Friday, January 21, 2022

California Fish Passage Forum

Project Name	Native Fish Passage in the San Joaquin River at Eastside Bypass Control Structure
Lead Organization	US Fish and Wildlife Service
Name of Project Lead/Point of Contact	Erin Strange
Contact Email	erin_strange@fws.gov
Phone Number	(209) 200-1100
Location of Project	Latitude: 37.205082, Longitude: -120.697574
Attach a map of your project	pdf San Joaquin River Restoration Program Rest...

PROJECT INFORMATION

1. Concisely describe why this project is important, what activities you will undertake to meet your objectives (clearly identify all objectives), resulting outcomes/deliverables to benefit fish passage in California, and why this project should be selected for funding through this RFP. If the funding you are seeking from the Forum is part of a larger project, please clearly describe which portion of the project Forum funding would be applied to, and the specific deliverables and outcomes expected to result from this funding.

For over 60 years, the San Joaquin River saw no adult spring-run Chinook Salmon make their annual migration from the ocean to spawn – the fish had been cut-off from their native spawning grounds by Friant Dam and subsequent water diversions that dried up over 60 miles of channel. Chinook Salmon runs had been extirpated from the San Joaquin River upstream of the Merced River confluence. But all of that changed in 2019 when the San Joaquin River Restoration Program (SJRRP) documented its first returning adult spring-run Chinook. A main goal of the SJRRP is to restore fish and flows back to the San Joaquin River above the Merced River confluence to maintain a self-sustaining,

naturally-reproducing Chinook salmon fishery.

One of the initial projects to help the SJRRP achieve this goal is the Eastside Bypass Fish Passage Improvement Project (Project). The Eastside Bypass Control Structure (EBCS) is within the Eastside Bypass and is part of the State's flood bypass system (see map of the Restoration Area). The EBCS is a partial fish passage barrier. The objectives of the Project include installing a full-width rock ramp roughened channel below the EBCS and modifications to the EBCS to improve fish passage, while retaining its ability to provide flood control. Modifications to the EBCS to provide fish passage include removing a portion of the sill, half of the energy dissipation blocks within the four center bays, and 4-foot-high stop logs on the upstream side of the EBCS. In addition, an approximately 380 foot-long rock ramp would be constructed downstream of the structure to provide suitable passage from the downstream pool to the structure. The ramp would extend from bank to bank. It would be constructed by filling the large pool downstream of the structure with approximately 7,800 cubic yards of compacted fill up to subgrade elevation, and then adding a 3- to 4-foot-thick top layer of approximately 30,200 tons of Engineered Streambed Material (ESM) comprised of rock mixes with particle sizes ranging from boulders to sand and silt. 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. To stabilize the end of the ramp, 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. These elements will allow fish to move more easily through the EBCS with minimal impacts to the structure, as well as not require extensive operation or maintenance. The modifications to the EBCS and adding a 380-foot-long rock ramp downstream will allow passage for salmonids and improve passage for other native fish such as sturgeon and lamprey.

Improved passage at the EBCS, especially during drought conditions, will help rebuild native fish populations in the San Joaquin River and build on the larger on-going investment for volitional passage for native fish in the Restoration Area. The Project is currently in 95% design and is planned to be bid in fall of 2022. Construction activities are anticipated to start in spring or summer of 2023. USFWS is requesting CFPF funds of $50,000 towards the cost of construction of the Project. DWR has secured $6,273,000 for the remaining design and construction, and the remaining unfunded construction need is $1,500,000. This Project should be selected because funding received from CFPF and other grants (for which applications have been submitted) would allow for completion of the Eastside Bypass Fish Passage Improvement Project. This Project is the last element that needs to be completed to allow

volitional passage through the Eastside Bypass between Sand Slough and the EBCS, allowing native fish to get back to the San Joaquin River and access to an additional 11 miles of bypass channel and 13 miles of river channel habitat. Increased costs of the projects are at risk of exceeding existing State appropriated funds and USFWS, in collaboration with DWR, is looking for additional funds to support the construction of the Project. Without these additional funds, the SJRRP, including DWR, may not have sufficient funds to implement the Project and it could be delayed until additional funds are secured.

The outcomes and deliverables of the Project would be removal and modification of barriers to fish passage under variable flow conditions, substantially enhancing fish passage and migration through the project area. For example, adult salmon migrating upstream would be able to enter the Lower Eastside Bypass and move 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 be able to 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. Although temporary passage constraints may exist during instream construction, primarily associated with dewatering and fish rescue, long-term this Project will improve the overall conditions for Chinook Salmon and other native fish species. The design criteria for this Project are being developed in conjunction with the Settlement's Implementing Agencies to identify criteria for fish passage (including velocities, depths, and fish species jump heights). The design criteria will be 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.

2. Select all components that apply to your project.

Barrier removal or remediation | Barrier assessment | Fish passage monitoring | Education/outreach

3. List all partner organizations, and describe their involvement in the project (funder, planning/design, technical assistance, outreach, monitoring/evaluation, etc.)

