJRRP fishways (rock ramp) must not exceed 4.0 feet per second (fps). In addition, non-pool-type fishways (e.g., rock ramps) that are longer than 200 feet should have average velocities less than 3.0 fps. If that criterion cannot be met, resting areas should be incorporated into the design. For native resident fish, it is recommended that average velocities be kept below 2.5 fps to enable their upstream movement. A one-dimensional model was developed to ensure that the rock ramp meets the criteria for fish passage and flood control. Modeling also informed design features, such as the ramp slope, sizing of the low-flow channel, sizing of ramp and bank materials, and measures to protect the ramp from erosion.

Figure 2-15. Eastside Bypass Control Structure Design Water Surface Elevation



Source: California Department of Water Resources 2017

Modeled water-surface profiles in the project area for Restoration Flows up to 4,500 cfs and flood flows up to 8,000 cfs in the project area show velocities less than 3 fps throughout the entire ramp at all flows, except at the upper most end of the ramp between 600 cfs and 850 cfs (velocities slightly exceed 3 fps). Velocities through the Eastside Bypass Control Structure with the project are lower than 3 fps at flows below about 2,000 cfs, and are below 6 fps below about 8,000 cfs. The depth of water through the rock ramp and Eastside Bypass Control Structure is greater than 1 foot at a flow of 45 cfs and greater than 3.3 feet at a flow greater than 1,000 cfs.

The design meets passage criteria for Chinook salmon and steelhead at all flows from 45 cfs to 4,500 cfs under Restoration Flow releases, but up to 6,000 cfs for flood flows. For white and green sturgeon, project passage criteria are met at flows from 1,000 cfs to 8,000 cfs for both Restoration Flow releases and flood flows, and for Pacific lamprey from 45 cfs to 1,500 cfs for Restoration Flow releases. In general, the velocities within the Eastside Bypass Control Structure exceed the 5 fps velocity criterion for culverts that are between 60 – 100 feet long (National Marine Fisheries Service 2011) for flood flows ranging between 6,000 cfs and 8,000 cfs. However, it is assumed that adult Chinook salmon and steelhead could burst through the Eastside Bypass Control Structure during higher flood flows. The flow ranges meeting passage criteria for native resident species will depend on final design and are variable

and shown below. **Table 2-3** summarizes the range of flows that the rock ramp would provide passage when compared to the design criteria by species in **Table 2-2**. The safe passage range is based on average depth and velocity. Greater passage may be provided in the outer edges of the ramp where velocities would be less.

Table 2-3. Summary of Passage Flows by Species at Modified Eastside Bypass Control Structure

Species	Unimpeded Flow Passage Range (cubic feet per second)
Chinook salmon (adult)	45 – 6,000[1,2]
Central Valley steelhead	45 – 6,000[1,2]
White or green sturgeon	1,000 – 8,000[1]
Pacific lamprey	45 – 1,500[2,3,4]
Other native fish	45 – 250[4,5]

Notes:
1 Impended passage during flood event may occur if gates are operated.
2 Velocities through the bays of the structure exceed the 5 feet per second velocity criterion for culverts between 60 – 100 feet long for flows between 6,000 to 8,000 cubic feet per second. Existing bays of the Eastside Bypass Control Structure, which could be considered culverts, are approximately 70 ft long.
3 Based on an assumed average velocity of 2.8 feet per second.
4 Range of flow could be higher by allowing passage of slower-moving fish on the channel fringes.
5 Based on an assumed average velocity of 2.5 feet per second.
Source: California Department of Water Resources 2017

At 8,000 cfs, the water surface elevation matches that for the existing condition for the segment downstream from the bottom end of the ramp. Throughout the ramp, water surface changes range from a 0.02-foot decrease to a 0.06-foot increase when compared to the existing condition. Decreases in water surface elevation were seen throughout most of the rest of the Eastside Bypass Control Structure with a water surface decrease of just over 1 foot upstream of the control structure for the design condition. Because velocities would increase upstream as a result of lowering the water surface, bank erosion control measures (i.e., riprap, etc.) immediately upstream of the Eastside Bypass Control Structure could be implemented, if necessary.

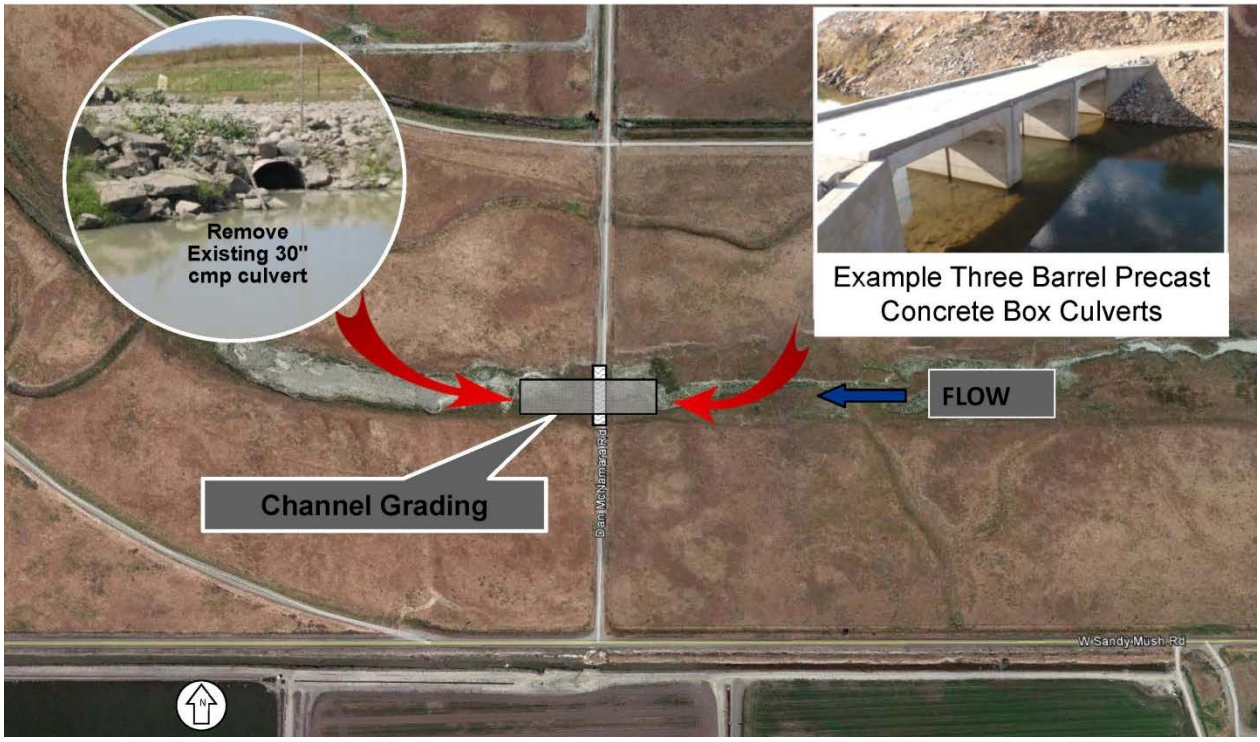
Operating conditions at the modified control structure would influence how the flow is split between the Eastside Bypass and the Mariposa Bypass. The design condition shows there is nearly 700 cfs of additional flows that would be diverted through the Eastside Bypass Control Structure when compared to the existing condition at design flood flows. If needed, the gates could be operated or the boards could be placed back into the Eastside Bypass Control Structure during flood flows to divert additional flows into the Mariposa Bypass. In the rare event that the gates may be operated during flood events and flood flows need to be diverted into the Mariposa Bypass, or if maintenance needs to occur downstream of the Eastside Bypass Control Structure, fish passage through the structure could be impeded although both of these situations are unlikely to occur often and maintenance can be scheduled when salmonids are not present.

Dan McNamara Road Modifications

To provide fish passage at Dan McNamara Road, the existing single low-flow culvert would be replaced with a series of up to three pre-cast concrete box culverts, each approximately 12-feet wide and 10-feet

tall (**Figure 2-16**). The road would remain within the existing County ROW. The culverts and road design would incorporate the Merced County Improvement Standards and Specifications for a two-lane 60-foot wide rural roadway (Merced County 2009). Only the travel lanes and shoulders would be constructed, resulting in a two-lane, approximately 40-foot-wide road. The culvert would be 1-foot thick and would be the top of the road. Up to 200 feet of road on either side of the culverts would be regraded and covered with 6 inches of aggregate base followed by 6 inches of concrete. Riprap would then be placed along the new road embankments for erosion control and covered with native material, if needed.

Figure 2-16. Dan McNamara Road Modifications Culvert Replacement



Source: California Department of Water Resource 2017

The new culverts would also allow for vehicle access for Restoration Flows less than 200-400 cfs depending on the final design. Higher flows would begin overtopping the road prohibiting vehicle access while continuing to provide unimpeded fish passage. Estimates of monthly road closures from Restoration Flows (not flood flows) for the wettest year type are 10 days for the Fall pulse flows November 1 through November 10, and 120 days during spring flows March 1 through July 1. Because of the flexible flow periods in October, the latter part of November, and February, road closures may start earlier or extend later depending on the year-type and how Restoration Flows are released.

Safety features, such as guard railing or a curb, could be added to prevent vehicles from driving off the road crossing. When the road would be inundated, gates or some other barrier would be placed at each end of the road to facilitate road closure and limit access. Warning signs are already present.

Approximately 2,000 cubic yards (cy) of material would be excavated about 500 feet downstream and 200 feet upstream of the new culverts to establish a low-flow channel that would be approximately 45-feet wide with 2:1 side slopes through the culverts. All culverts would be embedded 6-feet deep with approximately 350 cy of ESM or native material to improve fish passage and for future changes in the channel bed as a

result of erosion or deposition and subsidence. The corners of the culverts could be rounded to enhance Pacific lamprey passage.

Cattle are currently allowed to graze in the channel and would continue to graze under project conditions. To keep grazing cattle from crossing the road or getting into the culverts, break away fencing (or some other cattle exclusion barrier) would be added approximately 10 feet upstream and downstream of the culvert openings and at the edge of the ROW. Additional measures to keep cattle out of the culvert include installing metal piping at the openings of the culvert or floating gates but without adversely affecting fish passage.

Modeled water-surface profiles for flow up to 4,500 cfs and flood flows up to 16,500 cfs show velocities of less than 5 fps through the culvert. This is less than the 6 fps velocity criterion specified for culverts less than 60 feet in length (NMFS 2001, 2008).

Table 2-4 summarizes the range of flows that the new culvert would provide fish passage compared to the design criteria by species in **Table 2-2**. The safe passage range is based on average depth and velocity. Greater passage may be provided in the outer edges of the culverts, as well as in the channel as the road is being overtopped. In addition, the culvert bays could be staggered to further enhance fish passage. The flow ranges meeting passage criteria for native resident species will depend on the final design and are variable.

At the design flood stage, the water surface elevation is the same with and without the project (**Figure 2-17**).

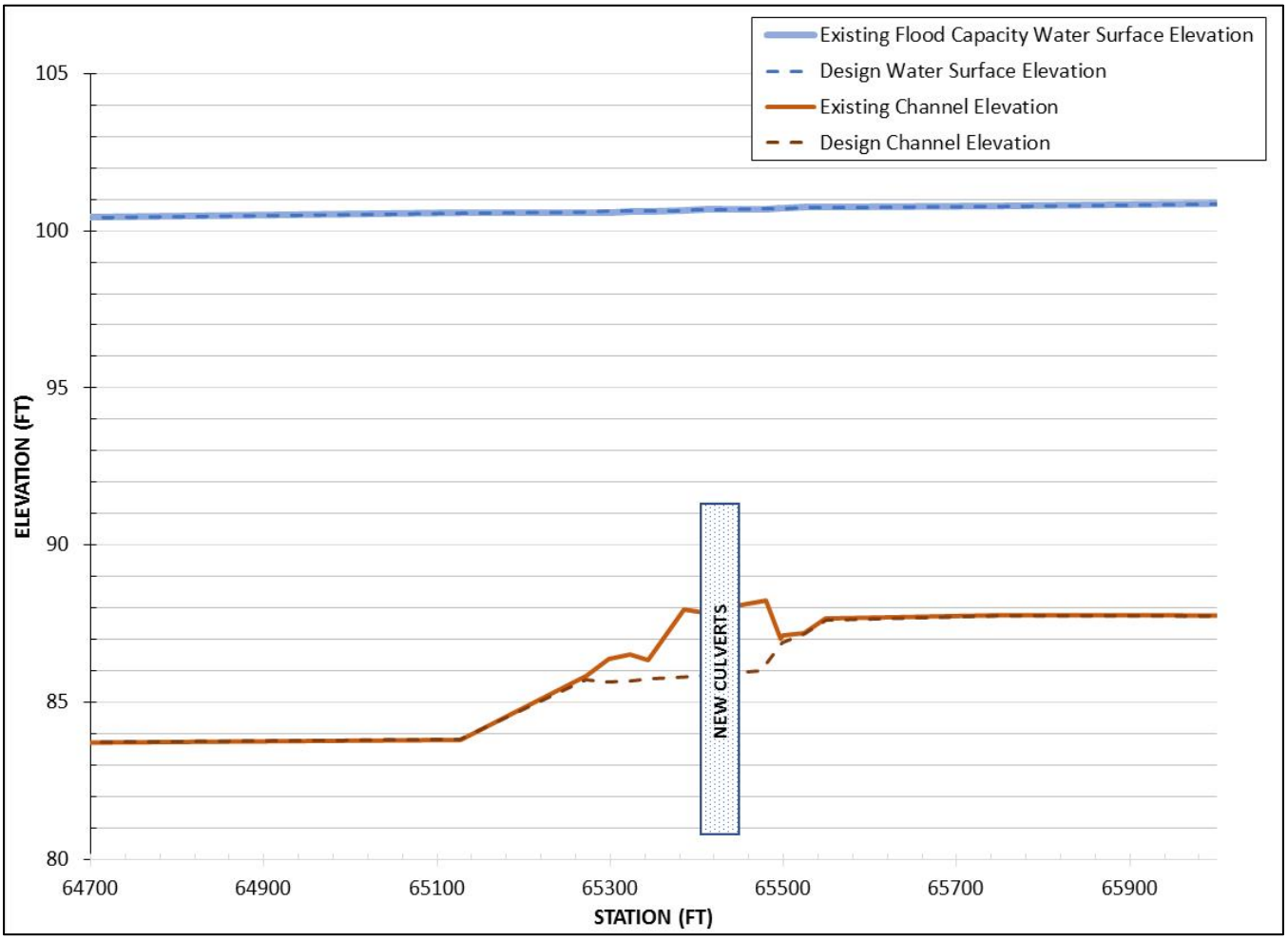
Dan McNamara Road modifications as proposed entail replacing an existing culvert with new and larger culverts, as described above. However, one potential simpler and cost-effective option still under consideration is to remove the culvert without replacement and grade the streambed after culvert removal. Under this option, Dan McNamara Road at the Eastside Bypass would begin to be inundated at any flow, compared to flows above the existing culvert capacity of about 25 cfs.

Table 2-4. Summary of Passage Flows by Species for Dan McNamara Road Modifications

Species	Unimpeded Flow Passage Range (cubic feet per second)
Chinook salmon (adult)	45 – 16,500
Central Valley steelhead	45 – 16,500
White or green sturgeon	200 – 16,500
Pacific lamprey	45 – 400 [2,3]
Other native fish	45 – 350 [3,5]

Notes:
1 Additional features will be designed into the culverts to allow passage, including rounded edges for the culverts.
2 Based on an assumed average velocity of 2.8 feet per second.
3 Range of flow could be higher by allowing passage of slower-moving fish on channel fringes.
4 Passage is likely to occur for flows up to 16,500 cubic feet per second by allowing passage of slower-moving fish on channel fringes.
5 Based on an assumed average velocity of 2.5 feet per second.

Figure 2-17. Dan McNamara Road Modifications Water Surface Elevations



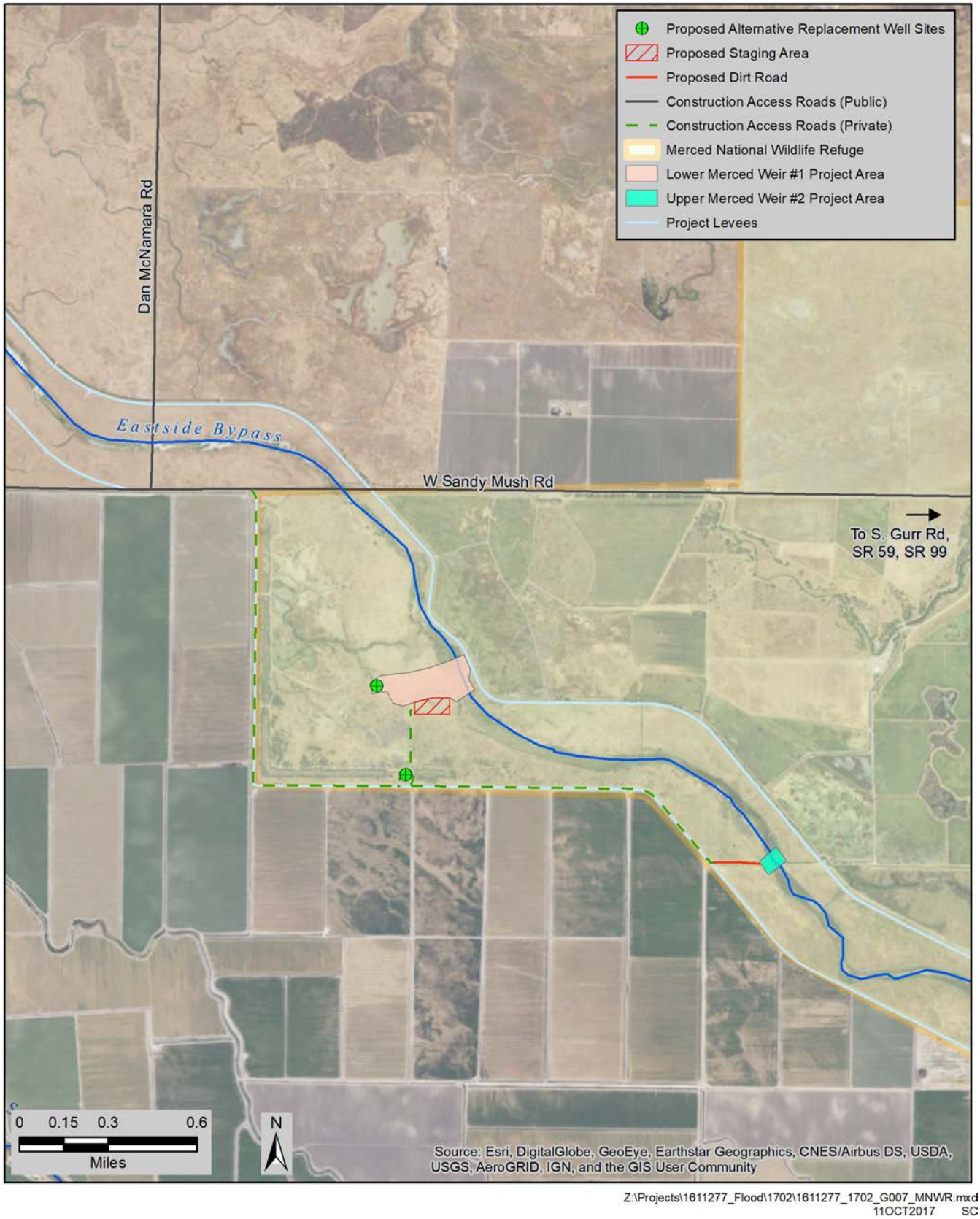
Source: California Department of Water Resources 2017

Merced National Wildlife Refuge Weir Removal and Well Replacement

The two existing weirs in the Eastside Bypass operated by USFWS would be removed by demolishing and removing the concrete foundation, apron, metal grating, and other miscellaneous metal work, and regrading (**Figure 2-18**). An existing non-operational well on the Merced NWR would be replaced with a new well to provide replacement water supply lost by removing the weirs. The replacement well would either be at the existing well location near the west levee, or near where the existing gator pump is located. Existing infrastructure such as power and piping is already at the existing well location. Additional measures, such as installing additional power lines and associated piping infrastructure, may be required if the well is installed near the existing gator pump.

Design parameters of the new replacement well have been determined based on a review of well completion reports of 35 wells drilled within a 3-mile radius of the proposed well site. The replacement well would be screened in the shallow aquifer and would have a target discharge rate of approximately 1,500 gallons per minute (gpm) or about 6.6 acre-feet per day. It would have an approximately 30-inch conductor casing and a 16-inch steel casing. The well pump would be a constant speed 120 horse power vertical turbine pump that produces 1,500 gpm at up to 250 feet of head. The top of the well casing would extend through up to approximately a 4-foot-wide, 4-foot-long, and 4-foot-high reinforced concrete well pump

Figure 2-18. Merced National Wildlife Refuge Weir Removal and Well Replacement



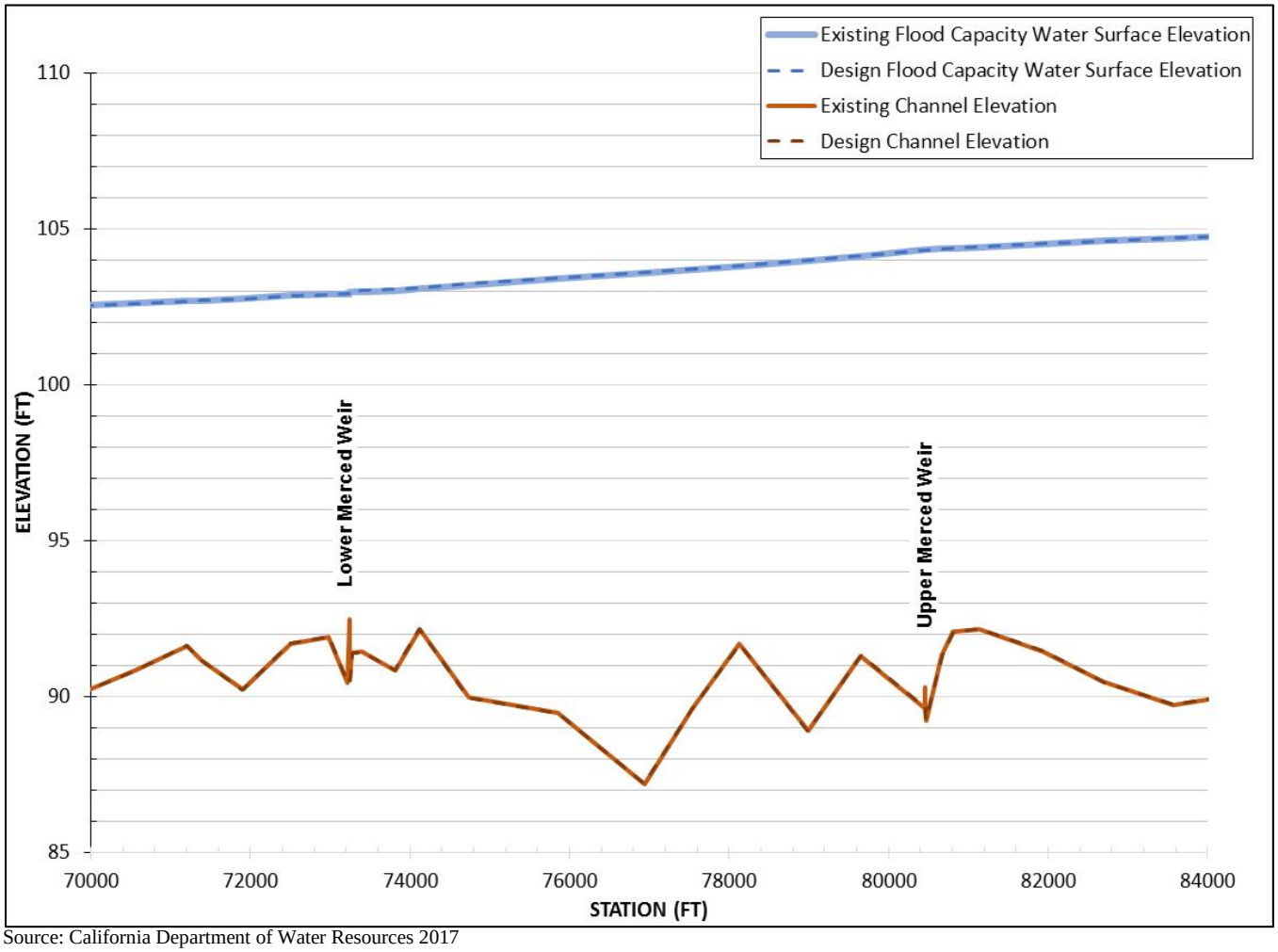
Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

foundation. The motor would be connected to a long stem pipe mounted above flood stage and about 2 feet above the pump foundation depending on its final location. An access ladder attached to the pump foundation may be required to service the motor.