-State of California agencies (California Department of Fish and Wildlife and California Department of Water Resources)
-Federal agencies (Reclamation, USFWS, and National Marine Fisheries Service)
-Water exchange contractors
-The Lower San Joaquin Levee District, which operates and maintains the Eastside Bypass within the broader flood bypass system
-Nonprofit participants (e.g., the Bay Institute, River Partners)
-The private landowner adjacent to the EBCS

	These partners are contributing to the passage project, with design headed up by California Department of Water Resources (DWR).
4. If proposed project addresses a barrier to fish passage, does it have a California Passage Assessment Database (PAD) identification number(s)?	YES
If you answered "yes" to question 6, please provide the PAD ID number(s).	758813
5. Describe the barrier(s) under "average" conditions, if it is a complete, temporal, or partial barrier, how often passage is provided for both adult and juvenile anadromous fish, and if the information is available (e.g., meets fish passage criteria for adults 45% of the time and 0% of the time for juveniles) for each barrier addressed. Please specify which species you are referring to when describing barrier status.	The EBCS is considered a partial barrier to fish passage generally (both adults and juvenile anadromous fish), and does not meet criteria for adult Chinook Salmon below 700 cfs. This was established by comparing results from a 1-D hydraulic model with passage criteria for jump, depth, and velocity. The same analysis also showed that it is a partial barrier for other resident native fish such as sturgeon and lamprey. The EBCS modifications aimed at improving fish passage include removing part of the sill that leads into the control structure, along with half of the energy dissipation blocks at the center bays and stop logs. On the downstream side of the structure will be a rock ramp to lessen the drop for migrating fish, and both ends of the ramp will be supported by sheet pile. As there is currently a large pool at that location, it will be filled with compacted fill, and topped with a layer of Engineered Streambed Material. Once completed, the EBCS project will allow for Chinook Salmon passage between 45-4,500 cfs, and support passage for other native species across varying flows. It will also open access to 11 miles of bypass habitat and 13 miles of river access along Reach 4A, until the next upstream impediment at Sack Dam.
6. Indicate how you determined that this barrier is a high priority project and/or addresses a high priority barrier(s). (Please check all that apply.)	Barrier(s) is listed in a key restoration plan for the region (see question 9 below) Endorsed by an agency
7. List the name(s) of the recovery plans and the specific task that name this barrier/project as a high priority, the agency that endorsed this project, or the local representative that names this project as a priority.	San Joaquin River Restoration Settlement Paragraph 11, (1) Phase I improvements (8) identifies “Modifications to structures in the Eastside ... Bypass channels, to the extent need to provide anadromous fish passage”. In SJRRP’s Funding Constrained Framework for Implementation (2018), the Eastside Bypass (Reach 4B) project is one of the identified Restoration Goal activities for fiscal years 2017-2024.
8. The California Fish Passage Forum (Forum) has seven (7) overall objectives. Please check each objective your project will help to address. (check all that apply)	1. Remediate barriers to effective fish migration. 2. Facilitate coordination and communication among agencies, agency staff, and other entities that may

propose, review, or promulgate fish passage criterial within California.

3. Coordinate funding mechanisms to remove fish passage barriers.

4. Support state and federal permit coordination and streamlining.

5. Facilitate plans to monitor and evaluate fish passage restoration effectiveness to ensure accountability.

6. Encourage existing state and national policy and actions that support fish passage improvement in California.

7. Implement education and outreach activities, targeting both the general public and fish passage practitioners.

9. Provide a brief explanation of how your project addresses all of the checked boxes in question 10.

1. The construction of the rock ramp and modifications to the EBCS achieved through this project will provide passage through the Eastside Bypass for native fishes, including Chinook Salmon, steelhead/rainbow trout, lamprey, and sturgeon.

2. Results of the proposed monitoring will help facilitate coordination and communication among the agency partners of the SJRRP and DWR for the passage facility and modifications at EBCS. Until recently, discussions for passage design had been focused on Chinook Salmon, but are now shifting to accommodate other native species such as sturgeon and lamprey. Design criteria for this Project will be developed in conjunction with the Settlement's Implementing Agencies (U.S. Bureau of Reclamation [Reclamation], U.S. Fish and Wildlife Service [USFWS], the National Marine Fisheries Service [NMFS], the Department of Water Resources [DWR], and the California Department of Fish and Wildlife [CDFW], to identify criteria for fish passage (including velocities, depths, and fish species jump heights). The design criteria will be 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.

3. A combination of in-kind, matching, and Forum funds would be leveraged as coordinated funding mechanisms to achieve the ultimate goal to improve fish passage conditions at EBCS. Refer to the project budget justification and project budget spreadsheet attached to this application for a breakdown in overall project budget and details.

4. The proposed monitoring associated with this project has been coordinated with NMFS and CDFW. The USFWS has obtained a section 10(a)(1)(A) permit with NMFS and scientific collecting permit with CDFW that cover specified monitoring activities. The NMFS section 10 (a)(1)(A) permit covers activities undertaken by multiple SJRRP implementing agencies, where USFWS is the permit holder. Any modifications to the project that would alter "take" since these permits were obtained will be coordinated with the respective regulating agency and USFWS will seek an amendment prior to conducting the monitoring activities. The NMFS section 10(a)(1)(A) permit is file number 16608-2R and the CDFW scientific collection permit is permit number 13786.
Additionally, the USFWS is the lead for coordinating a multi-agency team, the SJRRP Fisheries Management Work Group (FMWG), that consists of participation from the implementing agencies of the Settlement. The FMWG coordinates with other SJRRP work groups to provide guidance on fisheries-related aspects such as fish screen/passage criteria, environmental compliance, and permitting. Data collected on the baseline conditions of sturgeon in the Restoration Area under this funding opportunity would be shared with other technical experts that participate in the FMWG in addition to public agencies, academia, research institutes, non-profit organizations, and the private sector.

5. This project will provide the funding to remedy a fish passage impediment and if a grant is provided for our other proposal, "Designing for Sturgeon Passage in the San Joaquin River at Eastside Bypass Control Structure", then monitoring will be conducted to provide baseline information and post-construction data for gauging restoration effectiveness.