Discharge piping would include approximately 70 feet of a 16-inch diameter pipeline connected to the existing pipe system that feeds the units of the Mariposa Wetlands. The well would operate to pump about 400 to 600 acre-feet per year to meet irrigation needs of the Merced NWR, which would average about 90 days of operation over the 7-month period when the well would be operating each year. Ultimately, the amount of extracted groundwater would depend on year type and availability of other supply sources, but the net use of water would not change.

At the design flood stage, the water surface elevation is the same with and without the project (**Figure 2-19**).

Figure 2-19. Water Surface Elevations between Weirs



Source: California Department of Water Resources 2017

2.3.3 Proposed Land Acquisition/Easements

Land acquisition is not anticipated to be needed for any of the proposed project elements. However, easements will be needed during and after construction depending on the improvement as summarized below.

Levee Improvements

During construction, temporary easements or special use permits would be needed for modifying levees, staging equipment and materials, and placing temporary borrow pits within private lands and the Merced NWR.

Eastside Bypass Control Structure Modifications

During construction, temporary easements or special use permits would be needed for staging equipment and materials, and placing temporary borrow pits within private lands. Because there are some proposed staging areas within a conservation easement held by USFWS, additional coordination will be needed to ensure that any activities are consistent with the easement. After construction, a permanent easement may be needed because the rock ramp would be located on private land.

Dan McNamara Road Modifications

During construction, temporary easements would be needed for modifying the road, staging equipment and materials, and placing borrow pits within county ROW and private lands. Because the channel and culverts are within a conservation easement held by USFWS, additional coordination will be needed to ensure that any activities are consistent with the easement.

Merced National Wildlife Refuge Weir Removal and Well Replacement

For construction activities, a special use permit would be needed for removing the weirs, constructing a new replacement well, and staging equipment and materials.

2.3.4 Proposed Construction Methods

Proposed construction activities within the flood channel are anticipated to take place primarily between April 1 and November 15. Completion of construction of the levee improvements, such as re-grading the levee crown and other activities outside of the flood channel may continue until the end of the year. The construction start date depends on water elevations and permit requirements. Project construction of the levee improvements, Eastside Bypass Control Structure modifications, and Dan McNamara Road modifications would likely occur in one construction season in 2019. Project construction of the Merced NWR weir removal and well replacement would likely occur in one construction season in 2020. Specific construction periods would be determined in concert with NMFS, USFWS, and CDFW to minimize impacts to special-status species.

Construction would take place during daylight hours, typically from 7:00 a.m. to 6:00 p.m., Monday through Friday. These work times may be extended into the evening or weekend during key points of the construction phase, as needed. Adjacent landowners, the LSJLD, Merced County, and the Merced NWR manager would be notified prior to the start of construction activities.

Levee Improvements

Site Access, Mobilization, and Staging

Construction equipment and materials would be transported from State Route (SR) 152, heading north on SR 59, then west on West Washington Road until Harmon Road is reached. The primary staging area would be approximately 31 acres and is located south of West El Nido Road, adjacent to the Eastside Bypass levees. Approximately 2 acres of land from within this area may be needed as potential borrow area capable of providing suitable levee fill material. However, it is not anticipated that a substantial

amount of borrow would be needed. A portion of the staging area may also be used to spoil material in a manner that is acceptable to the land owner. A secondary staging area that is about 2 acres is available just South of West Chamberlain Road may be used. For the Reach O-1 levee improvements, construction equipment and materials would be alternatively transported from SR 59, heading west on Sandy Mush Road and then south on Lone Tree Road. Heading west on a canal maintenance road off Lone Tree Road would lead to an alternate staging area which is adjacent to the levee improvement area for Reach O-1 (see **Figure 2-11**). Staging of equipment would only occur outside of the channel.

Clearing and grubbing would take place in the designated staging area and also along the construction boundary limits of the project. An approximately 24-foot-wide temporary road would be required along the levee improvement areas within the channel along the waterside toe to stockpile degraded material and provide construction route access.

It is anticipated that no public road closures would be necessary because the two construction routes along the levee are not accessible to public vehicles. Nevertheless, the construction area would be clearly marked with construction fencing to indicate to public foot traffic that the construction area is restricted. In addition, signs would be posted at West Washington Road and Lone Tree Road to let the public know not to enter the construction area. If needed, monitors would be used to reinforce the 'no entry' signage.

Based on the timing of construction, dewatering at this location is not anticipated. Still, if the area includes some wetted area, the channel would be pumped down accordingly with an NMFS-approved fish rescue plan in place.

Construction Activities

The One Pass Trench (OPT) Method or the Open Trench Method would be used to construct soil-bentonite cutoff walls through the center of the levees for Reaches O-1, O-3, and O-4. The assumed average height above natural grade for levees is 13 feet, with a 3:1 waterside slope, 2:1 landside slope, and 12-inch crown width. The existing levee would be typically degraded by either 2 feet or by one-third of the levee height to create a working platform, depending on the construction method. The OPT Method requires a 20-foot-wide working platform and the Open Trench Method requires a 40-foot-wide working platform. Prior to degrading the levee, grass would be stripped down from the levee slopes within the improvement area and gravel on the levee crown would be salvaged to the extent possible and stockpiled in staging areas.

Degraded material deemed suitable would be blended with borrow pit material and stockpiled adjacent to the levee in an approximate 24-foot-wide corridor for reuse to reconstruct the top third of the levee after the cutoff wall is placed. The portion of degraded material deemed unsuitable would be separately stockpiled adjacent to the levee and would be used to fill in the borrow pit area or spoiled within the area in coordination with the landowner.

After the working surface has been excavated and prepared, the starter trench would be excavated to the required depths shown on the final design plans for each levee segment. Depending on the construction method, up to 50% of the cutoff wall trench cut soil would be stockpiled in the staging area and later blended with bentonite inside the trench to create the slurry. The starter trench would be backfilled with suitable compacted levee fill material and then an excavator would be used to construct slurry cutoff walls with depths ranging from approximately 23-32 feet and a consistent wall thickness of about 36 inches. A settlement plate and temporary soil cap may be installed depending on final design plans.

The settlement plate would be removed upon approval, and suitable material would be exposed to a trench depth of 1 foot below the working surface. Upon adequate curing of cutoff walls, the trench excavation would be filled to elevations established as part of the final design.

Proper moisture-conditioned embankment materials would be placed in accordance with accepted levee construction standards for material type, lift thickness, and compaction to restore levee height and crown. Embankment material would be meeting requirements of the specifications for levee fill. Each lift would be moisture-conditioned and compacted to the specified density using suitable tamping foot compactors.

The levee degrade and crown reconstruction would include a homogeneous section of suitable low permeability material. Suitability of material would be determined during final design. After the levee is reconstructed, aggregate base or asphalt concrete would be placed on the levee crown patrol road to match preconstruction conditions, and the levee slopes would be seeded and/or planted with approved vegetation. Currently, no asphalt concrete paving of levee crowns is envisioned except for localized areas where reconstruction of short paved ramps from the levee crown to a major road crossing would be needed.

A preliminary field survey was conducted to locate readily identifiable utilities and irrigation channel crossings penetrating the levees. However, a more detailed levee survey would be performed as part of the final design to identify all levee penetrations. The cutoff walls would be constructed in areas where large underground utilities are currently present and it may be possible for the construction contractor to expose utilities and work around them while building the cutoff wall. However, it is also possible that the sizes and depths of some of the utilities may preclude working around them. At such locations, and at major road crossings, it may be necessary to leave gaps in the cutoff wall. Currently, it is anticipated that these gaps would be closed using cement bentonite (CB) panel sections placed to levels under the exposed utilities and the road pavement section. Controlled low-strength material would be placed over the wall to encase and support the utilities and complete backfilling the trench to a point approximately 3 feet below the levee crown or completed road surface. Backfill above the controlled low strength material would be approved levee fill, or road pavement section under the road crossings. Closure panels would overlap the adjacent slurry cutoff walls by a minimum of approximately 25 feet. If utilities are obstructions to the placement of cutoff walls, actual details for handling would be finalized as part of the final project design.

Eastside Bypass Control Structure Modifications

Site Access, Mobilization, and Staging

The site would be accessed from the north from Highway 99, then south on Highway 59 for 7 miles to Sandy Mush Road. From the south, the site would be accessed from Highway 99 to Highway 152, then north on Hwy 59 to Sandy Mush Road (**Figure 2-20**). Once at Dan McNamara Road, the two possible construction routes follow the levees located west of Dan McNamara Road along the Eastside Bypass. Primary staging for equipment would be located along the west side of the project area outside of the levees. In addition, staging of materials (rock, sheet pile, etc.) and equipment could be required within the channel itself. Temporary access ramps into the bypass would be necessary to allow for equipment to move into and out of the channel. Staging and construction footprint areas would be cleared and grubbed. The borrow area would be located in the channel downstream of the rock ramp project area.

Figure 2-20. Proposed Haul Routes and Staging and Borrow Areas for Eastside Bypass Control Structure Modifications

Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

No public road closures would be necessary because the two construction routes near the project area are not accessible to public vehicles. Nevertheless, the construction area would be clearly marked with construction fencing to indicate to public foot traffic that the construction area is restricted. In addition, signs would be posted at the transition of West. Sandy Mush Road and Dan McNamara Road to let the public know not to enter the construction area. If needed, monitors would be used to keep the public out of the construction area.

Because of the high groundwater at the site, and the possibility of low flows within the channel, dewatering may be needed at the site.

Construction Activities

The sill, boards, and energy dissipation blocks at the control structure would be saw-cut, demolished, and removed, as needed. Approximately one to two large dump trucks full of material would be removed and transported to the nearby landfill.

Approximately 13,000 cy of fill would be excavated from the channel downstream of the ramp to construct the base for the approximately 380-foot-long ramp (to get to subgrade elevation). The ramp has a 1% slope downstream of the control structure. Laterally, the ramp would extend from bank to bank, with a 2% slope towards the middle of the channel.

Approximately 11,500 tons of ESM would be used to construct the top layer of the ramp, featuring two different rock gradations. The upper 50 feet would be constructed of a larger rock mix with a gradation from light class riprap (1.8-foot diameter) down to silt and sand. This section of the ramp may need to be grouted to withstand possible velocities from operation of the gates during floods. The remaining 330 feet of the ramp would be constructed of a gradation featuring slightly smaller size boulders (1.3-foot diameter) down to silt and sand. A weir, spanning the entire channel and featuring 3-foot-diameter boulders, would be installed about 30 feet downstream of the control structure. The weir would have two levels of rocks, a footer level to provide support and an upper level with its top at final grade.

A 1-foot-deep, low-flow trapezoidal channel would be created within the ramp, with a bottom width of approximately 10 feet and 2:1 side slopes. Individual 3- to 4-foot-diameter boulders (approximately 2 tons) would be placed in the low-flow channel at approximately 10-foot spacing to provide flow complexity, embedded such that one-third of their diameter protrudes from the bed. Outside of the low-flow channel, individual boulders would be placed beginning from about 150 feet upstream of the lower end of the ramp, with denser placement towards the top end of the ramp to provide resting areas for fish. A larger rock gradation may also be placed near the gated culvert outflow downstream of the structure to help alleviate erosion.

A 2-foot-thick bankline rock mix, with the same gradation as the smaller ESM mix, would be placed along the banks of the rock ramp. Both the ESM and bankline rock mix would be in machine-tamped lifts not to exceed 1 foot, followed by water jetting to seal voids. Fine-grained material would be added and water jetting continued until voids are filled and water flows on the surface. Excess material would be removed from the surface prior to channel flows back into the work area. Water used during the jetting process would not be allowed to discharge into the channel downstream, but would be reused or pumped into an approved dewatering system. Large rocks may need to be shifted to obtain the desired rock layout and embedment.

A sheet pile driver would be used to drive 30 feet of sheet pile to create an approximately 200-foot-long sheet pile wall at the bottom end of the ramp. The sheet pile would be driven approximately 20 feet into the ground, and extend about 10 feet above ground and key about 20 feet into the banks. The end of the ramp would then be backfilled to a 2:1 slope to stabilize the ramp so that no sheet pile is protruding into the ramp.

Construction is scheduled to begin towards the end of the spring pulse flows, when Restoration Flows would be at a minimum. If the gates on the control structure cannot be closed because of Restoration flows to work in the dry, the sheet pile wall would be extended another approximately 5 feet to prevent backwater from downstream going into the work area. The upper 5 feet would then be cut after construction is finished. If construction must occur during low flow, a sheet pile wall would extend lengthwise down the center of the ramp to allow flows through a portion of the bays of the control structure and staged construction. This may require an additional approximately 380 feet of sheet pile.

Dan McNamara Road Modifications

Site Access, Mobilization, and Staging

Dan McNamara Road is accessed from the north from Highway 99 to Highway 59, then south on Highway 59 for 7 miles to Sandy Mush Road. The site is accessed from the south from Highway 99 to Highway 152, then north on Highway 59 to Sandy Mush Road (**Figure 2-21**). Construction equipment and materials would use either of these routes to mobilize equipment to the site.

Clearing and grubbing would take place in the designated staging area and also along the construction boundary limits of this project element. The construction contractor would determine if any mature trees within the construction footprint could be preserved and marked to be saved.

Public road closures would be necessary because the roads adjacent to the project area are accessible to public vehicles. The construction area would be clearly marked with proper road closure signs and detours to indicate that the construction area is restricted.

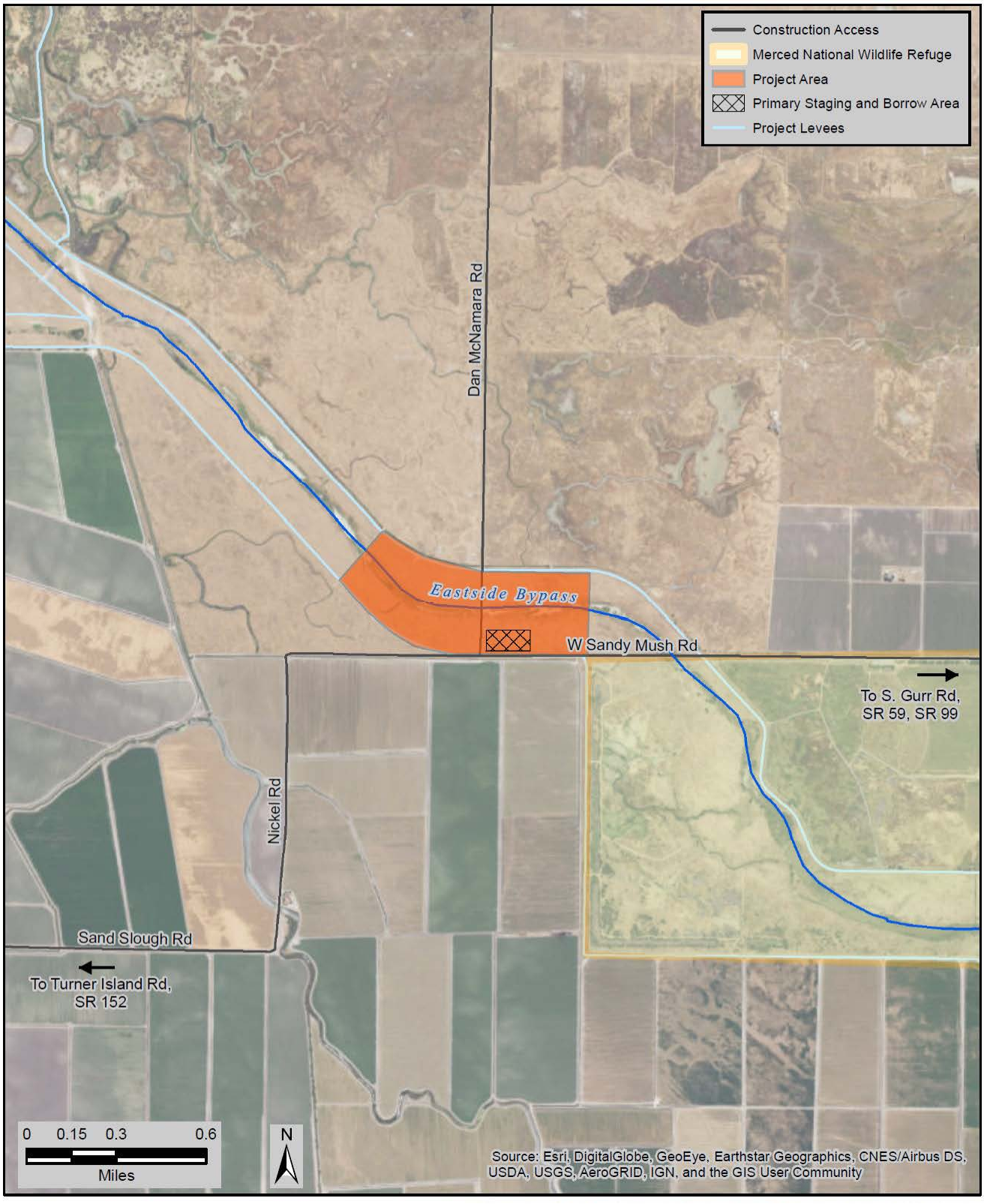
Construction is scheduled to begin after the fall pulse flows when Restoration Flows would be at a minimum so dewatering would be minimal or not needed. However, if water in the channel is present, temporary earthen dams would be constructed upstream and downstream of the low-flow crossing to divert the flow into an existing secondary channel or new temporary channel/culverts to bypass the work area. This secondary channel and existing culvert under the road may need maintenance or the new temporary channel would require excavating materials to allow the diverted flows to pass through.

Construction Activities

An existing 30-inch corrugated metal pipe would be removed under the road crossing. Existing barbed wire fencing and other debris would also be removed upstream and downstream of the project work area. Existing riprap protection would be moved and reused if possible. Unwanted demolished items and debris would be loaded and transported by dump truck off site to a nearby landfill.

At the location where the existing culvert would be removed, an excavator would over-excavate to a depth of approximately 8 to 10 feet by 60 feet long and 60 feet wide that would total approximately 600 cy of material to create space for the pre-cast concrete box culverts and wing walls. The excavated material would be re-used to backfill once the culverts are set in place. Once the area has been properly

Figure 2-21. Proposed Haul Routes and Staging and Borrow Areas for Dan McNamara Road Modifications



Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

staked and graded, a sheepsfoot roller compactor would be used to prep the subgrade (95% compaction) before the 12-inch aggregate base layer is placed. The aggregate base layer would then be placed and compacted with a roller compactor also to 95% compaction before installing the culverts.

A crane would be used to unload and place the pre-cast box culverts in the proper location. An excavator would be used occasionally to assist. The box culvert dimensions would be 10-foot tall by 12-foot wide and 40-foot long. The side walls would be a minimum of 8-inches thick, while the top and bottom thicknesses would be at least 12 inches. Three culverts would be placed side by side to increase flow capacity and improve fish passage through the crossing. The top of the culverts would be set at the finished grade of the road, and no additional aggregate base or concrete paving would be needed above the culverts.

A front-end loader, excavator, and sheepsfoot roller compactor would be used to backfill along the sides of the culvert up to the design road subgrade. Additional compacted fill may need to be imported. At this time, the channel subgrade would be prepared for placement of the ESM or native material, as appropriate. Approximately 880 tons of ESM may be placed upstream of, downstream of, and inside the culverts. It is assumed that all three culverts would be filled with 6 feet of ESM or native material; however, heights of the ESM or native material in each culvert may change after further hydraulic analysis is done to improve fish passage.

A motor grader, roller compactor, and water truck would then be used to grade and compact (95% compaction) the road subgrade and prepare it for aggregate base placement. Transfer trucks would be used to deliver approximately 190 tons of aggregate base to the project site and the same equipment would be used to grade and compact (95% compaction) the aggregate base prior to paving the road with concrete. Approximately 144 cubic yards of concrete would need to be delivered to pave the road on both sides of the box culvert and to construct curbing, as needed.

After the concrete pavement cures after several days, erosion control measures (riprap) along the new road embankments would be placed and barb wire fencing installed. Access gates would also be installed on each side of the levees to prevent public access when flows overtop the crossing.

If DWR elects to remove the existing culvert without replacement, construction would be greatly simplified. The existing culvert would be removed and the streambed graded at the site. A front-end loader, excavator, and sheepsfoot roller compactor would be used to backfill the culvert up to the design road subgrade. Additional compacted fill may need to be imported.

Merced National Wildlife Refuge Weir Removal and Well Replacement

Site Access, Mobilization, and Staging

The two weirs and groundwater well are within the Merced NWR, approximately 18 miles southwest of the City of Merced. Access to both weirs would be from Sandy Mush Road and then the levees within the NWR (see **Figure 2-18**). To access the weirs for removal and to drill the new well, a temporary road down to each weir would need to be constructed. Construction equipment and materials would use either of these routes to mobilize equipment to the site.

Clearing and grubbing would take place in the designated staging area and also along the construction boundary limits of the project element. The construction contractor, in consultation with the NWR, would determine what vegetation within the construction footprint could be preserved and marked to be saved.

Construction is scheduled to begin so that dewatering would be minimal or not needed. However, if water in the channel is present, a temporary earthen dam would be constructed upstream of the weir into a secondary channel to bypass the work area.

Construction Activities

Dump trucks would remove and transport material from the weir removal and other miscellaneous items to a nearby landfill. Removal of the existing lower weir includes removing the middle concrete walls, metal walkway grating, and miscellaneous structural steel, as well as removing the concrete sill, sediment, and debris. The concrete abutment and the grouted cobbles on the spillway may be left intact if it will not cause scour or fish passage issues. Removing the existing upper weir includes demolishing and removing the concrete foundation, apron, metal grating, and miscellaneous metal work, before regrading and any necessary dewatering.

An existing non-operational well to provide irrigation to the refuge would be replaced. The replacement well would be drilled and screened within the shallow aquifer with a 30-inch conductor casing, 16-inch steel casing, and would discharge at a rate of approximately 1,500 gpm. A 120-horsepower vertical turbine pump would produce 1,500 gpm at up to 250 feet of head. It would discharge water to the wetlands through a 16-inch-diameter pipeline connected to the existing pipe system. The replacement well would operate in a fashion similar to other refuge wells by providing close to 400 to 600 acre-feet per year with an anticipated average operating time of up to 90 days over the 7-month operating period to meet the irrigation needs of the refuge.