6. On March 30, 2009, the Secretary of Interior authorized and directed to implement the terms and conditions of the Settlement in cooperation with the State of California as defined in the San Joaquin River Restoration Settlement Act, Title X, Subtitle A, Part I of Public Law 111-11 (Settlement Act). Concurrent with the execution of the Settlement, the Settling Parties entered into a Memorandum of Understanding with the State of California (by and through the California Natural Resources Agency, DWR, CDFW, and the California Environmental Protection Agency) regarding the State's role in the implementation of the Settlement. As previously mentioned, improving passage conditions at Sack Dam is a high priority action for the SJRRP, a program formed to implement the Settlement. The SJRRP is a collaboration between Reclamation, USFWS, CDFW, DWR, and NMFS.

The Strategic Plan for the US Fish and Wildlife Service Fish and Aquatic Conservation Program: FY2016-2020 (Strategic Plan) identified multiple goals and objectives for the USFWS's Fish and Aquatic Conservation Program. In that document, there are objectives targeting the conservation of species and their habitat. These actions to provide native fish passage align with the goals and objectives of the

Strategic Plan and overall mission of the USFWS.

The State has called out in the recent updates to the California Water Action Plan to “bring back salmon to the San Joaquin River”. This entails construction of a conservation hatchery and research facility. It also includes performing activities that support the implementation of channel and structural improvements that result in restoring fish passage, such as the project described for the EBCS.

7. The results of the monitoring efforts will be presented at the biennial SJRRP Science Meeting, which is attended by agency and academic scientists, and members of nonprofits and local San Joaquin River residents. Information will also be shared with the working groups of the SJRRP, including the design teams in charge of developing fish passage criteria and the engineered design.

10. Select each anadromous fish species that will benefit from your project (select multiple if applicable).

- Chinook Salmon
- Steelhead/rainbow trout
- Pacific Lamprey
- Green sturgeon
- White sturgeon

11. Describe anticipated outcomes of implementing the proposed project. Include specific numbers when possible. Outreach accomplishments could include workshops/presentations/webinars given, educational materials developed, volunteers engaged, websites developed, social media metrics, etc.

- Stream miles restored or enhanced: 24
- Acres of habitat restored: 0
- Number of barriers remediated: 1
- Number of barriers assessed: 1
- Number of watersheds or rivers assessed: 1
- Number of stream miles assessed: 0
- Number of fish populations assessed: 4
- Outreach accomplishments: 2
- Other: 0

12. Provide the location and distance in stream miles of the proposed project to downstream river structures, and whether each structure represents an insignificant, partial, or total barrier to fish passage.

Recent (2021) removal of two weirs within the Eastside Bypass and Merced National Wildlife Refuge has improved fish passage at low flows at these sites, which are located downstream of EBCS. The only remaining barrier downstream of the EBCS project is a concrete rubble weir for a pump diversion, approximately 9.5 miles downstream in the Eastside Bypass. The concrete rubble weir is a partial barrier to fish passage (i.e., at flows less than ~ 200 cfs). Currently, DWR is evaluating preliminary designs to improve fish passage at this site. It is anticipated that this project would be constructed in 2024/2025.

13. Provide the location and distance in stream miles of the proposed project to upstream river structures, and whether each structure represents an insignificant, partial, or total barrier to fish passage.

Upstream of EBCS, remaining passage impediments include Arroyo Canal and Sack Dam (approximately 23.5 miles upstream), and Mendota Pool (approximately 32.5 miles upstream; see map with photos of each project). Both the Arroyo Canal Fish Screen/Sack Dam Fish Passage Project and the Mendota Pool Bypass are permitted and funded, and the projects are currently in or nearing the 30% design phase. Construction for both is anticipated in 2025 or 2026. Both sites are considered total barriers to fish passage.

14. Indicate which of the Forum's priority habitats that will be enhanced or restored as a result of this project (choose all that apply).

Spawning habitat

Rearing habitat

15. Has the owner and/or responsible organization/agency of the barrier(s) proposed for removal and/or remediation been identified, notified, and given permission for this project to proceed as proposed?

YES

If YES, please provide the name of the entity that owns/is responsible, and describe how consent to proceed was obtained/documented, and their role (if any) in any monitoring.

Land adjacent to the EBCS is owned by a private landowner (John Turner and Rene Turner Sample). DWR is currently negotiating permanent and construction easements of the project area with the landowners. It is anticipated that these will be in place by June 2022.

Documentation of consent to proceed may be uploaded here if applicable.

pdf EBIP-IS-EA-Final-FONSI.pdf

pdf EBIP-IS-EA-Public-Draft-120617_Part1.pdf

pdf EBIP-IS-EA-Public-Draft-120617_Part2.pdf

pdf EBIP-IS-EA-Public-Draft-120617_Part3.pdf

pdf EBIP-IS-EA-Public-Draft-120617_Part4.pdf

pdf SJRRP_CFPF_White Sturgeon Telemetry and ...

16. Describe how the success of this project will be evaluated, and attach a copy of your monitoring and evaluation plan and indicate the person and/or organization that will be responsible for implementing.**

pdf EBCS Design.pdf

***For any barrier remediation projects, the Forum recommends, at a minimum, applicants use the California Fish Passage Forum's Fish Passage Barrier Removal Performance Measures and Monitoring Worksheet, and one year minimum pre- and post-project monitoring.*

17. Will your project be implemented within 12-18 months?

YES

18. Describe below the project's timeline of major tasks and milestones (including permits), as well as implementation and monitoring dates keeping in mind that funding through this RFP will likely be available in Spring/Summer 2023. Please describe any issues that may exist and/or arise that could delay project implementation.