The exact location of the well would be determined based on factors such as groundwater availability, the presence of salinity and boron, sodium-absorption ratio, and related parameters after conducting a hydrogeological assessment of the area by a qualified driller or professional consultant. The assessment would include a location that would limit the impacts of subsidence and take into considerations the factors above for final well design. Two sites are under consideration, and an exploratory well would be drilled as a near-term action.

After preliminary design work is complete, test or pilot holes may be taken at the selected location to obtain more detailed information. A mud pit would be constructed and conventional rotary or reverse rotary drilling technique would be employed. Drilling for an irrigation well could last several weeks. After the well bore is drilled, the driller would install 16-inch steel casings, appropriately sized screens, selected gravel fill around the casing, and a bentonite and cement grout seal at the annulus to prevent aquifer contamination. The depth of grout placement would adhere to minimum requirements set forth by the California Well Standards, Bulletin 74-90 (DWR 1991).

After placement, the well would be developed by water jetting or pressurized air to clean the borehole and to properly settle the gravel around the screen. The well would be properly developed as to ensure the gravel pack keeps fines out to provide an unrestricted flow path for water. An aquifer test would be conducted to check water levels in the well to determine the permeability of the aquifer, and well efficiency and capacity. A sanitary seal would be placed at the well head followed by installing a power source and 120 horsepower pump. A reinforced concrete pump foundation would be constructed and the motor extended above flood elevation. Final design of the pump may be adjusted based on the aquifer test results. Since the surrounding area includes agricultural area and wetlands, the well seal and a backflow prevention device would be installed in a manner as to prevent contaminated water from possible fertilizers or pesticides from flowing back into the well when the pump is shut off. The well surface seal would adhere to minimum requirements set forth in DWR Bulletin 74-90 (DWR 1991).

2.3.5 Anticipated Construction Equipment

Throughout the entire project area, approximately 50 construction personnel and four construction supervisors are estimated to be on-site daily during construction between all of the proposed improvements. Private worker vehicles would be parked within the staging areas or on top of the levee road where the levee is in close proximity to the construction footprint.

Levee Improvements

There would be up to approximately 20 construction personnel and one foreman on site daily during levee improvements. Equipment use is estimated as follows:

- Excavator - two per day, 80 days
- Long Reach Excavator – one per day, 60 days
- Dozer - one per day, 60 days
- Front-end Loader - two per day, 40 days
- Transfer Trucks (5-axle, 20 tons/load) – one per day, 80 days
- Grader - one per day, 100 days
- Water Truck - one per day, 80 days
- Sheepsfoot Roller – one per day, 60 days
- Smooth Drum Roller – one per day, 50 days
- Other equipment (compressor, generator, saws, etc.) - two per day, various days
- Both heavy and light duty trucks would be used throughout construction

Eastside Bypass Control Structure Modifications

There would be up to approximately 15 construction personnel and one foreman on site daily during project construction. Equipment use is estimated as follows:

- Excavator – up to two per day, 60 days
- Dozer – one per day, 45 days
- Front-end Loader –up to two per day, 45 days
- Transfer Trucks (5-axle, 20 tons/load) – up to five trucks per day, 40 days
- Roller Compactor – one per day for half days, 40 days
- Crane – one per day for half days, 40 days
- Sheet Pile Driver – one per day, 10 days
- Dewatering and Water Jetting Pumps – two per day, 40 days
- Water Truck – one per day, 45 days
- Other equipment (compressor, generator, saws, etc.) – one per day, various days
- Both heavy and light duty trucks would be used throughout construction

Dan McNamara Road Modifications

There would be up to approximately 19 construction personnel and one foreman on site daily during project construction. Equipment use is estimated as follows (equipment use and personnel would be substantially reduced if DWR elects to remove the culvert without replacement):

- Excavator – up to two per day, 19 days
- Dozer - one per day, 4 days
- Loader/Backhoe Combo – up to two per day, 26 days

- Front-end Loader - one per day, 14 days
- Roller Compactor - one per day, 8 days
- Crane - one per day, 3 days
- Transfer Trucks (5-axle, 20 tons/load) - three trucks per day, 5 days
- Grader - one per day, 3 days
- Water Truck - one per day, 45 days
- Concrete Mixing Truck - three trucks per day, 2 days
- Other equipment (compressor, generator, saws, etc.) - one per day, various days
- Both heavy and light duty trucks would be used throughout construction

Merced National Wildlife Refuge Weir Removal and Well Replacement

There would be up to approximately 13 construction personnel and one foreman on site daily during project construction. Equipment use is estimated as follows:

- Excavator - one per day, 80 days
- Dozer - one per day, 40 days
- Transfer Trucks (5-axle, 20 tons/load) - one truck per day, 80 days
- Water Pump – one per day, 60 days
- Crane – one per day, 20 days
- Drilling Rig – one per day, 40 days
- Water Truck - one per day, 80 days
- Other equipment (compressor, generator, saws, etc.) - one per day, various days
- Both heavy and light duty trucks would be used throughout construction.

2.3.6 Operations and Maintenance

Operations and maintenance of the Eastside Bypass improvements would be performed by several entities as described below. The timing of maintenance of structures within the bypass would depend on the flow hydrograph and forecasted flows but typically can be expected in summer/fall after high spring flows have receded. Cleaning of the in-channel structures typically would occur when flows are low enough to allow crews and equipment to enter the river safely to access the structures. All maintenance activities, when possible, would be timed to minimize potential impacts to fish and wildlife. Access and safety concerns, as well as timing of flows, may affect timing of the maintenance activities.

Levee Improvements

The existing Eastside Bypass levees are currently maintained by LSJLD as provided in an agreement with CVFPB. This includes routine vegetation management, levee inspections, levee restoration and repair, rodent control, encroachment removal, and levee patrolling during flood events. The proposed project would not change any of these maintenance needs, and LSJLD would continue to maintain the levees under its current agreement. There would be no change from existing conditions.

Eastside Bypass Control Structure Modifications

The Eastside Bypass Control Structure is operated and maintained by LSJLD. LSJLD operates the structure to direct flood flows between the Lower Eastside Bypass and the Mariposa Bypass. The new rock ramp and modifications would not change LSJLD's ability to operate the structure during flood events. With the modifications, the flow split between the Lower Eastside Bypass and Mariposa Bypass does change slightly. However, it is not expected that the slight change would necessitate a change in

how LSJLD has operated the structure during floods in the past. During gate operations, fish passage through the structure may be negatively affected. However, gates have not been operated during normal floods in the past and would continue similarly with the proposed project.

Maintenance to the Eastside Bypass Control Structure would not change as a result of the proposed project. However, maintenance to clear debris from the rock ramp may be necessary after large flood events. Furthermore, there is a slight chance that operations of the structure during floods could cause rock movement in the rock ramp and require some maintenance. If a majority of the gates are closed during a flood operation, the flow velocities may cause rock to move within the ramp and require maintenance to retain its shape. It is very unlikely that LSJLD would operate the gates in that manner based on future expected operational needs and historical gate operation.

Any required maintenance performed on the rock ramp would be performed by DWR during the first 5 years after construction or until funding for maintenance runs out. An agreement would be needed between DWR and the private landowner to allow DWR maintenance. The agreement would likely allow maintenance to allow DWR to maintain the structure as long as funds are available.

Dan McNamara Road Modifications

Merced County currently performs operations and maintenance within the Dan McNamara Road ROW for traffic crossing. Operations currently occur during flood events as the County closes the road, provides a 1.5-mile detour along the bypass levee, and posts the closure and detour on its website. Closing the road includes placing blockades or signs and opening and closing gates to access the detour. Flood flows generally would close the road from several weeks to several months every 4 to 5 years on average. Maintenance activities by the County currently include re-grading the road and debris removal from the top of the road after flood events, as necessary. It does not appear that the County currently maintains the existing culvert.

During Restoration Flows, the road would likely be closed up to twice per year during the spring and fall pulse flows when the road and culverts are overtopped. Road closures during Restoration Flows would also include detour signs and closing of gates as needed. Maintenance activities would likely increase due to Restoration Flows overtopping the road up to twice annually. Maintenance would also be required to remove excess sediment and debris from the culvert openings, as necessary, to ensure unobstructed fish passage. After Dan McNamara Road overtopping events and prior to the irrigation season for agriculture, the crossing would be inspected and any debris would be removed from the culvert openings. If the engineered streambed material near the site begins to erode, the material would be replaced. If the low-flow channel needs to be re-established, additional earthwork may be necessary.

DWR has met with the County regarding the County's continued maintenance obligation at the road during flood flows and Restoration Flows. DWR and the County would enter into an agreement to describe the activities that would be needed by the County to maintain the road to improve fish passage.

Merced National Wildlife Refuge Weir Removal and Well Replacement

The Merced NWR operates and maintains the weirs that are being removed as part of the proposed project. The refuge also operates and maintains several groundwater wells and a portable gator pump that supplies water to wetlands within the refuge. The removal of the weirs would reduce any future operations and maintenance of these structures. The new replacement well would have similar operations and maintenance of the well it is replacing. In general, the life expectancy of the well pump is assumed to be 10 years and that of the well up to 25 years. Operations would be expected to follow the

pump manufacturer's operations manual. The Merced NWR would continue to operate and maintain the well in the same manner as the well being replaced.

Chapter 3. Environmental Setting, Impacts, and Mitigation Measures

This chapter briefly describes the environmental setting of the project area, the regulatory setting for each of the resources that may be affected by the proposed project, and a discussion of the potential environmental impacts associated with the no action alternative and the proposed project. There would be only minor adverse impacts associated with the no action alternative so this chapter focuses on the proposed project.

The environmental setting for each resource describes the existing conditions when the environmental analyses were initiated and conducted for this environmental documentation: 2016 and 2017. The setting includes Restoration Flows, which were initiated in January 2014 but not regularly achieved, as well as other implemented SJRRP actions that have affected the physical environment.

For each resource, there is a discussion of the potential environmental impacts associated with construction and operations and maintenance of the proposed project. Potential direct and indirect impacts of the proposed project are analyzed in accordance with 40 CFR 1508.8. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action but are later in time or farther removed in distance. The IS/EA analyzes the direct and indirect impacts for each resource, but does not specifically differentiate between direct and indirect. In addition to being analyzed for each resource section, direct and indirect impacts are analyzed in association with other past, present, and probable/reasonably foreseeable impacts in Section 4.1, "Cumulative Impacts."

CEQA Guidelines Appendix G was used as the basis for assessing the significance of potential environmental impacts, taking into account the whole of the action as required by CEQA. Agency standards, regulatory requirements, and professional judgement were also used, where appropriate. For the purposes of NEPA, the context and intensity of the significance of potential project effects was taken into consideration.

Each of the resources was evaluated and determinations were made to describe the level of significance of impacts. The impact levels are categorized based on their level of significance and whether they can be mitigated to lessen the impact on the environment. This IS/EA uses the following terminology based on the CEQA Guidelines to denote the significance of each environmental impact. CEQ Regulations for NEPA do not require significance determinations. Impact categories are provided below:

- **No Impact.** No impact indicates that the proposed project would not have any direct or indirect impacts on the environment. It means that no change from existing conditions would result. This impact level does not require mitigation under CEQA.

- **Less-than-Significant Impact.** These are impacts resulting from the implementation of the proposed project that would not have a substantial and adverse effect on the environment. This impact level does not require mitigation under CEQA.

- **Less-than-Significant Impact with Mitigation Incorporated:** These are impacts that typically would have a significant or potentially significant impact to a resource prior to implementing mitigation measures. Once mitigation measures are implemented, however, the impacts to that resource would be reduced to a less-than-significant level.

- **Potentially Significant or Significant Impact:** These are impacts that are deemed to be potentially significant or significant. Under CEQA, feasible mitigation measures or alternatives to the proposed project must be adopted, when available, to avoid, minimize, reduce, or compensate for potentially significant or significant impacts. In this IS/EA, all potentially significant or significant impacts can be reduced to a less-than-significant impact with implementation of feasible mitigation measures.

- **Beneficial Impact:** Beneficial impacts are not specifically identified in the CEQA Environmental Checklist but are useful to identify changes to the condition of a resource that are beneficial to the resource.

Mitigation measures are provided to reduce potentially significant and significant impacts to less-than-significant levels, where applicable. Implementation of all mitigation measures are the responsibility of DWR (for the Eastside Bypass levee improvements, Eastside Bypass Control Structure improvements, and Dan McNamara Road improvements) and Reclamation (for the Merced NWR weir removal and well replacement improvements).

3.1 Aesthetics

Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
I. AESTHETICS – Would the project:					
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐	☐

3.1.1 Environmental Setting

Visual Resource Evaluation Concepts and Terminology

This visual resource assessment is based on the visual resource inventory methodology found in the Federal Highway Administration's (FHWA's) *Visual Impact Assessment for Highway Projects* (FHWA 1988). The following section describes the visual resources in the Eastside Bypass.

Both natural and created features in a landscape contribute to its visual character. Landscape characteristics influencing visual character include geologic, hydrologic, botanical, wildlife, recreation, and urban features. The basic elements that comprise the visual character of landscape features are form, line, color, and texture.

Visual quality was analyzed using the following criteria developed by FHWA (1988) and the U.S. Forest Service (USFS 1995):

- **Vividness** - Describes the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns.
- **Intactness** - Describes the visual integrity of the natural and human-built landscape and its freedom from encroaching elements.
- **Unity** - Describes the visual coherence and compositional harmony of the landscape considered as a whole.

In addition to visual character and quality, viewer sensitivity is also considered in assessing the effects of visual change and is a function of several factors. Viewer sensitivity and concern are based on the visibility of resources in the landscape, proximity of the viewers to the visual resource, elevation of the viewers relative to the visual resource, frequency and duration of views, numbers of viewers, and types and expectations of individuals and viewer groups. Landscape elements are considered higher or lower

in visual importance based on their proximity to the viewer. Generally, the closer a resource is to the viewer, the more dominant, and thus the more visually important it is to the viewer. Visual sensitivity is generally higher for views that are observed by residents of an area, people who are driving for pleasure, or who are engaging in recreational activities such as hiking, biking, camping, fishing, or bird watching.

Existing Visual Resources in the Project Area

This visual analysis considers one relevant landscape type: the flat alluvial plain of the Central Valley. The project area is located in the San Joaquin Valley (which comprises the southern half of the Central Valley), approximately 10 miles southwest of Merced and approximately 11 miles northeast of Los Banos. The project area is generally approximately 1.5 miles northeast of the San Joaquin River, except at the southern end of the proposed levee improvement area which is approximately 0.5 mile from the river. The project area, and all of the adjacent land, is flat.

The vegetation elements of the project area and vicinity consist primarily of agricultural land, most of which has been planted with irrigated row crops and open space. Water fills the Eastside Bypass temporarily for a few days or weeks during winter and early spring flood flows during some years. In summer, very little water has been present, usually in small, isolated pools although some agricultural return flow is typically present. Restoration Flows from Friant Dam since January 2014 have been limited because of both drought and flood conditions, but can increase up to approximately 300 cfs under existing conditions. The built environment in the project area and vicinity consists of irrigation canals and drainage ditches, water pumping stations, agricultural machinery and storage areas, fencing, local roads, the Eastside Bypass Control Structure, the upper and lower Merced NWR weirs, and the Eastside Bypass levees. Sandy Mush Road provides the primary access to the northern portion of the project area for residents and recreationists. Local Merced County roadways and farm roads, many of which are unpaved (e.g., Dan McNamara Road and West El Nido Road), provide access to the project area for residents and farm workers. The closest residence is located approximately 1 mile east of the levee improvements area.

Most of the project area is located within either the Merced NWR or the Grasslands Wildlife Management Area. A small portion of the project area, at the southern end of the proposed levee improvements, is outside and south of the Merced NWR. In fall, winter, and spring, when wetlands are flooded, wildlife is present, and the grasses are green, the Grasslands Wildlife Management Area and the Merced NWR display a high degree of visual cohesiveness, intactness, and unity. The water channels and visible and abundant wildlife, particularly migratory birds, combine to provide a memorable and scenic view. As viewed from Sandy Mush Road and the Refuge's public use areas, the wetlands and wildlife provide a sense of visual relief from the generally brown annual and perennial grasses during the hot summer months. Most of the project area is accessible to recreationists in the Merced NWR who come to the refuge for wildlife viewing and waterfowl hunting opportunities. The northern portion of the project area is within the Grasslands Wildlife Management Area, which is not open to the public but private waterfowl hunting clubs are available for recreational use.

The existing Eastside Bypass Control Structure is shown in **Figure 3.1-1**. The structure is more than 200 feet across and has six 20-foot-wide gated bays. Because of its visual mass, form, and linear nature, the structure stands out in the landscape and detracts from the sense of intactness and unity in the surrounding landscape. Due to its large size, the Eastside Bypass Control Structure is visually dominant in the landscape and intrudes on the scenic viewshed even in background views from the surrounding area.

Where the proposed road culverts would be installed, Dan McNamara Road consists of a one-lane dirt and gravel surface (**Figure 3.1-2**). The existing viewshed in summer is typically brown annual and perennial

Figure 3.1-1. View of the Eastside Bypass Control Structure in Summer, Looking Downstream to the North

Source: California Department of Water Resources 2017

Figure 3.1-2. View of Dan McNamara Road Crossing the Eastside Bypass during Inundation, Looking North

Source: California Department of Water Resources 2017

grasses on flat land that stretches to the horizon in all directions, but a thin strip of green grasses now occurs after flood and/or Restoration Flows are present. During the winter rainy season, the land on the northeast side of the proposed road construction consists of water channels interspersed with tall grasses. Water present in the bypass during winter flood flows and Restoration Flows overtops the road surface (see Figure 3.1-2). Land immediately to the south of Dan McNamara Road consists of irrigated row crops that are green during the growing season. The road tends to blend into the surrounding landscape and is visually similar to existing agricultural access roads throughout the project area.

The lower and upper Merced NWR weirs are shown in **Figures 3.1-3** and **3.1-4**, respectively. Both of these photographs were taken during winter and provide views of the bypass with water diverted for wetland management. The surrounding land is flat. Row crops are present on the west side of the bypass in this area, while wetland areas are present on the east side of the bypass. Scattered trees are present in the bypass near the lower weir. Although the structures are of a relatively small scale, the lower weir stands out in the landscape immediately adjacent to the structure (in foreground views) because of its form and linear nature and it visually detracts from the intactness and unity of the surrounding landscape.

Representative photographs showing the Eastside Bypass in the vicinity of the proposed levee improvements in spring and summer are provided in **Figures 3.1-5** and **3.1-6**, respectively. The Eastside Bypass includes project levees that were constructed as part of the LSJRFC or Lower San Joaquin River and Tributaries Project, in the 1960s. Levee heights in the project area are about 10–14 feet above the landside toe elevation. Crest widths are 10–12 feet, the landside slopes range from about 2 horizontal to 1 vertical (H:V) and 3H:1V, and the waterside slopes range from approximately 2H:1V to 4H:1V. The levees in the project area were raised 2–3 feet in 2000 by DWR to reduce the impacts of regional subsidence. Due to the relatively low heights of the existing levees and the earthen sides covered with native vegetation, when viewed from a distance they blend into the existing landscape. Most of the levee improvements area is in the Merced NWR immediately adjacent to the Lone Tree waterfowl hunting unit, and therefore is visible to recreationists, particularly during the waterfowl hunting season.

The southern end of the levee improvements area, below West El Nido Road, includes a 31-acre staging area on a parcel of privately owned vacant land between the existing Eastside Bypass levee and the nearby agricultural fields cultivated with row crops. Several residences are clustered together approximately 1 mile to the east of this staging area. Due to the intervening distance and vegetation, the staging area and levee would not be visible from these residences. However, construction equipment using West El Nido Road to access the levee and staging area during the approximately 6-month construction season would be traveling approximately 700 feet south of these residences, and therefore would be visible. The southern end of the proposed levee improvements area and the proposed 31-acre staging area are located approximately 0.5 mile north of West Washington Road. At this distance, the levee itself blends into the background views of the surrounding landscape, and the construction equipment would be briefly visible to motorists traveling westbound (eastbound views of the project area are blocked by a large area of trees immediately adjacent to and north of the roadway).

In summary, during winter and spring when the vegetation is green, the Eastside Bypass exhibits a high degree of visual quality due to its intactness, unity, and high degree of vividness. During the remainder of the year, the project area consists primarily of brown- to tan-colored land (except when there is a green ribbon of grasses after flood and/or Restoration Flows) with no topographic variation, and a uniform appearance due to the annual and perennial grasses and general lack of trees. Therefore, although the intactness and unity are high, the vividness is low during the summer and early fall, and the visual quality is moderate.

Figure 3.1-3. View of the Lower Merced Weir, Looking Downstream to the North

Source: California Department of Water Resources 2017

Figure 3.1-4. View of the Upper Merced Weir, Looking East

Source: California Department of Water Resources 2017

Figure 3.1-5. View of the Eastside Bypass, North of El Nido Road

Source: CDM Smith 2017

Figure 3.1-6. View of the Eastside Bypass from West Washington Road

Source: CDM Smith 2017

In general, as a viewer group, people engaged in recreational activities generally have a heightened awareness of their surroundings, are familiar with the scenic resources in the area, and are generally seeking an experience in a natural setting. Residents and recreationists generally have a higher sensitivity to visual change. There are no residences within 1 mile of the project construction sites, and given the distance and intervening vegetation, views of the project area are not available from residential homes. However, local residents do have views of the project area while traveling on local roads and while working on adjacent agricultural land. Viewer sensitivity for residents is considered high because of residents' concern for and awareness of their surroundings and because of the extended duration of views. Thus, viewer sensitivity is high where project-related facilities would affect those views. Therefore, viewer sensitivity for recreationists and local residents is considered high throughout the project area.

3.1.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to aesthetics apply to the proposed project.

State

No state plans, policies, regulations, or laws related to aesthetics apply to the proposed project.

Local

Merced County General Plan

The *2030 Merced County General Plan* Natural Resources Element (Merced County 2013) identifies the following policies related to aesthetics that are applicable to the proposed project.

- **Policy NR-4.1: Scenic Resource Preservation.** Promote the preservation of agricultural land, ranch land, and other open space areas as a means of protecting the County's scenic resources.

- **Policy NR-4.5: Light Pollution Reduction**. Require good lighting practices, such as the use of specific light fixtures that reduce light pollution, minimize light impacts, and preserve views of the night sky.

The General Plan also notes that State Route 152 and Interstate 5 are designated scenic routes in parts of the county. However, the project area is approximately 4.5 and 20 miles from these roadways, respectively, and therefore is not visible. There are no County-designated scenic roadways.

Merced County Improvement Standards and Specifications

The *Merced County Improvement Standards and Specifications* (Merced County 2015) contain requirements for design and construction of County roads that are applicable to the proposed project.

3.1.3 Environmental Effects

No Action Alternative

Under the no action alternative, no construction-related activities would occur and no existing facilities would be modified. There would be additional flows in the Eastside Bypass up to 580 cfs with proposed

seepage easements expected to be in place in 2018. There would be a small beneficial impact on aesthetics from these increased flows.

Proposed Project

a), c) Have a substantial adverse effect on a scenic vista or substantially degrade the existing visual character or quality of the site and its surroundings? *(Less-than-Significant Impact)*

Construction equipment, materials, and crews would be visible throughout the project area at each construction site and each staging area identified in Chapter 2, "Description of the Proposed Project and no action alternative." Most of the project-related construction sites would be visible to recreationists during the waterfowl hunting season. The Dan McNamara culvert installation would be visible to recreationists traveling on Sandy Mush Road, which serves as the primary access point for the Merced NWR. Most of the project-related construction sites and staging areas would be small—approximately 2 acres in size. Construction associated with the Eastside Bypass Control Structure, culverts at the Dan McNamara Road crossing, removal of the upper and lower Merced NWR weirs, and drilling of the new Merced NWR well, would not be visible from the three nature trails, the auto tour route, or the associated wildlife observation platforms in the Merced NWR (on the east side of the Eastside Bypass) due to the distance, height of the existing intervening levee, and intervening vegetation (which includes scattered trees).

Levee improvements would include reinforcing approximately 1,500 linear feet of levee in Reach O-1, 5,900 linear feet of levee in Reach O-3, and 2,600 linear feet of levee in Reach O-4. In addition, an approximately 24-foot-wide temporary road would be required along the levee improvement area within the channel along the waterside toe to stockpile degraded material and provide construction route access. Furthermore, the southern end of the levee improvements area, below West El Nido Road, includes a 31-acre staging area on a parcel of privately owned vacant land between the existing Eastside Bypass levee and the nearby agricultural fields cultivated with row crops. Several residences are clustered together approximately 1 mile to the east of the levee improvements area and the 31-acre staging area. Due to the intervening distance and vegetation, the staging area and levee improvements would not be visible from nearby residences. However, construction-related haul trucks utilizing West El Nido Road to access the levee and staging area would be traveling approximately 700 feet south of these residences, and therefore would be visible throughout the construction period. Local residents and recreationists traveling on roadways throughout the project area would have views of construction haul trucks on local roadways. However, there would be a low volume of haul trucks (see Section 3.20, "Transportation and Traffic") and they would be passing in and out of view in only a few seconds.

Because levee improvement construction activities would only be visible to a few Lone Tree Unit hunters on Wednesdays during the first 2 weeks of waterfowl hunting season, and because the residences north of El Nido Road and local and recreational motorists in other areas would only have views of a low volume of construction haul trucks on a short-term and temporary basis for intervals of a few seconds during the construction period, this impact is considered less than significant.

Due to its large size, the existing Eastside Bypass Control Structure is visually dominant in the landscape and it intrudes on the scenic viewshed even in background views from the surrounding area. Only the bottom portion of the structure within the bypass channel would be modified to improve fish passage. The proposed rock ramps and boulders would be constructed in the channel and are designed to mimic the natural stream substrate. Therefore, these improvements would not detract from the existing

visual quality or character. Although much smaller in scale as compared to the Eastside Bypass Control Structure, the upper and lower Merced NWR weirs are human-built structures that stand out in the surrounding natural landscape in foreground (close-up) views. Therefore, removal of these two weirs would represent a benefit to the visual character and quality.

The Dan McNamara Road improvements would consist of three pre-cast concrete box culverts, each approximately 12 feet wide and 10 feet tall. As compared to the existing road crossing over the bypass, the new concrete culverts would be more visually prominent. However, there are existing road culverts throughout the project area that are visually similar. Because the culverts would be constructed of concrete they would appear similar in color to the surrounding landscape elements, and due to a dip in the topography looking north from Sandy Mush Road along Dan McNamara Road, the new culverts would not stand out in the landscape to a degree that they would detract from the visual character or quality. Occasional high flood flow volumes during winter and early spring and Restoration Flows would still overtop the road, during which time the culverts would not be visible at all and the road would appear visually similar to existing conditions when flows overtop the road. Fencing to exclude cattle and small warning signs related to flood flows would appear visually similar to the surrounding agricultural area. Project design and construction of the Dan McNamara Road culverts would comply with *Merced County Improvement Standards and Specifications* (Merced County 2015) and therefore would appear visually similar to other culverts in the project area. This impact would be less than significant.

Once the proposed Merced NWR well is drilled, only the wellhead would be visible at the surface and due to its extremely small size it would not detract from the existing visual character or quality. This impact would be less than significant.

At the conclusion of project-related levee improvements, the existing Eastside Bypass levee would appear visually similar to existing conditions. The portion of degraded levee material that is deemed unsuitable for use would be separately stockpiled adjacent to the levee and would be used to fill in the borrow pit area (or spoiled within the area) in coordination with the landowner. Therefore, the land used for borrow (no more than 2 acres within the 31-acre area) would be suitable for use as grazing land at the conclusion of construction activities. Staging areas and the temporary access road would be returned to pre-project conditions. Therefore, operation of the modified Eastside Bypass levee would not detract from the existing visual character or quality. This impact would be less than significant**.**

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway? *(No Impact)*

State Route 152 and Interstate 5 are designated scenic routes in parts of the County. However, the project area is approximately 4.5 and 20 miles from these roadways, respectively, and therefore is not visible. There are no County-designated scenic roadways. Thus, the proposed project would have no impact to a State scenic highway.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area? *(Less-than-Significant Impact)*

Installation of rock ramps in the bypass channel at the Eastside Bypass Control Structure would have no effect on daytime or nighttime light or glare. The upper and lower Merced NWR weirs do not create

daytime or nighttime light or glare effects under existing conditions, and their removal would have no effect on day- or night-time views. The proposed levee improvements would consist of a slurry cut-off wall in the middle of the levee, which would have no effect on either daytime or nighttime light and glare. However, the various project staging areas may require a limited amount of short-term and temporary nighttime lighting for security purposes. Furthermore, although project construction activities would generally occur between the hours of 7 a.m. and 6 p.m., construction activities could continue into the nighttime hours if necessary (particularly during installation of the slurry cut-off wall for the levee improvements). Therefore, short-term and temporary nighttime lighting could be required during construction activities. However, nearby recreational opportunities are only available during daylight hours. Furthermore, the closest residence is located approximately 1 mile from the project area (east of the proposed 31-acre staging area associated with the levee improvements) and due to the distance and intervening vegetation, the nighttime lighting would not adversely affect nighttime views and would not result in sleep disturbance for these residents. Project operation would not require any nighttime lighting, and because the sides of the levee would be composed of earthen materials and seeded with native vegetation, no operational daytime glare effects would be created. Therefore, this impact would be less than significant.

3.2 Agriculture and Forestry Resources

Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
II. AGRICULTURE AND FORESTRY RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. – Would the project:					
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☒	☐	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☒	☐	☐
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒	☐
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒	☐
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒	☐

3.2.1 Environmental Setting

Agricultural Resources

Land uses along the Eastside Bypass consist of agriculture and open space. Agriculture is the prominent economic sector in Merced County and accounts for more than 90 percent of all land area. Merced County is ranked fifth among all counties in California and sixth in the nation in terms of annual market value of farm products. The project area and surrounding lands are all designated and zoned for rural agricultural (A) land uses in the *2030 Merced County General Plan.* (Merced County 2013.)

The California Department of Conservation (DOC) Important Farmland classifications recognize the land's suitability for agricultural production by considering physical and chemical characteristics of the soil, such as soil temperature range, depth of the groundwater table, flooding potential, rock fragment content, and rooting depth. The classifications also consider location, growing season, and moisture available to sustain high-yield crops. In addition, DOC identifies other categories based on their suitability for agricultural use. All project elements, including the proposed staging areas, would be constructed on land classified by DOC under the Farmland Mapping and Monitoring Program (FMMP). as Grazing Land. Grazing Land is defined as land with existing vegetation that is suitable for livestock grazing.

The 2014 Important Farmland Map for Merced County, produced by the DOC Division of Land Resource Protection (DOC 2015), was used to evaluate the agricultural significance of the lands in the project area.

Williamson Act Contracts

The Williamson Act is designed to preserve agriculture and open space lands by discouraging their premature and unnecessary conversion to urban uses. The act enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments that are much lower than normal because they are based on farming and open space uses as opposed to full market value.

There are numerous parcels held under Williamson Act contracts throughout the project vicinity (Merced County 2016). However, the only project element that would be constructed on land held under a Williamson Act contract is the new culvert under the existing Dan McNamara road crossing and the associated staging area.

Forestland Resources

Forestland, as defined in California Public Resources Code (PRC) Section 12220(g), is land that can support 10 percent native tree cover of any species—including hardwoods—under natural conditions, and that allows for management of one or more forest resources including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits. The project area contains less than 10 percent native tree cover (see Section 3.5, "Biological Resources – Vegetation and Wildlife"). Therefore, there are no designated forestland resources in the project area.

3.2.2 Regulatory Setting

Federal

Farmland Protection Policy Act

The Farmland Protection Policy Act is intended to minimize the impact of Federal programs with respect to the conversion of farmland to nonagricultural uses. It ensures that, to the extent possible, Federal programs are administered to be compatible with State, local, and private programs and policies to protect farmland. The Natural Resources Conservation Service (NRCS) is the agency primarily responsible for implementing the Farmland Protection Policy Act.

The Farmland Protection Policy Act established the Farmland Protection Program. This voluntary program, also administered by NRCS, helps purchase development rights to keep productive farmland in agricultural uses. The program provides matching funds to State, local, and tribal government entities and nongovernmental organizations with existing Farmland Protection Programs to purchase conservation easements. Participating landowners agree not to convert land to nonagricultural uses, and retain all rights to the property for future agriculture. A minimum 30-year term would be required for conservation easements, and priority is given to applications with perpetual easements.

State

Williamson Act

The California Land Conservation Act of 1965, commonly known as the Williamson Act, empowers local governments to establish "agricultural preserves" consisting of lands devoted to agricultural and other compatible uses. After such preserves are established, the local government may offer to owners of included agricultural land the opportunity to enter into annually renewable contracts that restrict the land to agricultural use for at least 10 years (i.e., the contract continues to run for 10 years following the first date on which the contract is not renewed). In return, the landowner is guaranteed a relatively stable tax rate that is based on the value of the land for agricultural/open space use only (unaffected by its development potential).

The Williamson Act addresses "compatible" uses. CCR Section 51238.1 states that uses approved on contracted lands shall be consistent with all of the following principles of compatibility:

- The use will not significantly compromise the long-term productive agricultural capability of the subject contracted parcel or parcels or on other contracted lands in agricultural preserves.
- The use will not significantly displace or impair current or reasonably foreseeable agricultural operations on the subject contracted parcel or parcels or on other contracted lands in agricultural preserves.
- The use will not result in the significant removal of adjacent contracted land from agricultural or open-space use.

California Important Farmland Inventory System and Farmland Mitigation and Monitoring Program

The U.S. Soil Conservation Service (SCS) (now called the Natural Resources Conservation Service, under the U.S. Department of Agriculture) began farmland mapping efforts in 1975. One of the

objectives of the SCS was to produce agricultural resource maps, based on soil quality and land use across the nation. The FMMP was established by the State of California in 1982 to continue the Important Farmland mapping efforts no longer sponsored by the SCS. DOC sponsors the FMMP and is also responsible for establishing agricultural easements, in accordance with PRC Sections 10250–10255. DOC FMMP maps are updated every 2 years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance.

Important Farmland is classified by DOC as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. However, under CEQA, "agricultural land" or "farmland" encompasses only the designations of Prime Farmland, Farmland of Statewide Importance, and Unique Farmland (PRC Sections 21060.1 and 21095, and State CEQA Guidelines Appendix G).

Local

Merced County General Plan

The *2030 Merced County General Plan* (Merced County 2013) is oriented towards preserving agricultural land by focusing future urban growth into either urban communities or new towns off the valley floor, and by increasing the average densities of residential development. The following policies from the Agricultural Element are applicable to the proposed project:

- **Policy AG-2.1: Agricultural Land Preservation.** Protect agriculturally-designated areas and direct urban growth away from productive agricultural lands into cities, urban communities, and new towns.

- **Policy AG-2.2: Agricultural Land Mitigation.** Protect productive agricultural areas from conversion to non-agricultural uses by establishing and implementing an agricultural mitigation program in cooperation with the six cities in Merced County, with consistent standards for county and city governments, that matches acres converted with farmland acres preserved at a 1:1 ratio. In addition, the Land Evaluation and Site Assessment Model (LESA model) may be used to determine whether the conservation land is of equal or greater value than the land being converted.

- **Policy AG-2.4: Preservation Programs.** Encourage property owner participation in programs that preserve farmland, including the Williamson Act, conservation easements, and conservation practices funded by the U.S. Department of Agriculture.

- **Policy AG-2.8: Conservation Easements.** Support the efforts of public, private, and non-profit organizations to preserve agricultural areas in the County through dedicated conservation easements, and range land held as environmental mitigation.

- **Policy AG-2.9: Infrastructure Extension.** Oppose the extension of urban services, such as sewer lines, water lines, or other urban infrastructure, into areas designated for agricultural use, unless necessary to protect public health, safety, and welfare.

3.2.3 Environmental Effects

No Action Alternative

Under the no action alternative, no construction-related activities would occur and no existing facilities would be modified. There would be no impact.

Proposed Project

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?
(Less-than-Significant Impact)

All project elements would be constructed on land classified by DOC (2015) as Grazing Land. Furthermore, the project elements would be consistent with the existing land uses. The proposed levee improvements would be constructed within the footprint of the existing levee. All staging areas would also be located on land classified by DOC (2015) as Grazing Land. Most staging areas would be small in size, approximately 2 acres. However, the primary staging area for levee construction (located south of West El Nido Road, adjacent to the Eastside Bypass levee) would be approximately 31 acres. Approximately 2 acres of land from within this area may be needed as potential borrow to provide suitable levee fill material. However, it is not anticipated that a substantial amount of borrow would be needed. A portion of the staging area may also be used to spoil material in a manner that is acceptable to the land owner. The portion of degraded levee material that is deemed unsuitable for use would be separately stockpiled adjacent to the levee and would be used to fill in the borrow pit area (or spoiled within the area) in coordination with the landowner. Therefore, the land used for borrow would be suitable for use as grazing land at the conclusion of construction activities. The 2-acre secondary staging area south of West Chamberlain Road, which may or may not be used, would also be located on Grazing Land. Because the proposed project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use, and because grazing land used for borrow would be suitable for continuing grazing use after construction, this impact would be less than significant.

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?
(Less-than-Significant Impact)

The project area and surrounding lands are all zoned and designated for rural agricultural (A) land uses in the *2030 Merced County General Plan* (Merced County 2013). The proposed project components would not conflict with the existing zoning, and the proposed levee improvements would be constructed within the footprint of the existing levee. Use of agricultural land (designated as Grazing Land by the DOC [2015]) for staging areas would be short-term and temporary in nature, and staging area uses would be similar to existing agricultural equipment storage areas. Neither the primary 31-acre levee construction staging area nor the 2-acre borrow area within the primary construction staging area would be located on land held under a Williamson Act contract.

The proposed Dan McNamara Road culvert improvements and proposed staging area would be located on land held under a Williamson Act contract (Merced County 2016). However, Dan McNamara Road is an existing County roadway. At the conclusion of project-related construction activities, the staging area would be available for continuing agricultural use, and surrounding parcels also held under a Williamson Act contract would not be affected. Replacing the existing culvert under the roadway in the Eastside Bypass, and short-term temporary use of approximately 2 acres as a staging area, would not affect the continued long-term agricultural use of the parcel held under a Williamson Act contract. Therefore, this impact would be less than significant.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?
(No Impact)

The project area and lands in the project vicinity do not consist of any land that is zoned as forest land or timberland, or timberland zoned for timberland production. Thus, there would be no impact.

d) Result in the loss of forest land or conversion of forest land to non-forest use?
(No Impact)

As described in Section 3.5, "Biological Resources – Vegetation and Wildlife," the project area contains less than 10 percent native tree cover. Therefore, it does not meet the definition of "forest land" under PRC Section 12220(g). There would be no impact.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?
(No Impact)

The proposed project would remove barriers to existing fish passage in the Eastside Bypass, drill a new shallow well to replace the water supply provided to the Merced NWR by the two weirs that would be removed, and improve the existing Eastside Bypass Levee. The proposed project would not induce future conversion of Farmland or forest land to other uses. Thus, there would be no impact.

3.3 Air Quality

Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied on to make the following determinations. Would the project:					
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☒	☐	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☒	☐	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐	☐

3.3.1 Environmental Setting

This section analyzes the proposed project's impacts related to air quality. Refer to Section 3.9, "Greenhouse Gas Emissions," for an analysis of project-related greenhouse gas emissions.

Air quality in a specific area is affected by the location of air pollutant sources and the quantity of pollutants that they emit. Topography and meteorology also influence air quality. Physical features of the landscape along with atmospheric conditions, such as wind speed, wind direction, and air temperature gradients, determine the movement and distribution of air pollutants.

The California Air Resources Board (CARB) divided California into regional air basins based on topographic and meteorological features. The proposed project is in Merced County, which is in the San Joaquin Valley Air Basin (SJVAB). The SJVAB includes all of Fresno, west Kern, Kings, Madera, Modesto, San Joaquin, and Tulare Counties.

The SJVAB comprises the southern portion of California's Central Valley. The SJVAB is bounded by the Sierra Nevada Mountains in the east, the Coast Ranges in the west, and the Tehachapi mountains in the south. The SJVAB is flat other than a slight downward gradient in the northwestern area of the valley. While marine air from the San Francisco Bay generally flows into the SJVAB through the Carquinez Straits, the topography of the basin hinders the movement of air through and out of the basin.

The elevation of the surrounding mountains ranges from 3,000 feet to the west (Coast Ranges); 6,000 to 8,000 feet to the south (Tehachapi Mountains); and 8,000 to 14,000 feet to the east (Sierra Nevada mountains). Because the normal height of summer inversion layers is 1,500 to 3,000 feet, well below the vertical height of the surrounding mountains, air pollution readily accumulates in the SJVAB (SJVAPCD 2002).

During summer, wind usually originates in the northern portion of the SJVAB and flows in a south-southeasterly direction through the Tehachapi pass into the Southeast Desert Air Basin. During winter, wind occasionally originates in the south and flows in a north-northwesterly direction. The SJVAB also experiences light (less than 10 miles per hour), variable winds that create a climate favorable to high carbon monoxide (CO) and inhalable particulate matter (less than 10 microns in aerodynamic diameter, PM_{10}) concentrations. A diurnal wind cycle also exists in the SJVAB, with a sea breeze that flows into the basin from the north during the day and a land breeze that flows out of the basin during the night. Combined with this is an upslope (mountain) flow during the day and a downslope (valley) flow at night (SJVAPCD 2002).

The SJVAB has an "inland Mediterranean" climate that is characterized by warm, dry summers and cooler winters. Summer high temperatures average between 90 and 100 degrees Fahrenheit (°F) throughout the valley with maximums that frequently exceed 100°F. These high temperatures are crucial in the formation of ozone, which forms from a photochemical reaction with sunlight; generally, ozone formation increases with higher temperatures. Extremely hot temperatures can break the inversion layer that forms in the afternoon, allowing winds to transport pollutants to the Mojave Desert Air Basin. Ozone levels would peak in the early afternoon under such conditions; otherwise, peak concentrations typically occur around 3 to 7 p.m. Winters are mild and humid because the Sierra Nevada prevent cold, continental air masses of the interior from influencing the basin; however, storm systems from the Pacific Ocean bring a maritime influence. The average daily low temperature is 45°F (SJVAPCD 2002).

Air temperature typically decreases with increasing altitude; however, an atmospheric condition where air temperature increases with height, called an inversion, occurs frequently in the SJVAB. The "mixing height" is the height of the base of the inversion and is the level to which pollutants can mix vertically. The inversion layer traps pollutants below the mixing height, thereby playing an important role in ozone formation and CO and PM_{10} concentrations (SJVAPCD 2002).

Precipitation and fog often act to reduce pollutant concentrations because ozone needs sunlight for its formation, CO is slightly water-soluble, and precipitation removes PM_{10} from the atmosphere. Most precipitation in the basin occurs during winter. Average annual rainfall for the basin is 9.25 inches on the floor. Tule fogs form between winter storms when the combination of high pressure and light winds allow cold moist air to pool on the SJVAB floor.

Although CO is water-soluble, non-atmospheric conditions can work to increase CO concentrations during winter. Maximum CO concentrations often occur during clear, cold nights when many fireplaces are in use. A secondary peak often occurs during the morning commute when the nightly surface inversion has not broken. Additionally, although precipitation can reduce PM_{10} concentrations, fog can help in formation of secondary particulates like ammonium sulfate. These secondary particulates contribute to winter season violations of PM_{10} and fine particulate matter ($PM_{2.5}$) (SJVAPCD 2002).

Existing Air Quality Conditions

The U.S. Environmental Protection Agency (EPA) and California Air Resources Board (CARB) have established ambient air quality standards for six "criteria pollutants," pursuant to the federal Clean Air Act of 1970 and the California Clean Air Act, respectively. The criteria pollutants are ozone, CO, nitrogen dioxide (NO_2), $PM_{2.5}$, (PM_{10}), sulfur dioxide (SO_2), and lead (EPA 2016). CARB oversees standards maintenance for three additional pollutants: hydrogen sulfide, sulfates, and visibility-reducing particles.

Existing air quality conditions in the project area are characterized by comparing the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) for these pollutants with monitoring data collected in the region. **Table 3.3-1** lists the NAAQS and CAAQS.

Criteria air pollutants are monitored at several stations in the SJVAB. The closest monitoring stations are in Merced, but those stations do not monitor all pollutants. The Merced station located on South Coffee Avenue measures NO_2 and ozone, whereas the station on M Street measures PM_{10} and $PM_{2.5}$. The 1st Street station in Fresno was the closest station that measures CO and SO_2. **Table 3.3-2** summarizes air quality data from these stations for the most recent 3 years of available data.

Attainment Status

The Federal Clean Air Act (CAA) requires states to classify air basins (or portions thereof) as either "attainment" or "nonattainment" with respect to criteria air pollutants, based on whether the NAAQS have been achieved. Areas that previously exceeded the NAAQS, but have since attained the standard, are called "maintenance" areas. States are also required to prepare State Implementation Plans (SIPs) containing emission reduction strategies to maintain the NAAQS for those areas designated as attainment and to attain the NAAQS for those areas designated as nonattainment.

Certain pollutants, namely ozone and PM_{10}, are further subdivided based on how close an area is to achieving the NAAQS. The possible classifications for the O_3 NAAQS are marginal, moderate, serious, severe, or extreme. Areas with worse classifications are given more time to attain the NAAQS than areas with better air quality. The possible classifications for the PM_{10} NAAQS are moderate and serious. Section 188 of the CAA (42 United States Code [USC] 7513) states that all areas designated nonattainment for the PM_{10} NAAQS initially are to be classified as moderate; however, an area can be reclassified as serious if EPA determines that the area cannot practicably attain the standard by the attainment date.

California also has its own ambient air quality standards (CAAQS) and has designated the air basins within the State based on whether the CAAQS are attained. **Table 3.3-3** summarizes the attainment status for the SJVAB. The area is designated as nonattainment for $PM_{2.5}$ (Federal and State), PM_{10} (State), and ozone (Federal and State), and maintenance for PM_{10} (Federal).

Ozone and particulate matter are respiratory irritants that can cause serious health problems. Reactive organic gases (ROGs) and nitrogen oxides (NOx) are ozone precursors. Vehicle emissions, such as from light and heavy-duty vehicles traveling on roads and agricultural vehicles and equipment, contribute to ozone precursors and particulate matter. Wind-blown dust from dirt roads and agricultural activities, as well as from open burning of burn piles, also contributes to particulate matter. Diesel particulate matter is a component of inadequately filtered diesel exhaust and is a toxic air contaminant.