The Project is currently in 95% design review. DWR will finalize the design in the summer of 2022. In addition, DWR has obtained all but one of the environmental permits needed to bid the Project. The only permit remaining is an encroachment permit from the Central Valley Flood Protection Board. DWR anticipates obtaining the encroachment permit in the summer of 2022. DWR is also in the process of negotiating with the landowners a permanent easement to allow for construction and long-term monitoring and maintenance. DWR anticipates obtaining the easement late this year or early next year.

If you would like to also upload a document to help illustrate the project's timeline (as described above) please do so here. A template timeline can be found on the Forum's funding page (www.cafishpassageforum/funding)

xlsx 67_USFWSConstructionTimeline_Budget_CF...

19. Attach any project designs, plans, and/or photos.

pdf 35_EBCS Design_1472.pdf

PROJECT COSTS & BUDGET

20. Total Project Cost.

$7,773,000

21. Total funding amount being requested from the Forum.

64809

22. List all partner contributions (cash and/or in-kind) and indicate whether match is considered federal, non-federal, or tribal using the table below:

	Name of Partner Organization	Type of Match	Value of Cash Contributions ($)	Cash Contributions Secured?	Value of In-Kind Contributions ($)	In-Kind Contributions Secured?	Total Contribution ($)
1	DWR	Non-Federal			170,000	Yes	170,000
2	DWR	Non-Federal			6,103,000	Yes	6,103,000
3							
4							
5							
6							
7							

23. Will the project be fully funded if funding currently being requested from the Forum through this RFP is awarded?

NO

24. All budgets must include the following information. Please check each box indicating understanding of this requirement and upload a copy of your budget (including budget narrative) below.

- Total coast of project
- Total funding being requested from the Forum clearly indicating how/on what Forum funds will be spent.
- Total match (cash/in-kind) and resulting deliverables. Please include and differentiate federal and non-federal match.
- Monitoring/evaluation costs
- Accompanying narrative explaining budget categories, amounts listed, what will be accomplished, and what deliverables are expected, etc.

Attach a project budget, including a narrative that describes the overall project budget and a detailed budget breakdown. (Word, .pdf, or .xls) A budget template is available on the Forum's funding page (www.cafishpassageforum.org/funding).

xlsx USFWSConstructionTimeline_Budget_CFPF_...

docx USFWS_DWR Construction_BudgetJustificat...

PROJECT TEAM CAPABILITIES

25. Describe the experience and capabilities of up to three of the project leaders relative to their ability to implement this project. Include any work on other Forum-supported projects or efforts project leaders have been involved with.

Erin Strange has 25+ years of experience in managing, designing, leading, permitting, and implementing field studies of anadromous fish species in Sacramento and San Joaquin Rivers, including the first chinook salmon juvenile telemetry study for the San Joaquin River Restoration Program. Erin has overseen the implementation and management of fishery and habitat restoration activities focused on conserving and enhancing Pacific anadromous salmonids including strategic planning, project development, budgets, annual work plans, financial assistance, contractual obligations, and coordination with partners. Erin also has 10+ years of experience working on the design, planning, and pre-project fishery monitoring for all the fish passage and fish screening projects within the the San Joaquin River Restoration Program area, including the Eastside Bypass Control Structure Fish Passage Project.

OUTREACH

26. Describe how this project conducts outreach and education to the local or regional community? Examples could include, but are not limited to: public workshops, tours, signs, scientific journal articles, scientific conference presentations, educational forums, professional photo/video development, website, press release, newsletter, social media outreach, volunteers, schools, etc. Include any existing urls, social media handles, etc.

This project will conduct outreach and education to the local and regional community through the following activities: SJRRP biennial Science Meeting presentation (anticipated Fall 2024) which may include participants from the public (the Friant or Fresno community if in-person or the broader public if virtual), water operators and agricultural interests, and tribes; and a featured story in the FWS Pacific Southwest Highlights online (https://www.fws.gov/cno/). The project will also be chronicled on the SJRRP website (https://www.restoresjr.net/).

ALIGNMENT WITH NATIONAL PRIORITIES

27. Which of the National Fish Habitat Partnership's (NFHP) FY23 National Conservation Strategies will be addressed by your project? (select all that apply)

2. Restore hydrologic conditions for fish.

3. Reconnect fragmented fish habitats.

Review the *FY23 NFHP National Conservation Strategies*.

28. What U.S. Fish & Wildlife Service (USFWS) Climate Change Strategies will be addressed by your project? (select all that apply)

3.2 Promote habitat connectivity and integrity.

3.3 Reduce non-climate change ecosystem stressors.

3.4 Identify and fill priority freshwater needs.

Review the *USFWS: Rising to the Urgent Challenge – Strategic Plan for Responding to Accelerating Climate Change*.

29. Provide specific information about how your project addresses the climate change strategy you checked in question 32.

Our project will address 3.2 Promote habitat connectivity and integrity as a USFWS Climate Change Strategy, by constructing a rock ramp and modifying an existing control structure to rectify the most downstream passage barrier for Chinook Salmon returning to the SJRRP Restoration Area in most water years. Increasing access to potentially cooler spawning and rearing habitats upstream will also be important for other native fishes under climate change. In addition, the project will help fulfill 3.3 Reduce non-climate change ecosystem stressors by reversing some of the impacts of stream modification at this site. Similarly, the project will also address 3.4 Identify and fill priority freshwater needs, by helping water managers provide adequate (i.e., more natural, less impeded) flows at the EBCS site by removing the sill and removing several energy dissipation blocks.