Table 3.3-1 National and State Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS Primary	NAAQS Secondary	CAAQS	Violation Criteria
Ozone (O_3)	8 Hour	0.070 ppm	Same as Primary Standard	0.070 ppm	NAAQS: Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
		(137 µg/m^3) [1]		(137 µg/m^3) [1]	CAAQS: Not to be exceeded
Inhalable Particulate Matter (PM_{10})	24 Hour	150 µg/m^3	Same as Primary Standard	50 µg/m^3	NAAQS: Not to be exceeded more than once per year on average over 3 years. CAAQS: Not to be exceeded
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	35 µg/m^3	Same as Primary Standard	N/A	NAAQS: 98th percentile, averaged over 3 years
	Annual	12 µg/m^3 [2]	15 µg/m^3	12 µg/m^3 [2]	NAAQS: Annual mean, averaged over 3 years
Carbon Monoxide (CO)	1 Hour	35 ppm	N/A	20 ppm	NAAQS: Not to be exceeded more than once per year
		(40 mg/m^3)		(23 mg/m^3)	CAAQS: Not to be exceeded
	8 Hour	9 ppm	N/A	9.0 ppm	NAAQS: Not to be exceeded more than once per year
		(10 mg/m^3)		(10 mg/m^3)	CAAQS: Not to be exceeded
Nitrogen Dioxide (NO_2)	1 Hour	100 ppb	N/A	0.18 ppm	NAAQS: 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		(188 µg/m^3)		(339 µg/m^3)	CAAQS: Not to be exceeded
	Annual	53 ppb	Same as Primary Standard	0.030 ppm	NAAQS: Annual mean
		(100 µg/m^3)		(57 µg/m^3)	CAAQS: Not to be exceeded
Sulfur Dioxide (SO_2)	1 Hour	75 ppb	N/A	0.25 ppm	NAAQS: 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		(196 µg/m^3)		(655 µg/m^3)	CAAQS: Not to be exceeded
	3 Hour	N/A	0.5 ppm (1,300 µg/m^3)	N/A	NAAQS: Not to be exceeded more than once per year
	24 Hour	0.14 ppm	N/A	0.04 ppm	NAAQS: Not to be exceeded more than once per year
		(366 µg/m^3) [3]		(105 µg/m^3) [3]	CAAQS: Not to be exceeded
	Annual	0.030 ppm (79 µg/m^3) [3]	N/A	N/A	NAAQS: Annual mean
Lead (Pb)	Rolling 3-Month Average [4]	0.15 µg/m^3	Same as Primary Standard	N/A	NAAQS: Not to be exceeded
	30- day Average	N/A	N/A	1.5 µg/m^3 [3]	CAAQS: Not to be equaled or exceeded
Visibility Reducing Particles	8 Hour	N/A	N/A	See footnote 5	CAAQS: Not to be exceeded
Sulfates	24 Hour	N/A	N/A	25 µg/m^3	CAAQS: Not to be equaled or exceeded

Table 3.3-1 National and State Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS Primary	NAAQS Secondary	CAAQS	Violation Criteria
Hydrogen Sulfide	1 Hour	N/A	N/A	0.03 ppm (42 µg/m3)	CAAQS: Not to be equaled or exceeded
Vinyl Chloride	24 Hour	N/A	N/A	0.01 ppm (26 µg/m3)	CAAQS: Not to be equaled or exceeded

Notes:
[1] On October 26, 2015, the U.S. Environmental Protection Agency (EPA) published a final rule to lower the 8-hour ozone NAAQS to 0.070 ppm. The final rule was effective on December 28, 2015 (80 FR 65292).
[2] On January 15, 2013, EPA published a final rule to lower the annual primary ($PM_{2.5}$ NAAQS to 12.0 µg/m^3. The final rule was effective on March 18, 2013 (78 FR 3086).
[3] On June 22, 2010, the 24-hour and annual primary sulphur dioxide NAAQS were revoked (75 FR 35520). The 1971 sulphur dioxide NAAQS (0.14 and 0.030 ppm for 24-hour and annual averaging periods, respectively) remain in effect until 1 year after an area is designated for the 2010 1-hour primary standard. The California Air Resources Board (CARB) recommended that all of California be designated attainment for the 1-hour SO_2 NAAQS, but EPA has not yet finalized area designations.
[4] The lead NAAQS was revised on November 12, 2008 to a rolling 3-month average (73 FR 66964). The 1978 lead NAAQS (1.5 µg/m^3 as a quarterly average) remained in effect until 1 year after an area is designated for the 2008 standard. On December 31, 2010, final area designations for the 2008 lead standards became effective; therefore, the 1978 lead NAAQS is no longer in effect in California (75 FR 71033).
[5] In 1989, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the Statewide and Lake Tahoe Air Basin standards, respectively.

Key:
CAAQS = California Ambient Air Quality Standard
NAAQS = National Ambien Air Quality Standard
ppb = parts per billion
ppm = parts per million
µg/m^3 = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter
N/A = not applicable
FR = Federal Register
Source: California Air Resources Board 2016c

Table 3.3-2 Pollutant Concentrations Measured at Coffee Ave, M Street, and 1st Street Air Quality Monitoring Stations (2014–2016)

Pollutant[1]	2014	2015	2016
CO[2]			
Maximum Concentration 1-hour period, ppm	3	2.2	2.3
Maximum Concentration 8-hour period, ppm	2.4	1.8	1.7
NO_2[3]			
Maximum Concentration 1-hr period, ppm	0.054	0.035	0.035
Annual Arithmetic Mean, ppm	0.008	0.007	0.007
1-Hour O_3[3]			
Maximum Concentration 1-hour period, ppm	0.1	0.102	0.097
Days above the CAAQS (0.09 ppm)	3	2	2
8-Hour O_3[3]			
Maximum National Concentration 8-hour period, ppm	0.088	0.089	0.086
Maximum California Concentration 8-hour period, ppm	0.088	0.09	0.087
Days above the NAAQS (0.070 ppm)	40	29	28

Table 3.3-2 Pollutant Concentrations Measured at Coffee Ave, M Street, and 1st Street Air Quality Monitoring Stations (2014–2016)

Pollutant[1]	2014	2015	2016
Days above the CAAQS (0.070 ppm)	44	34	29
PM_{10}[4,5,6]			
Maximum National Concentration 24-hour period, µg/m^3	88.3	97.2	64
Maximum California Concentration 24-hour period, µg/m^3	92.7	94	64.5
Annual California Concentration, µg/m^3	*	30.7	29.5
Measured Number of Days Above NAAQS (150 µg/m^3)[7]	0	0	0
Measured Number of Days Above CAAQS (50 µg/m^3)[7]	9	5	6
$PM_{2.5}$[4,5,6]			
Maximum National Concentration 24-hour period, µg/m^3	53.7	60.8	42.8
Maximum California Concentration 24-hour period, µg/m^3	53.7	60.8	4238
Annual National Concentration, µg/m^3	11.2	12.6	11.2
Annual California Concentration, µg/m^3	*	*	*
Measured Number of Days Above NAAQS (35 µg/m^3)[7]	5	5	2
SO_2[2]			
Maximum Concentration 1-hour period, ppm	0.0067	0.0108	0.008
Maximum Concentration 24-hour period, ppm	0.0027	0.0024	0.002
Annual Arithmetic Mean, ppm	0.00049	0.00051	0.00046

Notes:

1 An exceedance is not necessarily a violation. Violations are defined in 40 Code of Federal Regulations 50 for NAAQS and 17 CCR 70200 for CAAQS.

2 Data from Fresno – 1st Street monitoring station.

3 Data from Merced – South Coffee Avenue monitoring station.

4 Data from Merced – 2334 M Street monitoring station.

5 Statistics may include data that are related to an exceptional event.

6 State and national statistics may differ for the following reasons: State statistics are based on California-approved samplers, whereas national statistics are based on samplers using Federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.

Key:

* = There was insufficient (or no) data available to determine this value.

O_3 = ozone

µg/m^3 = micrograms per cubic meter

PM_{10} = inhalable particulate matter

CAAQS = California Ambient Air Quality Standard

$PM_{2.5}$ = fine particulate matter

CO = carbon monoxide

ppm = parts per million

NAAQS = National Ambient Air Quality Standard

SO_2 = sulfur dioxide

NO_2 = nitrogen dioxide

Sources: California Air Resources Board 2016a; U.S. Environmental Protection Agency 2016e

Table 3.3-3. Federal and State Attainment Status of San Joaquin Valley Air Basin

Pollutant	National Standards [a]	California Standards[b]
CO	Attainment	Attainment/Unclassified
NO_2	Attainment	Attainment
O_3	Nonattainment, extreme (8-hour)[2]	Nonattainment
Pb	Attainment	Attainment
PM_{10}	Maintenance	Nonattainment
$PM_{2.5}$	Nonattainment, moderate (2012 standard) Nonattainment, serious (2006 standard)	Nonattainment
SO_2	Attainment[3]	Attainment

Notes:

[a] Source: U.S. Environmental Protection Agency 2016b

[b] Source: California Air Resources Board 2016b

Toxic Air Contaminants

Toxic Air Contaminants (TACs) are defined as air pollutants that may cause or contribute to an increase in mortality or serious illness or which may pose a present and potential hazard to human health (California Health and Safety Code Section 39655[a]). Toxic air pollutants are called hazardous air pollutants (HAPs) in Federal terms; however, the two lists of TACs and HAPs are not the same. For example, California recognizes diesel particulate matter (DPM) and environmental tobacco smoke as toxic air pollutants, whereas the Federal Government does not (42 USC 7412[b]).

The health effects associated with TACs vary but can generally be broken down into three main categories: cancer risks, chronic noncancer risks, and acute noncancer risks. Health risks are a measure of the chance that an individual will experience health problems. The *California Almanac of Emissions and Air Quality Data* (CARB 2009) indicates that 10 TACs contribute the greatest health risk in California based on ambient air quality data. Of these TACs, DPM is of the greatest concern because it is estimated to be responsible for approximately 70 percent of the total ambient air toxics risk in the State (CARB 2016).

Vehicles on State Route (SR) 33, SR 59, SR 140, SR 152, and SR 165 are located near the study area and contribute to DPM and other mobile source TAC emissions. Two airports, Merced Regional Airport and Los Banos Municipal Airport, are located within 15 miles of the proposed project site and may contribute to ambient TAC emissions.

Odors

Odors are generally regulated as nuisances and do not typically pose a health risk. Odorous processes or facilities often lead to citizen complaints to local governments, including the SJVAPCD. Odor impacts are subjective because different people have different sensitivities to odor. As such, the significance of odor impacts is usually determined by the number of complaints received for a source (SJVAPCD 2016). Examples of facilities that could adversely affect area receptors because of odors include wastewater treatment facilities, landfills, petroleum refineries, asphalt batch plants, chemical manufacturing, coating operations, food processing facilities, dairy lots, and rendering plants.

Sensitive Receptors

Sensitive receptors are areas where human populations (especially children, seniors, and sick persons) are located and where there is reasonable expectation of continuous human exposure to air pollutants of concern. Typical sensitive receptors are residential subdivisions, schools, or hospitals. The southern end of the levee improvements area, below West El Nido Road, includes a 31-acre staging area on a parcel of privately owned vacant land between the existing Eastside Bypass levee and the nearby agricultural fields cultivated with row crops. Several residences are clustered together approximately 1 mile to the east of this staging area. Equipment using West El Nido Road to access the levee and staging area would be traveling approximately 700 feet south of these residences. The nearest school to the construction areas is about 10 miles away.

3.3.2 Regulatory Setting

This section briefly summarizes Federal, State, and local regulations related to air quality in the project area. Federal air quality is regulated by EPA. CARB implements these Federal regulations and sets additional air quality regulations at the State level. SJVAPCD is the local entity responsible for implementing Federal and State air quality regulations.

Federal

Clean Air Act

The Clean Air Act (CAA) was created in 1970 and has been amended numerous times, with the last amendment occurring in 1990. The CAA regulates air emissions from mobile and stationary sources to protect public health and welfare. The law authorizes the EPA to establish the NAAQS to regulate emissions of hazardous air pollutants and sets dates for achieving compliance with the standards. EPA has established NAAQS for six air pollutants, known as "criteria" pollutants: carbon monoxide, lead, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$), ozone, and sulfur dioxide. Pursuant to the CAA, states are required to prepare state implementation plans to achieve these standards.

General Conformity Rule

Section 176 (c) of the CAA (42 USC 7506[c]) requires any entity of the Federal Government that engages in, supports, or in any way provides financial support for, licenses, permits, or approves any activity to demonstrate that the action conforms to the applicable SIP required under Section 110 (a) of the Federal CAA (42 USC 7410[a]) before the action is otherwise approved. In this context, conformity means that such Federal actions must be consistent with a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards. Each Federal agency must determine that any action proposed that is subject to the regulations implementing the conformity requirements will, in fact, conform to the applicable SIP before the action is taken. This project is subject to the General Conformity Rule because the United States Department of the Interior, Bureau of Reclamation (Reclamation) is the Federal lead agency for NEPA compliance and responsible for removing the two weirs and installing a replacement well at the Merced National Wildlife Refuge. The general conformity regulations apply to a proposed Federal action in a nonattainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutants caused by the proposed action equal or exceed certain *de minimis* amounts. A Federal agency can indirectly control emissions by placing conditions on Federal approval or Federal funding. **Table 3.3-4** presents the *de minimis* amounts for nonattainment areas that relate to the project area.

Table 3.3-4 General Conformity *de minimus* Thresholds

Pollutant	*De Minimis* Threshold (typ)
O_3	10
PM_{10}	100
$PM_{2.5}$	100

Notes:
[1] Pollutant not subject to *de minimis* threshold if the State does not determine it to be a significant precursor to $PM_{2.5}$ emissions.
Key: Pb = lead, tpy = tons per year, $PM_{2.5}$ = fine particulate matter, PM_{10} = inhalable particulate matter, VOC = volatile organic compounds
Source: 40 Code of Federal Regulations 93.153

Toxic Air Contaminants

The project would have emissions from mobile sources used in construction activities. Mobile source air toxics are emitted from highway vehicles and nonroad equipment such as those used in construction activities. Typical mobile source air toxics include benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, and DPM. In February 2007, EPA adopted controls on gasoline, passenger vehicles, and portable fuel containers to reduce emissions of benzene and other HAPs (72 FR 8428). Section 211 of the CAA (42 USC 7545(k)(3)(B)) also requires reformulated gasoline to be used during the high ozone season to reduce emissions of both VOCs and HAPs. Various regulations also govern efforts to reduce DPM emissions.

Odors

There are no Federal laws, regulations, or policies pertaining to odors.

Greenhouse Gases

On December 15, 2009, EPA published its endangerment finding for greenhouse gases (GHGs) in the Federal Register (74 FR 66496). The endangerment finding responds to the 2007 United States Supreme Court decision that GHGs fit within the CAA's definition of an air pollutant. The EPA Administrator determined that six GHGs, taken in combination, endanger both the public health and welfare of current and future generations. See Section 3.9, "Greenhouse Gas Emissions," for more information on Federal laws and regulations pertaining to GHGs.

State

California Clean Air Act

CARB is responsible for protecting public health, welfare, and ecological resources by reducing air pollutants. CARB's regulations are contained in the California Code of Regulations Title 13, Division 3, and Title 17, Division 3. CARB is responsible for establishing ambient air quality standards and determining if an area is in attainment, nonattainment, or unclassified for each standard.

2016 State Strategy for the State Implementation Plan

The 2016 State Strategy for the State Implementation Plan (State SIP Strategy) describes CARB staff's proposed strategy to attain health-based Federal air quality standards over the next 15 years as part of the SIPs due in 2016 (California Air Resources Board 2016). The 2016 SIPs consist of a combination of State and local air quality planning documents that must show how California will meet Federal air quality standards for both ozone and fine particulate matter ($PM_{2.5}$). CARB has the responsibility to develop SIP strategies for cars, trucks, and other mobile sources, as well as consumer products; local air

districts are primarily responsible for controlling stationary sources. Recently, air quality standards have been lowered to more health-protective levels. These lower standards will require substantial reductions from both mobile and stationary sources to reach attainment. This will require comprehensive actions to transform technologies and fuels, community design, and transportation of people and freight.

Measures contained in the SIP include, but are not limited to, deploying cleaner technologies, lowering NOx engine standards, incentive funding to achieve further emissions reductions from on-road heavy-duty vehicles, and low-emission diesel requirements for off-road equipment. CARB is committed to identifying funding needs to enhance the scale of cleaner technology, continuing partnerships with other agencies and the private sector to pursue research and pilot projects to advance zero emission technologies, identify schedules for incorporating improvements in system efficiencies and transportation systems, provide status updates and briefings to CARB, and provide reports to EPA.

Local

San Joaquin Valley Air Pollution Control District Air Quality Plans

SJVAPCD is required to adopt plans describing how they intend to meet the CAAQS and NAAQS. These plans require, among other emissions-reducing activities, control technology for existing sources; control programs for area sources and indirect sources; a permitting system designed to ensure no net increase in emissions from any new or modified permitted sources of emissions; transportation control measures; sufficient control strategies to achieve a 5 percent or more annual reduction in emissions (or 15 percent or more in a 3-year period) for VOC, NOx, CO, and PM_{10}; and demonstration of compliance with CARB's established reporting periods for compliance with air quality goals.

Guidance for Assessing and Mitigating Air Quality Impacts

The SJVAPCD published the *Guidance for Assessing and Mitigating Air Quality Impacts* (GAMAQI) advisory document to provide lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents (SJVAPCD 2015). The GAMAQI contains qualitative and quantitative significance thresholds for assessing impacts from construction and operational activities.

Merced County General Plan

The 2030 Merced County General Plan (Merced County 2013) contains an Air Quality Element that provides goals and policies for addressing air quality in the region. The Air Quality Element contains the following goals related to air quality:

GOAL AQ-1: Reduce air pollutants and GHG emissions and anticipate adaptation due to future consequences of global and local climate change.

GOAL AQ-2: Mitigate significant local and regional air quality impacts of projects through the CEQA process.

GOAL AQ-3: Improve air quality through improved public facilities and operations and to serve as a model for the private sector.

GOAL AQ-4: Reduce traffic congestion and vehicle trips through more efficient infrastructure and support for trip reduction programs.

GOAL AQ-5: County residents are protected from toxic air pollutants and noxious odors from industrial, manufacturing, and processing facilities and agricultural operations.

GOAL AQ-6: Improve air quality in Merced County by reducing emissions of PM_{10}, $PM_{2.5}$, and other particulates from mobile and non-mobile sources.

Toxic Air Contaminants

The SJVAPCD's Integrated Air Toxic Program regulates TACs. The program essentially integrates the State and Federal TAC requirements into one consolidated program to avoid the duplication of effort from any overlapping requirements between different programs. The SJVAPCD relies on existing programs for quantifying, assessing, and controlling TAC emissions.

3.3.3 Environmental Effects

The California Emission Estimates Model version 2016.3.1 (CalEEMod) was used to calculate potential emissions associated with construction, operation, and maintenance of the proposed project. Estimates of equipment and usage input were provided for the air quality analysis by DWR engineers. The results of the CalEEMod analysis are presented in Appendix A, "Air Quality and Greenhouse Gas Emissions Modeling Results and Consistency Determination."

According to the CEQA Guidelines, the significance criteria established by the applicable air quality management district or air pollution control district may be relied on to make significance determinations for potential impacts on environmental resources. For the proposed project, significance criteria are established by SJVAPCD. Analysis requirements and suggested thresholds of significance for construction- and operation-related pollutant emissions for proposed projects are described in SJVAPCD's *Guidance for Assessing and Mitigating Air Quality Impacts* (SJVAPCD 2015). The SJVAPCD thresholds of significance in **Table 3.3-5** represent thresholds below which a project can safely be considered to have a less-than-significant impact on air quality standards or less-than-cumulatively considerable contributions to a significant cumulative impact on regional air quality. For general conformity determinations, significance criteria are established for pollutants that have a non-attainment or maintenance status. The general conformity significance criteria in **Table 3.3-5** represent *de minimis* thresholds.

No Action Alternative

Under the no action alternative, emissions would remain the same as under existing conditions; there would be no impact.

Table 3.3-5. San Joaquin Valley Air Pollution Control District and Federal General Conformity Project-level Thresholds of Significance for Pollutants

Pollutant	San Joaquin Valley Air Pollution Control District Thresholds of Significance	Thresholds for Federal Conformity Determinations
Reactive organic gases (ROGs)	10 tons/year	No established threshold
Nitrogen oxides (NOx)	10 tons/year	25 tons/year
Particulate matter (PM10)	15 tons/year	100 tons/year

Table 3.3-5. San Joaquin Valley Air Pollution Control District and Federal General Conformity Project-level Thresholds of Significance for Pollutants

Pollutant	San Joaquin Valley Air Pollution Control District Thresholds of Significance	Thresholds for Federal Conformity Determinations
Fine particulate matter (PM2.5)	No established threshold	100 tons/year
Sulfur dioxide (SO2)	10 tons/year	100 tons/year
Carbon monoxide (CO)	100 tons/year	100 tons/year
Toxic air contaminants from stationary sources	The probability of contracting cancer for the Maximally Exposed Individual (MEI) equals 10 in 1 million or more. OR Ground-level concentrations of non-carcinogenic toxic air contaminants would result in a Hazard Index equal to 1 for the MEI or greater.	No established threshold
Offensive odors	Odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property.	No established threshold

Source: San Joaquin Valley Air Pollution Control District 2015; U.S. Environmental Protection Agency 2016c

Proposed Project

a) Conflict with or obstruct implementation of the applicable air quality plan? *(Less-than-Significant Impact)*

The proposed project would generate construction-related mobile emissions and dust (discussed under *b)* and *c)* immediately below), but these emissions would not impede attainment of the NAAQS or CAAQS because emissions are below the thresholds of significance. Proposed operation and maintenance activities would be similar to existing conditions and would not impede attainment of the NAAQS or CAAQS. Accordingly, the proposed project would not conflict with the measures and commitments included in the Yolo-Solano Air Quality Management District Air Quality Attainment Plan or State SIP Strategy, and thus would result in a less-than-significant impact.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation? — and —

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? (Less-than-Significant Impact with Mitigation Incorporated).

Local/Regional Air Quality Standards

The proposed project would involve short-term construction activities in the project area. Proposed project construction is expected to occur in 2019 from April through December for levee improvements, Eastside Bypass Control Structure modifications, and Dan McNamara Road crossing modifications; and, in 2020 from April through July to remove the two weirs and construct a replacement well in the Merced NWR. Equipment and materials for the proposed project would be transported to the project area by using haul trucks. Construction equipment anticipated for use would include excavators, cranes, graders, rollers, front-end loaders, dozers, backhoes, compressors, generators, pumps, bore/drill rigs, and a water truck. Smaller vehicles would also be used to transport construction workers to the project area. A significant impact would occur if the alternative is inconsistent with the Air Quality Management Plan (AQMP) or the Air Quality Element of the County's General Plan. To aid in determining the significance of project impacts, SJVAPCD developed thresholds of significance for project operations and construction; if emissions are less than these thresholds, then the proposed project would be determined to not conflict with or obstruct implementation of the various AQMPs. Additionally, projects must also be compliant with SJVAPCD Regulation VIII (Fugitive PM_{10} Prohibition) to be less than significant.

The potential maximum daily and annual ROG, NOx, and criteria pollutant emissions calculated for proposed project construction activities are summarized in **Table 3.3-6**. Potential emissions were calculated with the assumption that best management practices (BMPs) and minimization measures for exhaust emissions and dust would be implemented. The BMPs for minimization of exhaust emissions are included in DWR's Greenhouse Gas Emissions Reduction Plan (GGERP) (refer to Section 3.9, "Greenhouse Gas Emissions").