30. Would an existing tribal, commercial, recreational, or subsistence fishery be enhanced as a result of the project? If yes, please describe. If not, is there a future fishery that would potentially be restored through increased habitat as a result of this project? If so, describe.

The population of White Sturgeon occupying the Sacramento-San Joaquin River basin is recreationally fished (bag limit of 3 White Sturgeon per year between 40-60 inches) with the exception of a few reaches. Increasing access to additional spawning and rearing habitat in the upper San Joaquin River will thus enhance the existing White Sturgeon fishery.

31. Would this project increase public access to land or water resources for fish and wildlife-dependent recreational opportunities? If so, describe.

The proposed project would be constructed on land managed by DWR, and would not provide any public access structures. However, construction of the fish passage project at EBCS and improvement projects throughout the Eastside Bypass would allow for release of increased flows upstream and access to higher quality habitat for native fishes in the SJRRP Restoration Area. In this way, the project could aid public access to recreational opportunities.

Thank you for your interest in the Forum, and for taking the time to submit this proposal. You will be contacted by the Forum to discuss the outcome of this funding process.

Reaches of the San Joaquin River under evaluation include the following:

Reach 1 – Friant Dam to Gravelly Ford

Reach 2 – Gravelly Ford to Mendota Dam

Reach 3 – Mendota Dam to Sack Dam

Reach 4 – Sack Dam to the confluence of Bear Creek and the Eastside Bypass

Reach 5 – Eastside Bypass/Bear Creek confluence to the Merced River confluence

Eastside Bypass Control Structure

Sack Dam

Mendota Dam

Reach 2B downstream of the Chowchilla Bifurcation

Friant Dam

Turlock

Newman

California Aqueduct

Merced River

Tuolumne River

Dry Creek

Los Banos

Atwater

Bear Creek

Mariposa Bypass

Merced

Sand Slough Control Structure

Delta-Mendota Canal

Arroyo Canal

Eastside Bypass

Sack Dam

Ash Slough

San Joaquin River

Firebaugh

Chowchilla Bypass

Mendota Dam

Mendota

Chowchilla Bifurcation Structure

Mendota Pool

Gravelly Ford

Fresno Slough

James Bypass

Fresno

Friant Dam

Millerton Lake

5

4B2

140

99

165

4B1

152

4A

3

33

2B

2A

180

1B

1A

FINDING OF NO SIGNIFICANT IMPACT

San Joaquin River Restoration Program
Eastside Bypass Improvements Project
Merced National Wildlife Refuge Well Replacement

United States Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
Sacramento, California

Recommended: Rebecca Victorine 4/5/18
Rebecca Victorine
Natural Resource Specialist Date

Concurred: Gina Weil 4/5/18
Gina Weil
Project Manager Date

Concurred: 4/5/18
Elizabeth Vasquez
Deputy Program Manager – Restoration Goal Date

Approved: Ann Lubas-Williams 5 April 2018
Ann Lubas-Williams
Acting Program Manager Date

FONSI Number: 18-03-SJRRP

This Page Intentionally Left Blank

FINDING OF NO SIGNIFICANT IMPACT

BACKGROUND

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

- Restoration Goal – To restore and maintain fish populations in "good condition" in the main stem of the 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 Contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

The San Joaquin River Restoration Program (SJRRP) is being implemented in accordance with the Settlement by the U.S. Bureau of Reclamation (Reclamation), U.S. Fish and Wildlife Service (Service), National Marine Fisheries Service (NMFS), the California Department of Water Resources (DWR) and the California Department of Fish and Wildlife (DFW).

Consistent with the Restoration Goal, the SJRRP is proposing to implement the Eastside Bypass Improvements Project (EBIP) to facilitate fish migration and increased Restoration Flow capacity in the Eastside Bypass by 2020. In December 2017, Reclamation, as the lead agency in accordance with the National Environmental Policy Act (NEPA), and DWR, as the lead agency in accordance with the California Environmental Quality Act, prepared and released for public review the EBIP Draft Environmental Assessment/Initial Study (EA/IS). The EBIP Final EA/IS consists of the December 2017 Draft EA/IS, including Appendices A and B; public comments received (Appendix C), responses to public comments and minor text changes to the EA/IS (Appendix D), Endangered Species Act (ESA) compliance documentation (Appendix E) and National Historic Preservation Act (NHPA) Section 106 compliance documentation (Appendix F).

The EBIP includes several actions being planned and designed for implementation by DWR and Reclamation, including removal of two existing weirs the Merced National Wildlife Refuge (Refuge) has historically operated for irrigation of managed wetlands. To replace the water supply historically provided by these two weirs, Reclamation is proposing to replace an existing non-operational well on the Refuge with a new well.

The proposed action, including environmental commitments that will be implemented to avoid and minimize potential impacts to the extent feasible, is further described in the attached EA/IS. While the attached EA/IS analyzes the potential impacts to the human environment of implementing the removal of the weirs and the well replacement, along with the other elements of the EBIP being planned for implementation by DWR, this finding of no significant impact (FONSI) is being prepared for the proposed action of providing a replacement well only. Reclamation has completed all related environmental compliance documentation for the proposed well replacement, as further described below. Reclamation will prepare a subsequent FONSI for the proposed action of removing the weirs once all related environmental compliance documentation has been completed for that proposed action. Reclamation will continue to coordinate with the Refuge on potential actions to offset the additional expense of operating the replacement well (such offsets may include the purchase and installation of a roof-mounted photovoltaic array). Subsequent environmental compliance documentation will be prepared as necessary for any such future actions.

FINDINGS

The attached EA/IS was prepared to evaluate the potential environmental impacts associated with the proposed action and the no action alternative. In accordance with NEPA, as amended, Reclamation has found that the proposed action of providing the Refuge with a replacement well, as further described in the attached EA/IS, is not a major Federal action that would significantly affect the human environment. Therefore, an environmental impact statement is not required.

This FONSI is based on the following, as further described in the attached EA/IS:

- The proposed action will have no effect on the following resources: Indian sacred sites, Indian Trust Assets, agricultural resources, land use, hazards, population and housing, public services and utilities, and environmental justice.

- The proposed action constitutes an undertaking as outlined in Section 301(7) of the NHPA, initiating Section 106 of the NHPA and its implementing regulations at 36 CFR §800. Reclamation initiated consultation with the State Historic Preservation Officer (SHPO), notifying the SHPO of Reclamation's finding of no adverse effect, pursuant to 36 CFR §800.4(d)(1). The SHPO responded indicating no objection to this finding, concluding the consultation process for this undertaking (Appendix F).

- As described in the EA/IS, construction activities under the proposed action would be short term and have a small area of disturbance. In addition, the proposed action includes implementing environmental commitments that would avoid and minimize impacts to special status species, including those protected by the Migratory Bird Treaty Act. The Service has provided concurrence with Reclamation's determination that the proposed action, as described, may affect,

but is not likely to adversely affect, vernal pool crustaceans, Central California Distinct Population Segment California tiger salamander, blunt-nosed leopard lizard, giant garter snake, San Joaquin kit fox, and Fresno kangaroo rat (Appendix E). In addition, the proposed action is not likely to adversely affect the primary constituent elements of critical habitat for the vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fair shrimp, Hoover's spurge, or Colusa grass. The proposed action will be consistent with the goals and policies of the Draft San Luis and Merced National Wildlife Refuge Comprehensive Conservation Plan. The proposed action will have no effect on fish species. Therefore, impacts to biological resources will be less than significant.

- Long-term and cumulative impacts from the release of Restoration Flows into the San Joaquin River and the Eastside Bypass were previously analyzed and disclosed in the San Joaquin River Restoration Program EIS/EIR (PEIS/R). The EBIP EA/IS tiers from that document and focuses on implementation of several fish passage and levee projects that were more broadly analyzed in the PEIS/R. The change in hydrology and wetland function from releasing Restoration Flows is not analyzed as an impact of the proposed action in the EBIP EA/IS, as the change is assumed to be part of the no action alternative condition, which includes implementation of the selected alternative as described in the 2012 SJRRP PEIS/R Record of Decision, including release of up to 4,500 cubic feet per second of Restoration Flows in the Restoration Area. Reclamation recognizes that this no action alternative condition has affected the Refuge and will continue to work with the Refuge on avoiding and/or minimizing potential changes to Refuge operations and wetlands. The proposed action will not result in any fill of Waters of the U.S. Therefore, impacts to hydrology and wetlands will be less than significant.

- Construction associated with the proposed action will not be visible from the Refuge nature trails, auto tour route, or the associated wildlife observation platforms (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). Once the proposed action is completed, only the wellhead will be visible at the surface and due to its extremely small size it will not detract from the existing visual character or quality. This impact will be less than significant.

- The replacement well will 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 replacement well will have a capacity of 1,500 gallons per minute and be screened at about 150 to 200 feet below ground surface, not to extend below the bottom of the Corcoran clay layer, making withdrawals from the shallow aquifer. Given that the neighboring landowner already takes steps to actively reduce groundwater levels, a small decline in

groundwater levels in the shallow aquifer introduced by the new replacement well will not likely adversely affect conditions in the shallow aquifer. Therefore, impacts to groundwater levels and the potential for subsidence will be less than significant.

- The replacement well will be located in the Eastside Bypass and therefore may affect flood flows. However, the replacement well will be designed to result in negligible effects on flood elevations, specifically with respect to the Central Valley Flood Protection Board 0.1-foot water level increase criterion. Therefore, impacts to flood management will be less than significant.

- The proposed action will have no long-term, permanent impacts on private or public waterfowl hunting, or the wildlife viewing opportunities afforded by the three nature trails or auto tour route on the Refuge. Thus, the proposed action will have a less than significant impact on recreation opportunities.

- Construction emissions under the proposed action will be temporary and less than the *de minimus* air pollutant thresholds. Implementation of the environmental commitments as described in the attached EA/IS will further avoid and minimize potential impacts to air quality. Therefore, impacts to air quality will be less than significant.

- Cumulative impacts of the proposed action and other past, present and reasonably foreseeable future actions, including implementation of other SJRRP projects contributing to achieving the Restoration Goal will have a beneficial effect on hydrology and biologic resources. The proposed action will not considerably contribute to cumulative adverse impacts on any resources. As described in the attached EA/IS, the proposed action is a component of a series of actions along Reach 4B of the San Joaquin River and Eastside Bypass. However, the remaining EBIP actions are not anticipated to be implemented until at least 2019 or later; therefore, the potential minor and temporary construction-related impacts associated with the proposed action, as described in the attached EA/IS will be spaced out from these other actions.

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

This page intentionally left blank.

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:

Karen Dulik
California Department of Water Resources
South Central Region Office
3374 E. Shields Avenue
Fresno, CA 93726
Karen.Dulik@water.ca.gov
Fax: (559) 230-3301
Phone: (559) 230-3361

Becky Victorine
Bureau of Reclamation
San Joaquin River Restoration Program
2800 Cottage Way
Sacramento, CA 95825
rvictorine@usbr.gov
Fax: (916) 978-5469
Phone: (916) 978-4624

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

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.