Table 3.3-6 Calculated Maximum Daily (Pounds) and Annual (Tons) Emissions from Proposed Project Construction

Period	ROGs	NOx	CO	PM_{10}	$PM_{2.5}$
Maximum Daily (pounds)	10.0	105.9	63.2	9.3	5.0
SJVAPCD Daily Threshold	100 lbs/day	100 lbs/day	100 lbs/day	100 lbs/day	100 lbs/day
Annual (tons)[a]	0.42	4.7	2.7	0.2	0.2
SJVAPCD Annual Threshold	10 tons/year	10 tons/year	100 tons/year	15 tons/year	15 tons/year

Notes: CO = carbon monoxide, NOx = nitrogen oxides, PM2.5 = particulate matter less than 2.5 microns in diameter, PM10 = particulate matter less than 10 microns in diameter, ROGs = reactive organic gases, SJVAPCD = San Joaquin Valley Air Pollution Control District

[a] All emissions would occur in 2019 and 2020.

[b] See Appendix A, "Air Quality and Greenhouse Gas Emissions Modeling Results and Consistency Determination," for complete modeling results.

SJVAPCD feasible mitigation measures for reducing NOx are described below in Mitigation Measure AIR-1. Following implementation of these BMPs and mitigation measures, construction activities would

not generate criteria pollutant emissions in excess of the SJVAPCD thresholds of significance and thus would have a less-than-significant impact on air quality, as well as a less-than-considerable incremental contribution to a significant cumulative impact on air quality.

Table 3.3-7 shows that the criteria pollutants are below the daily and annual thresholds, except for maximum daily NOx. This impact would be a potentially significant impact.

Table 3.3-7. Mitigation for Nitrous Oxides Emissions

Type of Emissions	NOx Emissions (pounds/day)
Project-related Maximum Daily Emissions (unmitigated)	105.9
20% of Total NOx Emissions	21.2
Project-related Maximum Daily Emissions (mitigated)	84.1
San Joaquin Valley Air Pollution Control District Daily Threshold[a]	100

Notes: NOx = nitrogen oxides

[a] Refer to *Guidance for Assessing and Mitigating Air Quality Impacts* (SJVAPCD 2015)

DWR and/or Reclamation would implement Mitigation Measure AQ-1 during project construction to reduce this potential impact.

Mitigation Measure AQ-1: Implement Construction Equipment NOx and PM Controls

The exhaust emissions for construction equipment greater than 50 horsepower used or associated with the proposed project will be reduced by the following amounts from the Statewide average as estimated by the California Air Resource Board:

- 20% of the total NOx emissions
- 45% of the total PM_{10} exhaust emissions

Emissions accounting methods will be as described in SJVAPCD Rule 9510.

Implementation of Mitigation Measure AQ-1 would reduce the potentially significant impact for NO_x emissions to a less-than-significant level because daily NO_x emissions would be less than the SJVAPCD daily threshold for NO_x

Federal General Conformity Thresholds

General conformity is applicable to projects in nonattainment and maintenance areas with emissions over the *de minimis* thresholds.

Because the CEQA-related mitigation measures are fully enforceable under California Public Resources Code (PRC) §21081.6 and therefore would be legally required for project implementation, mitigated emissions (with Mitigation Measure AQ-1) were compared to the general conformity *de minimis* thresholds. **Table 3.3-8** summarizes estimated construction emissions and compares these emissions to the general conformity *de minimis* thresholds. The proposed project does not result in emissions that exceed the general conformity *de minimis* thresholds. Therefore, this air quality impact would be a less-than-significant impact with mitigation incorporated.

d) Expose sensitive receptors to substantial pollutant concentrations? — and —

e) Create objectionable odors affecting a substantial number of people? (Less-than-Significant Impact)

A potential project-related source of pollutants and odors would be exhaust from construction vehicles and equipment. Exhaust from diesel-powered vehicles and equipment would also be a source of toxic air contaminants. That said, these potential construction-related pollutants and odors would be

Table 3.3-8. Estimated Construction Emissions for the Proposed Project with Mitigation Incorporated Compared to General Conformity *De Minimis* Thresholds

Pollutant	Thresholds of Significance	Estimated Project Construction Emissions	Threshold Exceeded
Ozone (O_3)	N/A	N/A	N/A
Carbon Monoxide (CO)	SJVAPCD - 100 tpy	2.73	No
Nitrogen Oxides (NOx)	10 tpy	4.72	No
Reactive Organic Gases (ROGs)	10 tpy	0.44	No
Volatile Organic Compounds (VOC)	N/A	N/A	N/A
Lead (Pb)	N/A	N/A	N/A
Particulate Matter (PM_{10})	SJVAPCD - 15 tpy Federal - 100 tpy	0.23	No
Fine Particulate Matter ($PM_{2.5}$)	SJVAPCD - 15 tpyFederal - 100 tpy including precursors	0.18	No
Sulfur Dioxide (SO_2)	N/A	0.0	No

Notes:
SJVAPCD = San Joaquin Valley Air Pollution Control District, N/A = not applicable, tpy = tons/year
Source: GEI Consultants, Inc. 2017 modeling results (see Appendix A)

localized, would be temporary, and would not affect a substantial number of people because of the distance (0.7 – 1 mile) of the nearest sensitive receptor to the project area. These pollutants would be further reduced with implementation of BMPs to minimize exhaust emissions included in DWR's GGERP (refer to Section 3.9, "Greenhouse Gas Emissions"). Construction-related pollutants and odors would not violate SJVAPCD nuisance standards and would be less than significant.

As discussed above, project operation and maintenance activities would be similar to operations and maintenance activities under existing conditions. Because of the periodic and short-term nature of these activities, as well as the distance of the nearest sensitive receptor to the project area, ongoing operations and maintenance of the proposed project would not result in the exposure of sensitive receptors to substantial pollutant or odor emissions. The impacts would be less than significant.

3.4 Biological Resources – Fisheries

	Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
IV.	**BIOLOGICAL RESOURCES – FISHERIES – Would the project:**					
a)	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, or National Marine Fisheries Service?	☐	☒	☐	☐	☐
b)	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service? ***(See Section 3.5, "Biological Resources – Vegetation and Wildlife," for response.)***					
c)	Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means? ***(See Section 3.5, "Biological Resources – Vegetation and Wildlife," for response.)***					
d)	Interfere substantially with the movement of any native resident or migratory fish species or with established native resident or migratory fish corridors, or impede the use of native fish nursery sites?	☐	☒	☐	☐	☐
e)	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒	☐
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒	☐

3.4.1 Environmental Setting

The project area includes the Eastside Bypass and immediate surroundings. The Eastside Bypass circumvents the main stem San Joaquin River and extends from the confluence of the Fresno River and Chowchilla Bypass to the confluence with the San Joaquin River at the head of Reach 5. Riparian trees and shrubs have a patchy distribution along the banks of the Eastside Bypass. The Lower Eastside Bypass has some side channels and sloughs that support remnant patches of riparian vegetation. Outside

of the Merced NWR, the Eastside Bypass is managed for flood conveyance and does not currently support any type of riparian habitat. The Mariposa Bypass conveys flows from the downstream end of the Middle Eastside Bypass to the San Joaquin River. The Mariposa Bypass is also managed for flood conveyance and does not currently support riparian habitat.

Prior to the release of SJRRP Restoration Flows, other than some ponding in low-lying areas and agricultural tail-water during July through October that the Merced NWR may divert at its weirs, the bypasses generally remained dry until required to convey high flows during the flood season. The flood season for the LSJLD typically lasts from November 15 to June 15 of each water year, with rainfall contributing to high flows during the early part of the flood season, and snowmelt contributing to flows at the later part of the flood season. Since January 2014, Restoration Flows up to approximately 300 cfs in the Eastside Bypass have occurred with the exception when Restoration Flows were curtailed during the 2014-2015 critically dry water years and 2017 flood flows. The Restoration Flow releases from Friant Dam follow a complex release schedule that varies by restoration/water year type and month, ranging from 100 to 230 cfs during critical-low flow periods to 350 to 4,000 cfs during wet year periods [see Figure ES-4 on page 23 in SJRRP 2011].)

DWR performed a fish passage evaluation for the SJRRP throughout the project area (SJRRP 2011a, 2012b). In evaluating fish passage, criteria were identified based on guidelines developed by CDFW, NMFS, and others for adult salmonids (SJRRP 2011a, SJRRP 2012a). DWR and Reclamation worked in conjunction with the SJRRP Fisheries Management Work Group (which includes NMFS, USFWS, and CDFW staff) and other Implementing Agencies' experts to develop fish passage criteria used to design all modifications to existing structures. The criteria include passage conditions for salmonids and other native fishes, though not all native fishes would be afforded passage in all anticipated flow conditions.

The results of the evaluation conducted by DWR suggested that adult Chinook salmon would not be able to pass structures in the Eastside Bypass under the majority of flow conditions (SJRRP 2012a). The following structures in the project area were identified as the highest priority partial or complete barriers for adult migration of salmonids and would be evaluated further to develop passage alternatives (SJRRP 2012a):

- Merced NWR Weir #1
- Merced NWR Weir #2
- Dan McNamara Road crossing at Eastside Bypass
- Eastside Bypass Control Structure

The restriction of spawning to a limited area below impassable barriers is considered one of the primary factors causing the decline of anadromous fish species in the San Joaquin River, including Chinook salmon and steelhead (SJRRP 2010). Barriers can also impede the movement of numerous other native and non-native fish species.

Fisheries Resources

Aquatic Habitat and Associated Fish Species

The project area does not fall within Federally designated critical habitat for any Federally listed fish species. The project area does however lie within designated Essential Fish Habitat (EFH) as defined by the Magnuson-Stevens Fishery Conservation and Management Act. EFH for Chinook salmon has been designated in the San Joaquin River basin under the Pacific Coast Salmon Fishery Management Plan and includes the Eastside Bypass (PFMC 2016). Central Valley spring-run and fall-run are the Chinook

salmon stocks with historical and current presence in the Eastside Bypass. Reintroduction of spring-run Chinook within the project area is currently under way with the population designated as a 10(j) nonessential experimental population by NMFS. (A "nonessential" designation for a 10(j) experimental population means that, on the basis of the best available information, the experimental population is not essential for the continued existence of the species, and regulatory restrictions are considerably reduced under a Nonessential Experimental Population (NEP) designation.) The project area is currently nearly completely separated from the lower San Joaquin River and the ocean fishery by a lack of connectivity and fish barriers within and outside of the project's boundaries (i.e., Hills Ferry Barrier). As part of the proposed project, barriers within the project's boundaries are proposed to be removed/modified to enhance fish passage.

Special-status Fish Species

The USFWS IPaC was used to generate a list of Federally protected species with the potential to occur in the project area (USFWS 2017a). The IPaC search area was drawn to encompass the entire project area and immediate surrounding area. The CNDDB (CDFW 2017) was also queried to create the list of special-status fish species that have the potential to occur within the project area. The CNDDB search area is described in Section 3.5, "Biological Resources – Vegetation and Wildlife."

Fish communities in the project area and the adjacent San Joaquin River area have changed markedly in the last 150 years (SJRRP 2011a). Native fish assemblages were historically adapted to widely fluctuating riverine conditions, ranging from large winter and spring floods to low summer flows, and had migratory access to extensive upstream habitats. These environmental conditions resulted in a broad diversity of fishes, including anadromous species. Special-status fishes that may have historically occurred, as well as those that may inhabit or are seasonally present in the nearby San Joaquin River and therefore could be in the Eastside Bypass during flood flows and SJRRP Restoration Flows, are listed in **Table 3.4-1**.

The following species descriptions are brief accounts of the current and historical distribution, life history patterns, and habitat requirements of fish species with historic or current presence in the project area or may inhabit the area following implementation of the proposed project. This section is subdivided into anadromous fish and native riverine fish.

Native Anadromous Fish Species

The Eastside Bypass was constructed in 1966 to provide flood protection and is not considered to be an historical anadromous fish waterway. Due to the numerous fish barriers present in the project area and lack of adequate flows, native anadromous fish species historically present in the San Joaquin River cannot access the Eastside Bypass and reaches upstream except in the wettest years. Therefore, all anadromous fish species have been extirpated from the project area because access has been insufficient to allow viable populations to persist. Furthermore, extreme habitat degradation and unsuitably high water temperatures have made aquatic habitat in the project area unsuitable for most life stages of native anadromous fish species. However, the primary objective of the SJRRP is to restore and reestablish viable target fish populations in the San Joaquin River, inclusive of the project area, as further discussed below.

Table 3.4-1. Special-status Fish Species with Historic or Current Presence within the Project Area and Adjacent San Joaquin River Reach

Category	Species	Scientific Name	Federal/State Status[1]	Current Presence
Native Anadromous	Central Valley Spring-run Chinook Salmon	*Oncorhynchus tshawytscha*	T/T	Periodic[2]
	Central Valley Fall-run Chinook Salmon	*Oncorhynchus tshawytscha*	SC/ SSC	Periodic
	steelhead	*Oncorhynchus mykiss*	T/SSC	Unknown
	White Sturgeon	*Acipenser transmontanus*	--/SSC	Yes[3]
	River Lamprey	*Lampetra ayersi*	--/SSC	Yes
	Pacific Lamprey	*Entosphenus tridentata*	--/SSC	Yes
Native Riverine	Sacramento Hitch	*Lavinia exilicauda exilicauda*	--/SSC	Yes
	Sacramento Splittail	*Pogonichthys macrolepidotus*	--/SSC	Yes
	Central California Roach	*Lavinia symmetricus symmetricus*	--/SSC	Yes
	Hardhead	*Mylopharodon conocephalus*	--/SSC	Yes
	Riffle Sculpin	*Cottus gulosus*	--/SSC	Unknown

Notes:
[1] SSC = California Species of Special Concern, T = Threatened
[2] Central Valley spring-run Chinook salmon are a focus of San Joaquin River Restoration Program reintroduction activities and are designated by the National Marine Fisheries Service as a 10(j) non-essential experimental population.
[3] California Department of Fish and Game report card data 2009
Sources: San Joaquin River Restoration Program 2013 and 2017 Fish Assemblage Monitoring Unpublished Data.

Central Valley Spring-run Chinook Salmon

Spring-run Chinook salmon in the Central Valley was once among the largest runs on the Pacific Coast (Yoshiyama et al. 1998). Dam construction on the Sacramento, American, Mokelumne, Stanislaus, Tuolumne, Merced, and San Joaquin Rivers was a key factor in the extirpation of spring-run Chinook salmon from these watersheds. Although recent trends are positive, annual abundance estimates display a high level of fluctuation, and the overall number of spring-run Chinook salmon remain far below estimates of historic abundance (SJRRP 2011b). On September 16, 1999, NMFS listed the Central Valley spring-run Chinook salmon evolutionarily significant unit (ESU) as threatened under the Federal Endangered Species Act (ESA). Currently, as part of the SJRRP, a reintroduction program is in progress. Reintroduced individuals are classified as a 10(j) nonessential experimental population under the ESA. Since the proposed project partially falls within a national wildlife refuge, the experimental population is treated as a threatened species and subject to all the same protections.

In the San Joaquin River, spring-run Chinook salmon historically spawned as far upstream as the present site of Mammoth Pool Reservoir (River Mile [RM] 322), where their upstream migration historically was blocked by a natural velocity barrier (P. Bartholomew, pers. comm., as cited in Yoshiyama et al. 1996). The San Joaquin River historically supported large runs of spring-run Chinook salmon, and this run was one of the largest Chinook salmon runs on any river on the Pacific Coast, with an annual escapement averaging 200,000 to 500,000 adult spawners (CDFG 1990, as cited in Yoshiyama et al. 1996). Construction of Friant Dam began in 1939 and was completed in 1942, which blocked access to upstream habitat (SJRRP 2011a). Nevertheless, runs of 30,000 to 56,000 spring-run Chinook salmon were reported in the years after Friant Dam was constructed, with salmon holding in the pools and spawning in riffles downstream from the dam. Friant Dam began filling in 1944 and, in the late 1940s, began to divert increasing amounts of water into canals to support agriculture. Flows into the main stem

San Joaquin River were reduced to a point that the river ran dry near Gravelly Ford. By 1950, the entire run of spring-run Chinook salmon was extirpated from the San Joaquin River (Fry 1961).

Adult spring-run Chinook salmon historically used the San Joaquin River as a migration corridor during upstream migration in early spring on their way to holding habitat in the upper reaches of the San Joaquin River (Clark 1943), although now the San Joaquin River bed is dry and unlikely to support fish migration, except under flood conditions. While the Eastside Bypass may not have been a historical migration pathway, it is currently the most viable option for Restoration Flows, hence Restoration Flows are being released down the Eastside Bypass. Historic migration generally took place between April and June with May being the peak.

Spring-run Chinook salmon enter freshwater as sexually immature adult fish, and their holding period can last for several months before individuals ripen and are ready to spawn in fall (Moyle 2002; CDFG 1998). Spring-run Chinook salmon historically spawned in the San Joaquin River upstream from the town of Friant from late August to October, peaking in September and October (Clark 1943). Egg incubation generally lasts between 40 and 90 days at water temperatures of 43 to 54°F (Vernier 1969, Bams 1970, Heming 1982, Bjornn and Reiser 1991). Alevins remain in the gravel for 2 to 3 weeks after hatching and absorb their yolk sac before emerging from the gravels into the water column from November to March (Fisher 1994, Ward and McReynolds 2001).

The length of time spent rearing in freshwater varies greatly among juvenile spring-run Chinook salmon across their range (SJRRP 2011a). Spring-run Chinook salmon may disperse downstream as fry soon after emergence, early in their first summer, in fall as flows increase, or as yearlings during spring after overwintering in freshwater (Healey 1991). In contrast to more northern spring-run Chinook salmon populations, many of the current Central Valley populations exhibit fry and smolt downstream migration during winter and spring of their first year, and relatively few exhibit a yearling life history (NMFS 2014). However, some juveniles likely migrate downstream throughout the year (Nicholas and Hankin 1989).

Historically, spring-run Chinook salmon juveniles likely used the San Joaquin River as a migration corridor and also a rearing area due to the extensive floodplain habitat present. Juvenile salmonids rear on seasonally inundated floodplains when available. Sommer et al. (2001) found higher growth and survival rates of Chinook salmon juveniles reared on the Yolo Bypass compared with those in the main stem Sacramento River. Jeffres et al. (2008) observed similar results on the Cosumnes River floodplain. Drifting invertebrates, the primary prey of juvenile salmonids, were more abundant on the inundated Yolo Bypass floodplain than in the adjacent Sacramento River (Sommer et al. 2001). Increased growth rate through floodplain rearing is now understood to be a key element in the success of outmigrating juvenile Chinook salmon.

A study found that coldwater thermal refugia in the Eastisde Bypass were not present under summer low-flow conditions (SJRRP 2013). Many pools were found to be thermally stratified, however, no pools had cold water habitat below the lower critical temperature threshold (65°F) for Chinook salmon. Of the pools investigated, 28 of the 29 were found to be within the sub-lethal (68°F-75°F) or lethal (>75°F) temperature threshold criteria for Chinook salmon. Thermal stratification and thermal refugia were found to not be significantly influenced by subsurface-surface water exchange but were more strongly correlated with regional air temperatures.

Currently, spring-run Chinook salmon reintroduction is a main goal of the SJRRP. As stated, the Restoration Goal is to restore and maintain fish populations in “good condition” in the mainstem San

Joaquin River below Friant Dam to the confluence with the Merced River. This includes the passage of spring-run Chinook and other species in the Eastside Bypass. Spring-run Chinook currently have the potential to be present within the project as introduced juveniles in spring. The first release of juvenile Chinook occurred in 2014, and 2016 was the first year in which fish released in 2014 may have returned as adults. Returning adults have not been documented from any of the juvenile release groups. Adult spring run Chinook are currently not present in the project area but have the potential to occur in future years.

Central Valley Fall-run Chinook Salmon

Fall-run Chinook salmon generally spawn lower in watersheds than spring-run Chinook salmon (CDFG 1957). Although the San Joaquin River also supported a fall-run Chinook salmon run, they historically comprised a smaller portion of the river's total Chinook salmon abundance (Moyle 2002). Fall-run Chinook salmon historically spawned in the main stem San Joaquin River upstream from the Merced River confluence near the town of Friant and in the main stem channels of the major tributaries (Yoshiyama et al. 1996). Currently, however, they are primarily limited to the Merced, Stanislaus, and Tuolumne Rivers where they spawn and rear downstream from mainstem dams (SJRRP 2011a).

CDFW has operated a barrier (Hills Ferry Barrier) at the confluence of the Merced River with the San Joaquin River since the early 1990s to prevent adult fall-run Chinook salmon from migrating farther up the San Joaquin River, including into the project area, as there was no flow or passage to suitable habitat upstream. The project area experiences warmer temperatures that would be lethal and habitat unsuitable to support spawning, egg development, or juvenile rearing, as well as impassable barriers and entrainment risks. However, the Hills Ferry Barrier is not 100 percent effective and does allow for considerable passage under certain flow conditions. Since 2013, the SJRRP has captured individuals that pass the Hills Ferry Barrier (downstream of the project area) and transported them to upstream spawning grounds (Reach 1) where successful spawning and juvenile production has been observed (SJRRP 2017).

Fall-run Chinook salmon exhibit similar life history strategies as spring-run (see spring-run above), with some distinctions. Fall-run Chinook salmon do not have a summer holding period; instead, they migrate upstream fully mature during fall and typically spawn soon after reaching the spawning grounds from October through December, peaking in November in the San Joaquin River tributaries (SJRRP 2011a). Unlike spring-run Chinook salmon, only a small percent of fall-run exhibit a yearling life history strategy, and the majority emigrate as fry or smolts during winter or spring of the year they were born. Fall-run Chinook salmon fry typically disperse downstream from early January through mid-March, whereas smolts primarily migrate between late March and mid-June in the Central Valley (Brandes and McLain 2001).

Fall-run are thought to use the project area as a juvenile rearing and migration corridor during downstream emigration. Currently, depending on flow conditions, adult fall-run that pass the Hills Ferry Barrier are trapped downstream of the project site and hauled to spawning grounds upstream of the project area. Trap and haul is not currently planned to continue; however, low flows and high-water temperatures make it unlikely for fall-run Chinook to be present between April and November. Adult and juvenile fall-run Chinook have the potential to be present in the project area.

Steelhead

Historical rainbow trout/steelhead distribution in the upper San Joaquin River is unknown; however, in rivers where they still occur, they normally are more widely distributed than Chinook salmon (Voight

and Gale 1998, as cited in McEwan 2001, Yoshiyama et al. 1996) and are typically tributary spawners (SJRRP 2011a). Lindley et al. (2006) predicted the historical distribution of steelhead (the anadromous form of *O. mykiss*), using an Intrinsic Potential habitat model. They found that at least 81 independent populations of *O. mykiss* were widely distributed throughout the Central Valley, but populations were relatively less abundant in San Joaquin River tributaries than in Sacramento River tributaries because of natural barriers to migration. Additionally, many small tributaries to the major San Joaquin River tributaries have too high of a gradient or too little flow to have supported steelhead; consequently, they likely were restricted to the mainstems and larger tributaries (Lindley et al. 2006). Around 80 percent of the historical spawning and rearing habitat is now behind impassable dams, and 38 percent of the populations identified by the model have lost the use of their entire historic watershed (Lindley et al. 2006).

Historically, steelhead likely used the San Joaquin River for juvenile rearing and as an adult migration corridor on their way to spawning grounds in the upper reaches of the San Joaquin River. Similar to Chinook salmon, the extensive slough and off-channel aquatic habitat that existed historically in the project area likely provided a substantive amount of rearing habitat no longer available (Jeffres et al. 2008). In the Sacramento River system, drifting invertebrates, the primary prey of juvenile salmonids, have been found to be more abundant on an inundated floodplain than in the adjacent river channel (Sommer et al. 2001); floodplain habitat losses in the San Joaquin River likely have adversely affected steelhead rearing in the San Joaquin River system.