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.)*

This page intentionally left blank.

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 — Date: 12/6/2017

Kevin Faulkenberry, P.E. — Print Name

Region Manager — Title

California Department of Water Resources — Agency

This page intentionally left blank.

Eastside Bypass Improvements Project Initial Study/Draft Environmental Assessment

This page intentionally left blank.

Table of Contents

Abbreviations and Acronyms v

Chapter 1. Introduction 1-1
1.1 Project Overview 1-1
1.2 Project Area 1-1
1.3 Project Background 1-2
1.4 Project Purpose, Objectives, and Need 1-6
1.5 Purpose and Intended Uses of this IS/EA 1-7
1.6 Document Organization 1-8

Chapter 2. Description of the Proposed Project and No Action Alternative 2-1
2.1 Existing Structures to be Modified 2-1
2.2 No Action Alternative 2-12
2.3 Proposed Project 2-12

Chapter 3. Environmental Setting, Impacts, and Mitigation Measures 3-1
3.1 Aesthetics 3-3
3.2 Agriculture and Forestry Resources 3-13
3.3 Air Quality 3-19
3.4 Biological Resources – Fisheries 3-34
3.5 Biological Resources – Vegetation and Wildlife 3-56
3.6 Cultural Resources 3-109
3.7 Environmental Justice 3-124
3.8 Geology and Soils 3-129
3.9 Greenhouse Gas Emissions 3-138
3.10 Hazards and Hazardous Materials 3-147
3.11 Hydrology and Water Quality 3-165
3.12 Land Use and Planning 3-199
3.13 Mineral Resources 3-204
3.14 Noise 3-207
3.15 Paleontological Resources 3-215
3.16 Population and Housing 3-221
3.17 Public Services 3-224
3.18 Recreation 3-227
3.19 Socioeconomics 3-233
3.20 Transportation and Traffic 3-235
3.21 Indian Trust Assets 3-242
3.22 Utilities and Service Systems 3-243
3.23 Mandatory Findings of Significance 3-250

Chapter 4. Other Required Analyses 4-1
4.1 Cumulative Impacts 4-1
4.2 Growth-inducing Impacts 4-8
4.3 Relationship between Short-Term Uses and Long-Term Productivity 4-9
4.4 Irreversible and Irretrievable Commitments of Resources 4-9

Chapter 5. Consultation, Coordination, and Compliance 5-1
5.1 Public Outreach and Agency Involvement 5-1
5.2 Regulatory Compliance 5-4

Chapter 6. List of Preparers 6-1

Chapter 7. References 7-1

Tables

Table 2-1. Flood Flow Capacity for Structural Improvements 2-13
Table 2-2. Fish Passage Design Criteria 2-14
Table 2-3. Summary of Passage Flows by Species at Modified Eastside Bypass Control Structure 2-22
Table 2-4. Summary of Passage Flows by Species for Dan McNamara Road Modifications 2-24
Table 3.3-1 National and State Ambient Air Quality Standards 3-22
Table 3.3-2 Pollutant Concentrations Measured at Coffee Ave, M Street, and 1st Street Air Quality Monitoring Stations (2014–2016) 3-23
Table 3.3-3. Federal and State Attainment Status of San Joaquin Valley Air Basin 3-25
Table 3.3-4 General Conformity *de minimus* Thresholds 3-27
Table 3.3-5. San Joaquin Valley Air Pollution Control District and Federal General Conformity Project-level Thresholds of Significance for Pollutants 3-29
Table 3.3-6 Calculated Maximum Daily (Pounds) and Annual (Tons) Emissions from Proposed Project Construction 3-31
Table 3.3-7. Mitigation for Nitrous Oxides Emissions 3-32
Table 3.3-8. Estimated Construction Emissions for the Proposed Project with Mitigation Incorporated Compared to General Conformity *De Minimis* Thresholds 3-33
Table 3.4-1. Special-status Fish Species with Historic or Current Presence within the Project Area and Adjacent San Joaquin River Reach 3-37
Table 3.5-1. Project Area Habitat Types by Acreages and Types of Effects 3-65
Table 3.5-2. Potential Wetlands and Other Waters of the United States 3-68
Table 3.5-3. Prevalent Invasive Plant Species in the Project Area 3-70
Table 3.5-4. Potentially Occurring Special-status Species 3-72
Table 3-6-1. Summary of Cultural Resources Recorded during Inventory Survey within the Project Area. 3-112
Table 3.7-1. 2015 Demographic Characteristics 3-125
Table 3.7-2. 2015 Income, Unemployment, and Poverty Characteristics 3-125
Table 3.8-1. Project Site Soil Types and Characteristics 3-131
Table 3.11-1. Physical Water Quality Parameters Sampled in the Eastside Bypass at Merced National Wildlife Refuge 3-166
Table 3.11-2. Physical Water Quality Parameters Sampled in the Eastside Bypass below Mariposa Bypass 3-167
Table 3.11-3. San Joaquin River Beneficial Uses 3-168
Table 3.11-4a. Water Quality Sampling Results 3-178
Table 3.11-4b. Water Quality Sampling Results 3-179
Table 3.13-1. California Geological Survey Mineral Land Classification System 3-204
Table 3.14-1. Typical Noise Levels 3-208
Table 3.14-2. Decibel Changes, Loudness, and Energy Loss 3-208
Table 3.14-3. Construction Equipment Types and Noise Levels 3-211
Table 3.14-4. Construction Equipment Types and Vibration Levels 3-211
Table 3.15-1. Paleontological Records and Literature Search Results 3-218
Table 3.16-1. Estimated Population Growth in the Project Region, 2016–2030 3-221
Table 3.16-2. Housing Estimates for the Project Region, 2014 3-222
Table 3.19-1. Direct, Indirect, Induced, and Total Regional Economic Effects of Project Construction 3-234
Table 3.20-1. Highway Segment Operations – 2015 Conditions 3-236
Table 3.20-2. Local Roadway Operations –2006 Conditions 3-236
Table 5-1. Permits and Approvals that May Be Required for the Eastside Bypass Improvements Project 5-4