White Sturgeon and Green Sturgeon

White sturgeon have a marine distribution spanning from the Gulf of Alaska south to Mexico but a spawning distribution ranging only from the San Joaquin River northward (McCabe and Tracy 1994, and Jackson et al. 2016). Currently, self-sustaining spawning populations are only known to occur in the San Joaquin, Sacramento, Fraser, and Columbia Rivers. In California, primary abundance is in the San Francisco Estuary, with spawning occurring mainly in the Sacramento and Feather Rivers (Klimley et al. 2015). However, CDFG fisheries catch information obtained from fishery report cards (CDFG Report Card Data 2007) documented 25 mature white sturgeon encountered by fisherman in 2007 in the San Joaquin River, and six mature white sturgeon encountered in 2008 downstream of the project area at Highway 140 (SJRRP Reach 5). In addition, an unknown number of white sturgeon were captured near the project area in 2009 (CDFG Draft Report Card Data 2009). Adult sturgeon were caught in the sport fishery industry in the San Joaquin River between Mossdale and the confluence with the Merced River in late winter and early spring (Kohlhorst 1976).

Kohlhorst et al. (1991) estimated that approximately 10 percent of the Sacramento River system spawning population migrated up the San Joaquin River. According to Gruber et al (2012), white sturgeon were documented spawning in the San Joaquin River just downstream of Laird Park at RM 88 in April 2011. Telemetry studies have documented adult white sturgeon as far upstream as Patterson which is downstream of the confluence with the Merced River (USFWS 2015). White sturgeon have been documented spawning, downstream of the project area, within a 15-mile reach of the San Joaquin River from Sturgeon Bend (RM 74) to Grayson Road Bridge (RM 89) between March 20 and May 14, 2012. These observations confirm that white sturgeon do spawn in the San Joaquin River in both wet- and dry-year conditions (Jackson et al. 2016). No observations or data were found of white sturgeon either within or upstream of the Eastside Bypass. However, under certain flow conditions it is possible for white sturgeon to be present in the project area.

White sturgeon spend most of their lives in estuaries of large rivers, only moving into freshwater to spawn (Moyle 2002). Sturgeon migrate upstream when they are ready to spawn in response to flow increases. Male white sturgeon are at least 10 to 12 years old before sexual maturity (Moyle 2002). Spawning takes place between late February and early June when water temperatures range from 46 to 66^{o}F. Large white sturgeon year classes are associated with high outflows through the estuary in spring, presumably due to larval sturgeon being moved quickly downstream to suitable rearing areas in the estuary (Moyle 2002).

No suitable habitat is present within the project area for green sturgeon (*Acipenser medirostris*). In October 2017, a lone green sturgeon in the Stanislaus River near Knights Ferry was confirmed. This occurrence is the first time in decades that a green sturgeon has been confirmed in the San Joaquin River system upstream of the Delta. More commonly, white sturgeon have been encountered in the system, and adults have been captured as far upstream as Hills Ferry on the San Joaquin River. Considering what has been reported regarding occurrences in the San Joaquin River, there is a limited potential that green sturgeon could be present in the project area.

River Lamprey

River lampreys have been collected from large coastal streams from Juneau, Alaska, to San Francisco Bay (Moyle 2002). In California, most records are for the lower Sacramento-San Joaquin River system, including the Stanislaus and Tuolumne Rivers. The biology of river lamprey has not been well documented in California, so information available is based on studies from British Columbia. Adults migrate into freshwater during fall and spawn during February through May in tributary streams. They dig saucer-shaped depressions in gravelly riffles for spawning. Juvenile ammocoetes remain in silty backwaters and eddies to feed on algae and microorganisms.

Due to the presence of several fish migration barriers, river lamprey likely are blocked from migrating through the project area or upstream in all but the wettest years. Adult lamprey which pass into and through the project area during wet years have the potential to spawn. River lamprey ammocoetes (juvenile lamprey) may remain in freshwater for 2-7 years (Moyle 2002). Therefore, Pacific lamprey have the potential to be present within wetted portions of the project area.

Pacific Lamprey

Pacific lamprey are anadromous fish that have Pacific coast distributions and have been found in the San Joaquin River (USFWS 2017a). Pacific lamprey do not appear to home to natal streams, as little genetic variation has been observed in populations from British Columbia to southern California (Goodman et al. 2008). Instead, they appear to key in on pheromones released by ammocoetes present in the river such that they will not return to a river that lacks ammocoetes (Goodman and Reid 2012). The result is a source-sink dynamic for Pacific lamprey such that large river systems containing robust populations serve as sources for smaller rivers and streams that can be sinks (Moyle et al. 2015). The Pacific lamprey has diverse life histories with some rivers containing two runs; one run that returns in spring and spawns immediately after upstream migration and another run that migrates upstream in fall and spawns the following spring (Moyle et al. 2015). Most adult Pacific lamprey spawning migrations occur between March and late June, with upstream movement typically occurring at night (Moyle et al. 2015). Upstream migration seems to take place largely in response to high flows, and adults can move substantial distances unless blocked by major barriers. Due to several fish migration barriers present in the project area, Pacific lamprey likely are blocked from migrating into the project area or reaches

upstream in most years. However, some individuals may migrate through the project area in years of high spring flows.

Pacific lamprey hatching occurs in approximately 17 days at 57°F and, after spending an approximately equal period in redd gravels (Meeuwig et al. 2005), ammocoetes (larvae) emerge and drift downstream to depositional areas where they burrow into fine substrates and filter feed on organic materials (Moore and Mallatt 1980). Throughout this life stage, individuals will leave their burrows and drift to a new area at night (Moyle et al. 2015). Ammocoetes remain in freshwater for 4 to 7 years before undergoing a metamorphosis into an eyed, smolt-like form (macropthalmia) (Moore and Mallatt 1980, Moyle 2002, Moyle et al. 2015). At this time, individuals migrate to the ocean between fall and spring, typically during winter and spring high-flow events (Goodman et al. 2015), to feed parasitically on a variety of marine fishes and smooth skinned marine mammals (Van de Wetering 1998, Moyle 2002). Pacific lamprey remain in the ocean for approximately 18 to 40 months before returning to freshwater as immature adults (Kan 1975, Beamish 1980). Pacific lampreys die soon after spawning, though there is some anecdotal evidence that this is not always the case (Moyle 2002, Michael 1980).

Pacific lamprey are in the study as adults, ammocoetes and/or macroothalmia nearly every year. Adult lamprey can migrate in the spring when there is a connected river but can only emigrate under flood condtions. Individuals unable to emigrate likely perish at the end of wetted sections of the river in April and May. Adult lamprey which pass into and through the project area have the potential to spawn. Pacific lamprey ammocoetes (juvenile lamprey) may remain in freshwater for 4-7 years. Therefore, Pacific lamprey have the potential to be present within wetted portions of the project area.

Native Riverine Fish Species

Many of the native riverine species historically present in the San Joaquin River and project area are still present (USFWS 2017b; SJRRP 2013 and SJRRP 2017 Fish Assemblage Monitoring, Unpublished Data), but their abundance trends are unknown. The native riverine species generally can be divided into two assemblages: the deep-bodied fishes and the Pikeminnow-Hardhead-Sucker assemblage (Moyle 2002). Degradation or complete destruction of historical aquatic habitats due to dewatering, agricultural conversion, levee construction, and channelization likely has led to greatly reduced abundances of native riverine species in the project area. Furthermore, remaining native riverine species are likely competing with introduced species for limited habitat. Special-status native riverine fish may be seasonally present within the project area when the channel is wetted.

Sacramento Hitch

Sacramento Hitch are endemic to the Sacramento-San Joaquin River Basin (SJRRP 2011a). There are three subspecies within this species found in the Clear Lake, Pajaro, and Salinas watersheds and Sacramento-San Joaquin Watershed (Lee et al. 1980). Hitch occupy warm, low-elevation lakes, sloughs, and slow-moving stretches of rivers and clear, low-gradient streams. Among native fishes, hitch have the highest temperature tolerances in the Central Valley. They can withstand water temperatures up to 100°F although they prefer temperatures of 81 to 84°F. Hitch also have moderate salinity tolerances and can be found in environments with salinities up to 9 parts per thousand (ppt) (Moyle 2002). Hitch require clean, smaller gravel and temperatures of 57 to 64°F to spawn. When larvae and small juveniles move into shallow areas to shoal, they require vegetative refugia to avoid predators. Larger fish are often found in deep pools containing an abundance of aquatic and terrestrial cover (Moyle 2002).

Mass spawning migrations typically occur when flows increase during spring, raising water levels in rivers, sloughs, ponds, reservoirs, watershed ditches, and riffles of lake tributaries. Females lay eggs that

sink into gravel interstices (SJRRP 2011a). Hatching occurs in 3 to 7 days at 59 to 72°F, and larvae take another 3 to 4 days to emerge. As they grow, they move into perennial water bodies where they would shoal for several months in association with aquatic vegetation or other complex vegetation before moving into open water. Hitch are omnivorous and feed in open waters on filamentous algae, aquatic and terrestrial insects, zooplankton, aquatic insect pupae and larvae, and small planktonic crustaceans (Moyle 2002).

Sacramento Splittail

Sacramento splittail are endemic to the Sacramento and San Joaquin Rivers, Delta, and San Francisco Bay (SJRRP 2011a). In the San Joaquin River, they have been documented as far upstream as the town of Friant (Rutter 1908). In recent wet years, splittail have been found as far upstream as Salt Slough (Saiki 1984, Brown and Moyle 1993, Baxter 1999, Baxter 2000) where the presence of both adults and juveniles indicated successful spawning.

Adult splittail move upstream in late November through late January, foraging in flooded areas along the main rivers, bypasses, and tidal freshwater marsh areas before spawning (Moyle et al. 2004). Feeding in flooded riparian areas before spawning may contribute to spawning success and survival of adults after spawning (Moyle et al. 2004). Splittail appear to concentrate their reproductive effort in wet years when potential success is greatly enhanced by the availability of inundated floodplain habitat (Meng and Moyle 1995, Sommer et al. 1997). Splittail are fractional spawners, with individuals spawning over several months (Wang 1995).

Eggs begin to hatch in 3 to 7 days, depending on temperature (Bailey et al. 2000 as cited in Moyle et al. 2004). After hatching, the swim bladder inflates and larvae begin active swimming and feeding (Moyle 2002). Most larval splittail remain in flooded riparian areas for 10 to 14 days, most likely feeding in submerged vegetation before moving into deeper water as they become stronger swimmers (Wang 1986, Sommer et al. 1997). Most juveniles move downstream in response to flow pulses into shallow, productive bay and estuarine waters from April to August (Meng and Moyle 1995, Moyle 2002). Floodplain habitat offers high-quality food production and low predator densities to increase juvenile growth and survival.

Non-breeding splittail are found in temperatures up to 75°F (Young and Cech 1996). Juveniles and adults have optimal growth at 68°F, with physiological distress above 84°F (Young and Cech 1995). Splittail have a high tolerance for variable environmental conditions (Young and Cech 1996) and are generally opportunistic feeders. Prey includes mysid shrimp, clams, and some terrestrial invertebrates.

Central California Roach

Central California roach are found throughout the Sacramento-San Joaquin River drainage (Moyle 2002). Given their wide distribution, it is not surprising that California roach are found in a wide variety of habitats although they appear to be excluded from many waters by piscivorous fishes, especially nonnative ones. Despite their extensive distribution, roach are now absent from many streams and stream reaches where they once occurred, and most populations are isolated by downstream barriers such as dams, diversions, or polluted waters containing predatory introduced fishes.

California roach generally are found in small warm streams, and dense populations are frequently sighted in isolated pools in intermittent streams (Moyle 2002). Roach are tolerant of relatively high temperatures and low oxygen levels, a characteristic that enables them to survive in conditions too extreme for other fishes. Within a watershed, roach can be found in a diversity of habitats, from cool

headwater streams to the warm water lower reaches. Their abundance in streams of Clear Lake basin is positively correlated with temperature, conductivity, gradient, and coarse substrates and negatively correlated with depth, cover, canopy, and fast water.

Roach usually become mature after they reach 1.8 to 2.4 inches in length at 2 or 3 years of age (Moyle 2002). Spawning is from March through early July, depending on water temperature. Roach spawn in large groups, each female repeatedly depositing eggs a few at a time in crevices between gravel-sized rocks.

Hardhead

Hardhead are endemic to larger low- and mid-elevation streams of the Sacramento-San Joaquin River basins (SJRRP 2011a). Hardhead are widely distributed in foothill streams and may be found in a few reservoirs on the San Joaquin River upstream from Millerton Lake. Hardhead prefer water temperatures above 68°F, with optimal temperatures between 75 and 82°F. Their distribution is limited to well-oxygenated streams and the surface water of impoundments. They are often found in clear, deep pools greater than about 2.5 feet deep and runs with slower water velocities. Larvae and post-larvae may occupy river edges or flooded habitat before seeking deeper low-velocity habitat as they increase in size (Moyle 2002).

Hardhead spawn between April and August. Females lay eggs on gravel in riffles, runs, or the heads of pools. The early life history of hardhead is not well known. Juveniles may feed on insects from the surface, whereas adults are benthivores, occupying deep pools. Prey items may include insect larvae, snails, algae, aquatic plants, crayfish, and other large invertebrates (Moyle 2002).

Riffle Sculpin

Riffle sculpin have a scattered distribution pattern throughout California, including in the Sacramento-San Joaquin River watersheds (Moyle 2002). Riffle sculpin prefer habitats that are fairly shallow with moderately swift water velocities and oxygen levels near saturation (Moyle and Baltz 1985). They move where water temperatures do not surpass 77 to 79°F, and temperatures greater than 86°F are generally lethal (Moyle 2002).

Riffle sculpins are benthic, opportunistic feeders (Moyle 2002). Spawning occurs between February and April, with eggs deposited on the underside of rocks in swift riffles or inside cavities of submerged logs. Eggs hatch in 11 to 24 days, and when fry reach approximately 0.25 inch total length, they become benthic (Moyle 2002).

3.4.2 Regulatory Setting

Federal Endangered Species Act

The ESA grants protection over species that are formally listed as threatened, endangered, or proposed. The primary protective requirement in the case of projects requiring Federal permits, authorizations, or funding, is Section 7 of the ESA, which requires Federal lead agencies to consult (or "confer" in the case of proposed species or proposed critical habitat) with USFWS and NMFS (where marine or certain anadromous species may be affected) to ensure that their actions do not jeopardize the continued existence of Federally listed species. In addition to Section 7 requirements, Section 9 of the ESA protects listed species from "take." Take is broadly defined as those activities that "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect [a protected species], or attempt to engage in any such

conduct." An activity can be in violation of take prohibitions even if the activity is unintentional or accidental.

Section 7 also requires consultations to consider if significant modification or degradation of designated critical habitat for listed species is expected, or if activities may prevent or significantly impair essential behavioral patterns, including breeding, feeding, or sheltering, which are also considered "take" under the ESA. However, the project area does not contain Federally designated Critical Habitat. Federal agencies may receive authorization for the incidental take of listed species under Section 7 through the issuance of a Biological Opinion from USFWS and/or NMFS. For this project, Reclamation is the lead Federal agency responsible for consultation with USFWS and NMFS under Section 7 of ESA. The Eastside Bypass has a nonessential 10(j) experimental population of spring-run Chinook salmon which is provided the same protections as Federally threatened species when in a national wildlife refuge (Merced National Wildlife Refuge). Therefore, Reclamation in coordination with DWR will prepare a Biological Assessment and will be requesting consultation with NMFS in accordance with Section 7 of the ESA.

Magnuson-Stevens Fishery Conservation and Management Act

The amended Magnuson-Stevens Fishery Conservation and Management Act requires that all Federal agencies consult with NMFS on activities or proposed activities authorized, funded, or undertaken by that agency, which may adversely affect EFH of commercially managed marine and anadromous fish species. EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH is identified in the Fishery Management Plan developed by NMFS for commercially managed species. Chinook salmon freshwater EFH includes all habitat currently or historically occupied by Pacific Fishery Management Council-managed Chinook salmon in the states of Washington, Oregon, Idaho, and California, including the San Joaquin River and Eastside Bypass. Reclamation in coordination with DWR will prepare a Biological Assessment, pursuant to Section 7 of the ESA, that examines the effects of the proposed project on EFH.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) requires agencies to consult with USFWS when it plans to conduct, license, or permit an activity involving the impoundment, diversion, deepening, control, or modification of a stream or body of water. The Act also requires consultation with the head of the state agency that administers wildlife resources in the affected state. The purpose of this process is to promote conservation of wildlife resources by preventing loss of and damage to such resources and to provide for the development and improvement of wildlife resources in connection with the agency action. The proposed project includes the modification of instream structures and levees and is therefore subject to FWCA.

Clean Water Act

The Clean Water Act (CWA) established the basic structure for regulating discharges of pollutants into the waters of the United States in 1972. It gave EPA the authority to implement pollution control programs such as setting wastewater standards for industrial and municipal dischargers. The CWA provides the legal framework for several water quality regulations, including National Pollutant Discharge Elimination System (NPDES) permits, effluent limitations, water quality standards, pretreatment standards, antidegradation policy, nonpoint source discharge regulation, and wetlands protection. EPA has delegated the responsibility for administration of portions of the CWA to state and regional agencies. The CWA also continued requirements to set water quality standards for all known

contaminants in surface waters. The CWA made it unlawful for any person to discharge any pollutant from a point source into navigable waters, or when Section 404 is triggered, unless a permit was obtained under its provisions (EPA 2012).

Section 401

Section 401 of the CWA requires that an applicant for a Federal license or permit to discharge into navigable waters must provide the Federal agency with a water quality certification, declaring that the discharge would comply with water quality standards requirements of the CWA. USACE issuance of a Section 404 permit triggers the requirement that a Section 401 certification also be obtained. For the proposed project, the Central Valley Regional Water Quality Control (RWQCB) would issue this certification as a Section 404 permit will be required for certain elements of the proposed project.

Section 402

Section 402 of the CWA creates the NPDES permit program. This program covers point sources of pollution discharging into a surface waterbody.

Section 404

Section 404 of the CWA requires a permit to be obtained from USACE for the discharge of dredged or fill material into "waters of the United States, including wetlands." Waters of the United States include wetlands and lakes, rivers, streams, and their tributaries. Wetlands are defined for regulatory purposes as areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, vegetation typically adapted for life in saturated soil conditions. The proposed project involves modifying instream structures and levee improvements. Improvements made to the levee are within the OHWM of water of the U.S. Therefore, the proposed project is subject to certification under CWA Section 404.

Recovery Plan for Central Valley Anadromous Salmonids

In 2014, NMFS published the *Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon and the Distinct Population Segment of the California Central Valley Steelhead* (NMFS 2014). This recovery plan is considered necessary to improve the viability of these species to remove them from the need for protection under ESA. It provides a roadmap that includes steps, strategies, and actions that would reintroduce these species to ensure their long-term persistence and evolutionary potential. The SJRRP is identified in the recovery plan as a necessary action to assist in the recovery of spring-run Chinook salmon. The proposed project is part of the larger SJRRP and is designed to improve passage and habitat conditions for anadromous salmonids in the San Joaquin Basin.

State

California Endangered Species Act

Section 2080 of the California Endangered Species Act (CESA) prohibits "take" of State-listed threatened and endangered species. CESA defines take as any action or attempt to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill any listed species. If a proposed project may result in "take" of a listed species, a permit pursuant to Fish and Game Code Section 2081(b) is required from CDFW. Take of State-listed species is authorized through Section 2081 through a permit

process. Spring-run Chinook have the potential to occur within the project area and are listed as threatened under the CESA. Therefore, the proposed project is subject to regulation under the CESA.

The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act

The Salmon, Steelhead, Trout and Anadromous Fisheries Program Act was enacted in 1988. At that time, CDFG reported that the natural production of salmon and steelhead in California had declined to approximately 1,000,000 adult Chinook salmon; 100,000 coho salmon; and 150,000 steelhead. In addition, CDFG reported that the naturally spawning salmon and steelhead resources of the State had declined dramatically within the past four decades primarily because of lost stream habitat on many streams in the State. The Act declares that it is the policy of the State to increase the salmon and steelhead resources and directs CDFG (now CDFW) to develop a plan and program that strives to double the salmon and steelhead resources (Fish and Wildlife Code Section 6900). Restoration of the San Joaquin River and reestablishment of anadromous populations is part of the Act's doubling goals. The proposed project seeks to aid in restoring the San Joaquin River and its native salmonid populations.

Steelhead Restoration and Management Plan of California

The State's goals for steelhead restoration and management outlined in the *Steelhead Restoration and Management Plan for California* (McEwan and Jackson 1996) are: 1) to increase natural production as mandated by The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988 to create self-sustaining steelhead populations and maintain them in good condition, and 2) to enhance opportunities for angling and non-consumptive uses. The proposed project does not directly address steelhead. However, implementation of the proposed project and the greater SJRRP would have incremental and direct benefits to downstream steelhead populations.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act), enacted in 1969 and amended in 2005, specifies requirements for water quality protection in California. Under the Porter-Cologne Act, California is required to adopt water quality policies, plans, and objectives that ensure beneficial uses of the State are reasonably protected. The State Water Resources Control Board (SWRCB) and RWQCB are the agencies with the primary responsibilities of water quality protection and CWA implementation in California. In their respective regions, the RWQCBs engage in several water quality functions. One of the most important is preparing and periodically updating water quality control plans, which specify the beneficial uses to be protected within a region. RWQCBs also regulate all pollutant or nuisance discharges that may affect either surface water or groundwater, including non-point source discharges to surface water. Additionally, SWRCB, in acting on water rights applications, may establish terms and conditions in water rights permits to help implement water quality control plans.

California Fish and Game Code

Lake and Streambed Alteration (Sections 1600–1603)

These sections require notifying CDFW prior to any project activity that would substantially divert or obstruct the natural flow of any river, stream, or lake; substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. This includes ephemeral streams and watercourses with a subsurface flow. It may also apply to work undertaken within the floodplain of a body of water. Improvements made to the levees and

instream structures would require work below the OHWM within the Eastside Bypass and are therefore subject to Section 1600.

Local

Merced County General Plan

The *2030 Merced County General Plan* (Merced County 2013) identifies the following policies related to fisheries that could be applicable to the proposed project:

- **Policy NR-1.10**: Aquatic and Waterfowl Habitat Protection (MPSP) Cooperate with local, State, and Federal water agencies in their efforts to protect significant aquatic and waterfowl habitats against excessive water withdrawals or other activities that would endanger or interrupt normal migratory patterns or aquatic habitats.

- **Policy NR-1.11**: On-Going Habitat Protection and Monitoring (PSR) Cooperate with local, State, and Federal agencies to ensure that adequate on-going protection and monitoring occurs adjacent to rare and endangered species habitats or within identified significant wetlands.

3.4.3 Environmental Effects

No Action Alternative

Under the no action alternative, no construction-related activities would occur and no existing facilities would be modified. Under the no action alternative, Restoration Flows would increase from approximately 300 cfs in the Eastside Bypass under existing conditions up to a maximum of approximately 580 cfs in the Eastside Bypass because it is reasonably foreseeable that seepage concerns would be alleviated by Reclamation in 2018 as described in Reclamation's *Seepage Management Actions Environmental Assessment and Finding of No Significant Impact* (reference https://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=27373); seepage easement acquisitions in 2017 and 2018 should allow Restoration Flows up to approximately 580 cfs in the Eastside Bypass without the proposed project. These increased flows would benefit aquatic habitats and fish populations through increased habitat connectivity and a more consistently wetted channel. However, the existing fish passage barriers at the Eastside Bypass Control Structure, Dan McNamara Road crossing, and Merced NWR weirs would remain and substantially limit the benefits to aquatic habitats and fish populations from the increased flows. Nonetheless, the impact of increased Restoration Flows up to approximately 580 cfs on fish populations would be beneficial over existing flow conditions which are limited to approximately 300 cfs in the Eastside Bypass.

Proposed Project

Mitigation measures described below are similar to SJRRP Draft PEIS/R (SJRRP 2011) Conservation Measures PL-1, CVS-1, CVS-2, EFH-1, and EFH-2 with appropriate modifications for the proposed project. The SJRRP Conservation Measures are described on pages 2-52 to 2-79 of the SJRRP Draft PEIS/R (SJRRP 2011) and are incorporated by reference.

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, or National Marine Fisheries Service?
(Less-than-Significant Impact with Mitigation Incorporated)

Changes in Flow Conditions

The proposed project's levee improvements would allow increased flows from approximately 580 cfs to approximately 2,500 cfs, but only with additional future Reclamation projects. Therefore, there is no impact to fisheries resources from changes in flow conditions resulting from the proposed project.

The proposed project would not have any direct or indirect impacts on flows in the Eastside Bypass compared to the no action alternative or existing conditions; however, the proposed project would have indirect impacts on Restoration Flows in the Eastside Bypass in combination with additional seepage and system improvements in other SJRRP reaches. Restoration Flows up to a maximum of approximately 300 cfs in the Eastside Bypass occur under existing conditions. Restoration Flows up to a maximum of approximately 580 cfs in the Eastside Bypass would occur without the proposed project when seepage concerns are alleviated by Reclamation in 2018. Restoration Flows up to a maximum of approximately 2,500 cfs in the Eastside Bypass would occur with the proposed project (as conveyance capacity is increased to this level with the levee improvements in 2019) and additional seepage and system improvements in other SJRRP reaches. Therefore, this impact mechanism is discussed in Section 4.1, "Cumulative Impacts."

Changes in Water Temperatures

The proposed project would not have any measurable effect on Eastside Bypass water temperatures because the proposed project would not have any measurable direct or indirect impacts on flows in the Eastside Bypass (see above). Therefore, there is no impact to fisheries resources from changes in water temperatures. This impact mechanism is further discussed in Section 4.1, "Cumulative Impacts."

Changes in Habitat Conditions

The existing Eastside Bypass channel would be enhanced to provide fish passage under variable flow conditions by removing the Merced NWR weirs and modifying the Dan McNamara Road crossing and Eastside Bypass Control Structure. Compared to existing conditions and the no action alternative, all passage limitations for adult and juvenile anadromous fish species would be removed in the Eastside Bypass.

The proposed project would not have any direct or indirect impacts on flows in the Eastside Bypass, any measurable effect on Eastside Bypass water temperatures, or substantial effects on riparian vegetation. Therefore, habitat conditions would be relatively unchanged. This impact would be less than significant. This impact mechanism is further discussed in Section 4.1, "Cumulative Impacts."

Changes in Predation Levels

The proposed project would remove or modify barriers to allow for fish passage. Removal of fish barriers would increase access for striped bass, the primary anadromous predator in the Central Valley, to the bypass system. Since striped bass move regularly between salt and fresh water and usually spend much of their life cycle in estuaries, increased fish passage likely would increase the abundance of

striped bass. Although not anadromous (can be potadromous), Sacramento pikeminnow also would be able to more freely access the bypass system, potentially increasing their presence.

Removal or modification of manmade structures would decrease the congregation of predators at these structures. High predation rates on migratory fish, including juvenile salmonids, are known to occur below small dams and diversions in the Central Valley where Sacramento pikeminnow and striped bass congregate (Ward et. al, 2013). The reduction in the number of structures likely would decrease the number of predator "hotspots" throughout the bypass system. As part of the proposed project, the bottom topography of the Eastside Bypass channel would be designed and graded to decrease or eliminate predator holding habitat. Design will focus on softening the banks and slopes to decrease sharp edges and drop-offs which act as ambush locations for nonnative predatory species.

Therefore, predation levels would likely be reduced, and the proposed project would have a beneficial impact.

Changes in the Food Web

Food webs describe the pathways by which energy and materials move through ecosystems and provide insight into the complex, multispecies assemblages within which organisms of interest grow, survive, and reproduce (Polis and Winemiller 1996). The proposed project would not have any direct or indirect impacts on flows in the Eastside Bypass, any measurable effect on Eastside Bypass water temperatures, or substantial effects on riparian vegetation.

The proposed project is expected to increase the quantity, quality, and accessibility of food resources for special-status fish species. The removal and modification of fish barriers to create continuously connected habitat should create areas of increased secondary aquatic production and improve feeding opportunities for fish in the bypass system. Compared to existing conditions and the no action alternative, the proposed project would improve food production and the proposed project would have a beneficial impact on fisheries.

Increases in Pollutant Discharge

Construction activities within the Eastside Bypass and along the riverbank have the potential to introduce hazardous materials into receiving waters supporting special-status and native fish species. Common materials used at construction sites include petroleum-based fuels and lubricants, fertilizers, and herbicides that may be used during site replanting and invasive plant control. Many of these substances can kill fish through exposure to lethal concentrations or exposure to nonlethal levels that cause physiological stress, impair essential behaviors, decrease reproductive success, and increase susceptibility to other sources of mortality. Therefore, this potential impact from construction-related increases in pollutant discharge on special-status and other fish species would be potentially significant.

> **Mitigation Measure SWQ-1: Develop and Implement a Stormwater Pollution Prevention Plan**
>
> Please refer to Section 3.11, "Hydrology and Water Quality," for the full text of this mitigation measure.

Implementing Mitigation Measures SWQ-1 would minimize or prevent potential adverse effects on special-status fish species and their habitat. The impact from pollutant discharges would be less than significant with mitigation incorporated.

Increases in Sedimentation and Turbidity

The proposed project likely would reduce storage for sediment that currently accumulates behind structures and depositional areas at the weirs, road crossings, and the Eastside Bypass Control Structure. When flows first increase, releases may cause an initial temporary increase in suspended sediment and turbidity in the bypass system through short-term bed and bank scour of previously immobile material. Construction activities within the channel have the potential to introduce sediments into receiving waters supporting special-status fish species, although turbidity and sediments are expected to lessen and equilibrate after construction activities are completed.

This impact would be potentially significant.

> **Mitigation Measure SWQ-1: Develop and Implement a Stormwater Pollution Prevention Plan**
>
> Please refer to Section 3.11, "Hydrology and Water Quality," for the full text of this mitigation measure.

Implementing mitigation measure SWQ-1 would minimize or prevent potential adverse effects on special-status fish species: Further measures to reduce potential impacts associated with sedimentation and turbidity may include the use of sediment curtains during instream construction and turbidity monitoring; these measures will be developed in coordination with resource agencies as part of the permitting process.

Construction-related Impacts on Special-status Fish and Habitats

The proposed project may temporarily disturb fish habitat within the bypass system channel. During construction, vegetation that provides potential fish habitat would be removed in the footprint of proposed in-channel work. However, vegetation loss and/or changes and soil/substrate disturbance would be minimized in terms of extent and would be short term. Natural recovery and assisted restoration of removed vegetation would take place as needed, and invasive plant species would be removed and replaced with native plants and more appropriate habitat features. Further impacts and mitigation measures as it pertains to riparian habitat and vegetation is discussed in Section 3.5, "Biological Resources – Vegetation and Wildlife."

Proposed construction activities within the Eastside Bypass are anticipated to take place primarily between April 1 and November 15, outside of the flood season. This timing minimizes impacts to migratory and native fishes. Adult fall-run Chinook which typically migrate upstream in October and November are currently trapped downstream of the project site and transported to upstream spawning grounds. Trap and haul is not currently planned to continue; however, low flows and high-water temperatures make it unlikely for fall-run Chinook to be present between April and November. Completion of construction of the levee improvements, such as re-grading the levee crown and other activities outside of the flood channel, may continue until the end of the year. The construction start date depends on water elevations and permit requirements. Construction would take place during daylight hours, typically from 7:00 a.m. to 6:00 p.m., Monday through Friday, to avoid disrupting peak crepuscular foraging and migration activities.

All construction work would occur during low-flow periods, and there may be temporary impacts resulting from instream construction activities. During construction, the local hydraulics may be impacted due to construction activities, and the placement of temporary structures for localized

dewatering and fish exclusion. These structures may temporarily impact fish migrations through the project site. Anadromous species (excluding lamprey) are not anticipated to be present during project construction; however, resident native species and lamprey have the potential to be present. Lamprey (Pacific and river) ammoecetes have the potential to be present within the substrate and water column of the Eastside Bypass with the potential to be impacted. Native resident fishes (such as hitch and hardhead) can display seasonal or even daily migrations which could be disrupted by project construction. Direct impacts associated with instream construction include noise, passage, strike mortality, and disturbance which causes volitional and forced displacement of fishes from the immediate surrounding areas. Any displacement of fish is anticipated to be temporary with recolonization naturally occurring. These impacts are potentially significant.

Mitigation Measure FISH-1: Develop and Implement a Fish Rescue and Dewatering Plan

NMFS, USFWS, and CDFW will be consulted during the project permitting process to develop and approve a fish rescue and dewatering plan. Prior to construction site dewatering, fish will be captured and relocated to avoid potential impact. The plan will develop methods for removal, relocation, and exclusion of fish from areas of potential impact prior to construction or dewatering. At a minimum, the plan will describe capture and handling methods along with the identification of release locations. Methods for capture may include but are not limited to electrofishing and seining. A trained biologist approved by NMFS, USFWS, and CDFW will be onsite during all dewatering activities and, in the event of any project-related special-status fish stranding events, the biologist will stop work and immediately contact resource agencies.

Dewatering and construction should only occur within designated work windows as to minimize the amount of exposure to listed species potentially in the area. If fish are present, facilities would be operated to the extent practicable to create flow conditions adequate to provide for passage, water quality, and proper timing of life history stages, as well as to avoid juvenile stranding and redd dewatering. After dewatering, restore properly functioning channel, floodplain, and riparian conditions. If pumps are needed to dewater the area, they should be screened to NMFS fish screening criteria. Pumps should also be checked periodically to ensure the screens are working properly and fish are not being entrained. All equipment used to dewater the site should be removed at the end of the construction. If construction spans two construction seasons, it may be necessary to remove dewatering materials to allow for passage during the migration period.

Mitigation Measure FISH-2: Avoid Loss of Habitat and Risk of Take of Species

a) Impacts to habitat conditions (i.e. decrease in floodplain connectivity, removal of riparian vegetation, decrease in quality rearing habitat, etc.) will be analyzed in consultation with NMFS as part of the Biological Assessment to be prepared pursuant to Section 7 of the ESA, due to the potential to impact anadromous salmonids.

b) Before implementation of site-specific actions, Reclamation and/or DWR will conduct an education program for all agency and contracted employees relative to the special-status species that may be encountered within the study area of the action, and required practices for their avoidance and protection. An appointed representative will be identified to employees and contractors to ensure that questions regarding avoidance and protection measures are addressed in a timely manner.

c) Disturbance of riparian vegetation will be avoided and then minimized to the extent feasible. Any disturbed riparian vegetation will be replanted at 3:1 ratio in consultation with the San Lius National Wildlife Refuge (NWR) Complex, resource agencies, and permit requirements.

d) A biological monitor approved by NMFS, USFWS, and CDFW will be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction, to monitor implementation of conservation measures and water quality. As defined in FISH-1, a fisheries biologist will be onsite for all fish rescue, dewatering and anytime special-status fish could be present.

e) For pile driving that would occur during construction of Eastside Bypass Control Structure modifications, implement the following measures:

- When possible, avoid driving piles when salmon are present, especially the younger life stages and spawning adults.
- Avoid driving piles with an impact hammer when salmon or their prey are present and use alternatives such as vibratory hammers or press-in pile drivers.
- In cases where an impact hammer must be used, drive the piles as far as possible with a vibratory or other method that produces lower levels of sound before using an impact hammer.
- Select piles that are made of alternate materials that produce less-harmful sounds than those from hollow steel piles, such as concrete or untreated wood instead of steel.
- Implement feasible sound-attenuating measures, including use of a bubble curtain or a dewatered pile sleeve or coffer dam, and monitor the sound levels during pile driving to ensure that attenuation measures are functioning as expected.
- Monitor and report back to NMFS and CDFW the sound levels during pile driving to verify analysis assumptions were correct and any attenuation device is properly functioning. Monitoring and reporting protocols will be according to guidance provided by FHWG (2013). The report should be provided to NMFS and CDFW no later than 60 days after completion of pile driving.

Implementing Mitigation Measures FISH-1 and FISH-2 would minimize or prevent potential adverse effects on special-status fish species and their habitats from impacts associated with construction activities. This impact would be less than significant with mitigation incorporated.

Fish Disease

The proposed project is designed to increase habitat connectivity and remove barriers to fish passage. While increased habitat connectivity can provide an increased ability for the spread of disease, it does not increase this potential beyond existing conditions. Furthermore, barriers which create an increase in localized fish densities would be removed and higher flows may decrease water temperatures under certain conditions, which would both decrease the potential spread of disease. Compared to existing conditions and the no action alternative, this impact would be a beneficial impact.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?

Impacts related to riparian habitat or other sensitive natural communities as they pertain to terrestrial wildlife and botanical communities are discussed in Section 3.5, "Biological Resources – Vegetation and Wildlife."

c) Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Impacts related to wetland habitats are discussed in Section 3.5, "Biological Resources – Vegetation and Wildlife."

d) Interfere substantially with the movement of any native resident or migratory fish species or with established native resident or migratory fish corridors, or impede the use of native fish nursery sites?
(Less-than-Significant Impact)

Changes in Diversions and Entrainment

The magnitude and timing of water diversions in the project area would not change during construction or operations and maintenance of the proposed project; thus, no substantial changes in entrainment and impingement attributable to diversion volume are expected. With the proposed project, more fish would inhabit the project area and could be subject to diversions and entrainment. Improved fish passage would offset the risk of potentially increased diversion and entrainment. Therefore, this impact would be less than significant.

Changes in Fish Barriers

The proposed project would remove or modify barriers to fish passage under variable flow conditions. Because all known existing fish barriers in the Eastside Bypass would be removed or modified to allow for fish passage, migration through the project area would be substantially enhanced. Adult salmon migrating upstream would enter the Lower Eastside Bypass into the Middle Eastside Bypass before rejoining the San Joaquin River channel at the junction of Reach 4B1 and Reach 4A. Juvenile salmon migrating downstream would enter the system from the San Joaquin River Reach 4A or the Upper Eastside Bypass and move downstream through the Middle Eastside Bypass and Lower Eastside Bypass. Other native riverine fish species would gain access to the Eastside Bypasses and have access to newly connected mainstem habitat.

Compared to existing conditions and the no action alternative, the proposed project would remove and modify existing fish migration barriers through the Eastside Bypass, providing connectivity between Reach 4A and 5 fish. Temporary passage constraints may exist during instream construction, primarily associated with dewatering and fish rescue. Passage limitations would be substantially improved but not completely resolved for some andadromous fish species (e.g., sturgeon and lamprey). Therefore, the proposed project would have a substantial beneficial impact on fish passage.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?
(No Impact)

The proposed project does not conflict with any local policies or ordinances for the protection of fishery resources. All acts, plans, and policies described in Section 3.4.2 "Regulatory Setting," are adhered to by the proposed project. The proposed project is designed to improve habitat conditions and passage for sensitive fisheries resources. Therefore, the proposed project does not conflict with local policies or ordinances and would have no impact.

Any impacts as they pertain to vegetation and wildlife are discussed in Section 3.5, "Biological Resources – Vegetation and Wildlife."

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?
(No Impact)

The proposed project was designed to minimize any permanent adverse effects on riparian habitat and wetlands, and includes mitigation measures to reduce temporary and permanent effects on these habitats and associated special-status species to less-than-significant levels. In addition, the proposed project would improve aquatic habitat and enhance fish passage in the project area. The proposed project would not conflict with any provisions in the acts, plans, and policies described in Section 3.4.2 "Regulatory Setting." Therefore, the proposed project would have no impact.

Any impacts as they pertain to vegetation and wildlife are discussed in Section 3.5, "Biological Resources – Vegetation and Wildlife."

3.5 Biological Resources – Vegetation and Wildlife

	Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
V.	**BIOLOGICAL RESOURCES – VEGETATION AND WILDLIFE – Would the project:**					
a)	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☒	☐	☐	☐
b)	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☒	☐	☐	☐
c)	Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐	☐
d)	Interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐	☐
e)	Conflict with any local policies or other protecting biological resources, such as a tree preservation policy or ordinance?	☐	☒	☐	☐	☐
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, state, or Federalhabitat conservation plan?	☐	☐	☐	☒	☐

3.5.1 Environmental Setting

Biological resources evaluated for the proposed project include habitat types, special-status species, species recovery areas, designated critical habitat, potential waters of the United States, and sensitive natural communities. Numerous background documents were reviewed (CWHR 2010; ESRP 2006; USFWS 1998; Reclamation 1998a, 1998b, 2011, 2012a; DWR 2002). Biological surveys were completed from April through October 2012 within portions of the project area where access was granted (Reclamation 2012b); additional surveys are underway and will be incorporated into future permit applications. Survey boundaries were delineated by the maximum possible footprint, as defined

in Chapter 2, "Description of Proposed Project and No Action Alternative." A reconnaissance-level survey was conducted on November 3, 2016, to document habitat types in additional areas located within the Merced National Wildlife Refuge (NWR) that were not previously surveyed. Survey results are summarized below.

The project area is located in Merced County, and includes the Eastside Bypass between the Sand Slough Control Structure and the Mariposa Bypass. The project area is located in the Great Valley ecological region (Region), San Joaquin Basin subsection (Miles and Goudey 1997). The Region contains the alluvial plains of the Sacramento and San Joaquin Valleys. Summers are hot and dry, and winters are mild. The San Joaquin Basin subsection is on nearly level floodplains and basin floors, with elevation ranging from approximately 60 to 100 feet. The mean annual precipitation is about 8 to 10 inches, predominantly rain, and the mean annual temperature ranges from about 45°F in winter to 95°F (sometimes in excess of 100°F) in summer (USFS 2009).

Habitat Types

Habitat types in the project area were surveyed and evaluated several times (Reclamation 2012b, USFWS 2008, DWR 2011) and defined according to the California Wildlife Habitat Relationships (CWHR) System (CWHR 2010) or *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986).

A total of 13 habitat types occur within the project area – which includes the footprint of work areas, staging areas, borrow sites, and access routes. Habitat types are shown on **Figures 3.5-1a through 3.5-1g**. Acreages by habitat types mapped in the project area are provided in **Table 3.5-1** and include acreages within the immediate project footprints (to evalauate potential direct effects) and acreages within a 500-foot-wide buffer around the project footprints, as well as the section of the Eastside Bypass between the lower and upper weirs (to evaluate potential indirect effects)**.** Habitat types mapped in the project area are described below.

Habitat Distribution

Barren/Disturbed

Includes nonvegetated areas that have not been substantially disturbed but instead are naturally sparsely vegetated due to hydrology or other factors; also includes disturbed habitat, such as paved and unpaved roads and structures associated with agricultural activities. This habitat type occurs along the Eastside Bypass south of the Mariposa Bypass.

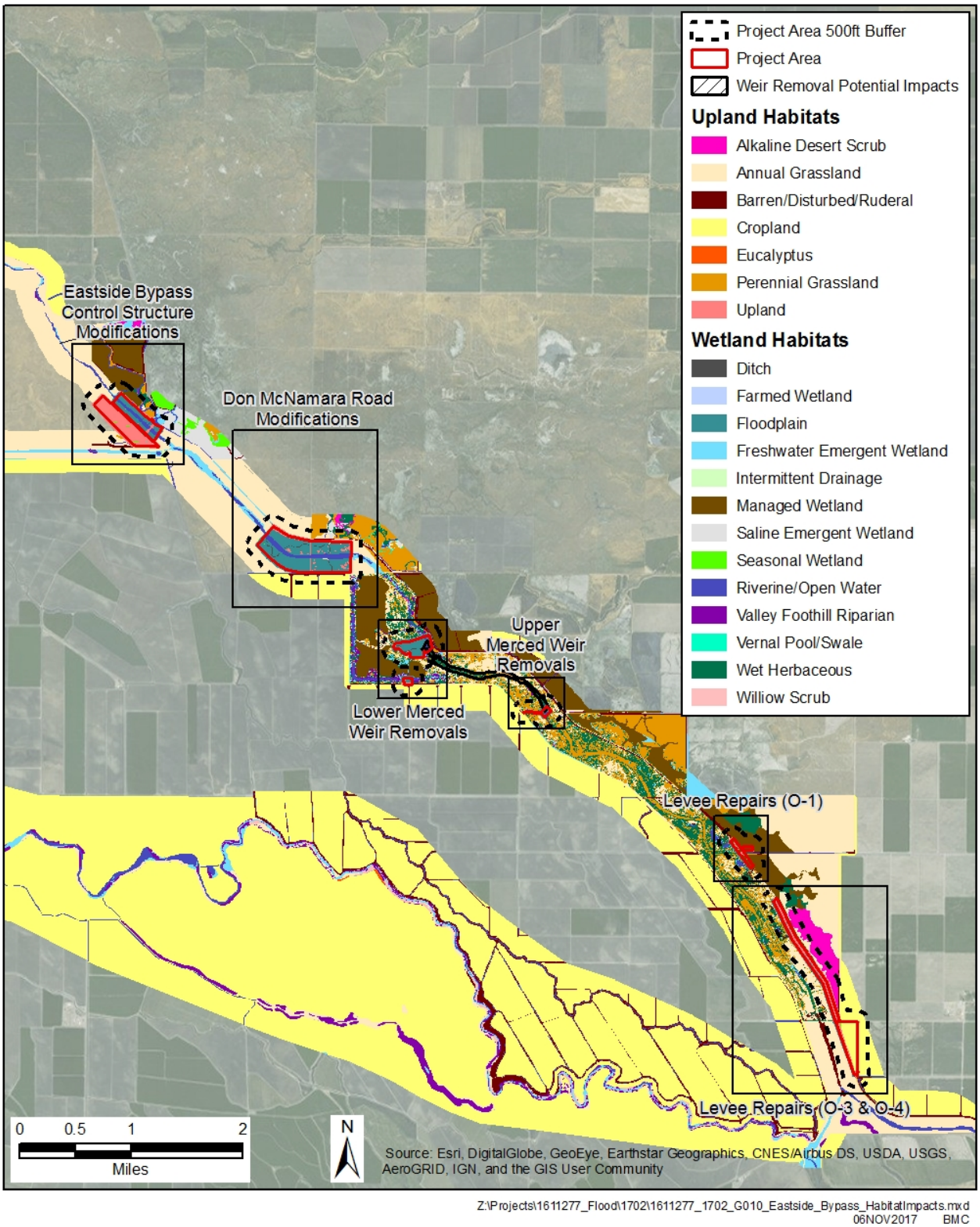
Alkali Desert Scrub

Typical vegetation within this habitat type includes alkali blite (*Suaeda nigra*), alkali heath (*Frankenia salina*), alkali weed (*Cressa truxillensis*), salt heliotrope (*Heliotropium curassavicum*), alkali sacaton (*Sporobolus airoides*), and saltgrass (*Distichlis spicata*). This habitat type occurs along the Eastside Bypass.

Annual Grassland

Open grasslands are composed primarily of annual plant species (CWHR 2010). Typical vegetation within this habitat type includes wild oat (*Avena fatua*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), and wild barley (*Hordeum marinum* ssp. *gussoneanum*. This habitat type occurs throughout the project area. Within **Figures 3.5-1a through 3.5-1g**, several acres of the annual

Figure 3.5-1a. Habitat Types



Source: CDM Smith, 2017