Figures

Figure 1-1. Project Location 1-3
Figure 1-2. Proposed Eastside Bypass Improvements Project Location 1-4
Figure 2-1. Irrigation Canal and Culvert Crossing at Existing Levee 2-3
Figure 2-2. Eastside Bypass Control Structure (looking downstream) 2-3
Figure 2-3. Existing Infrastructure at Eastside Bypass Control Structure 2-5
Figure 2-4. Gated Outflow Structure at Eastside Bypass Control Structure 2-6
Figure 2-5. Dan McNamara Road during Inundation 2-6
Figure 2-6. Low-flow Culvert within the Main Channel at Dan McNamara Road 2-7
Figure 2-7. Dan McNamara Road Crossing Detours during Flood and Restoration Flows 2-8
Figure 2-8. Merced National Wildlife Refuge Wetlands and Weir Facilities 2-10
Figure 2-9. Lower Merced Weir #1 Looking Downstream 2-11
Figure 2-10. Upper Merced Weir #2 Looking East at the Right Bank 2-11
Figure 2-11. Levee Improvement Segments 2-18
Figure 2-12. Typical Levee Improvement Cross Section 2-19
Figure 2-13. Eastside Bypass Control Structure Rock Ramp Plan View 2-19
Figure 2-14. Eastside Bypass Control Structure Typical Cross Section 2-20
Figure 2-15. Eastside Bypass Control Structure Design Water Surface Elevation 2-21
Figure 2-16. Dan McNamara Road Modifications Culvert Replacement 2-23
Figure 2-17. Dan McNamara Road Modifications Water Surface Elevations 2-25
Figure 2-18. Merced National Wildlife Refuge Weir Removal and Well Replacement 2-26
Figure 2-19. Water Surface Elevations between Weirs 2-27
Figure 2-20. Proposed Haul Routes and Staging and Borrow Areas for Eastside Bypass Control Structure Modifications 2-31
Figure 2-21. Proposed Haul Routes and Staging and Borrow Areas for Dan McNamara Road Modifications 2-34
Figure 3.1-1. View of the Eastside Bypass Control Structure in Summer, Looking Downstream to the North 3-5
Figure 3.1-2. View of Dan McNamara Road Crossing the Eastside Bypass during Inundation, Looking North 3-5
Figure 3.1-3. View of the Lower Merced Weir, Looking Downstream to the North 3-7
Figure 3.1-4. View of the Upper Merced Weir, Looking East 3-7
Figure 3.1-5. View of the Eastside Bypass, North of El Nido Road 3-8
Figure 3.1-6. View of the Eastside Bypass from West Washington Road 3-8
Figure 3.5-1a. Habitat Types 3-58
Figure 3.5-1b. Habitat Types (Eastside Bypass Control Structure Modifications) 3-59
Figure 3.5-1c. Habitat Types (Dan McNamara Road Modifications) 3-60
Figure 3.5-1d. Habitat Types (Lower Merced Weir Removal) 3-61
Figure 3.5-1e. Habitat Types (Upper Merced Weir Removal) 3-62
Figure 3.5-1f. Habitat Types (Levee Repairs O-1) 3-63
Figure 3.5-1g. Habitat Types (Levee Repairs O-3 & O-4) 3-64
Figure 3.5-2. Designated Critical Habitat and Recovery Areas within Project Area 3-79
Figure 3.10-1. Closest Landfills to the Project Area 3-149
Figure 3.10-2. Hazardous Materials Sites in the Project Area 3-151
Figure 3.11-1. Groundwater Resources in the Project Area and Surrounding Area 3-169
Figure 3.11-2. Location of Select Groundwater Monitoring Wells within the Project Area 3-170
Figure 3.11-3. Hydrogeologic Cross Section at Transect 166.5 3-171
Figure 3.11-4. Hydrogeologic Cross Section at Transect 161.3 3-172
Figure 3.11-5. Hydrogeologic Cross Section at Transect 158.0 3-173
Figure 3.11-6. Groundwater Elevation and Ground Surface Elevation (Eastside Bypass, Right Bank) 3-174
Figure 3.11-7. Groundwater Elevation and Ground Surface Elevation (Eastside Bypass, Left Bank) 3-174
Figure 3.11-8. Groundwater Elevation and Ground Surface Elevation (Eastside Bypass, Left Bank) 3-175
Figure 3.11-9. Groundwater Elevation and Ground Surface Elevation (Eastside Bypass, Left Bank) 3-175
Figure 3.11-10. Measured Subsidence Rate between December 2011 and December 2016 3-177
Figure 3.11-11. Water Quality Sampling Locations 3-180
Figure 3.19-1. Unemployment Rate Profile for Merced County (2005-2016) 3-233
Figure 3.20-1. Dan McNamara Road Crossing Detours during Flood and Restoration Flows 3-238

Appendices

Appendix A. Air Quality and Greenhouse Gas Emissions Modeling Results and Consistency Determination
Appendix B. Biological Resources – Vegetation and Wildlife Appendix

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

This page intentionally left blank.

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

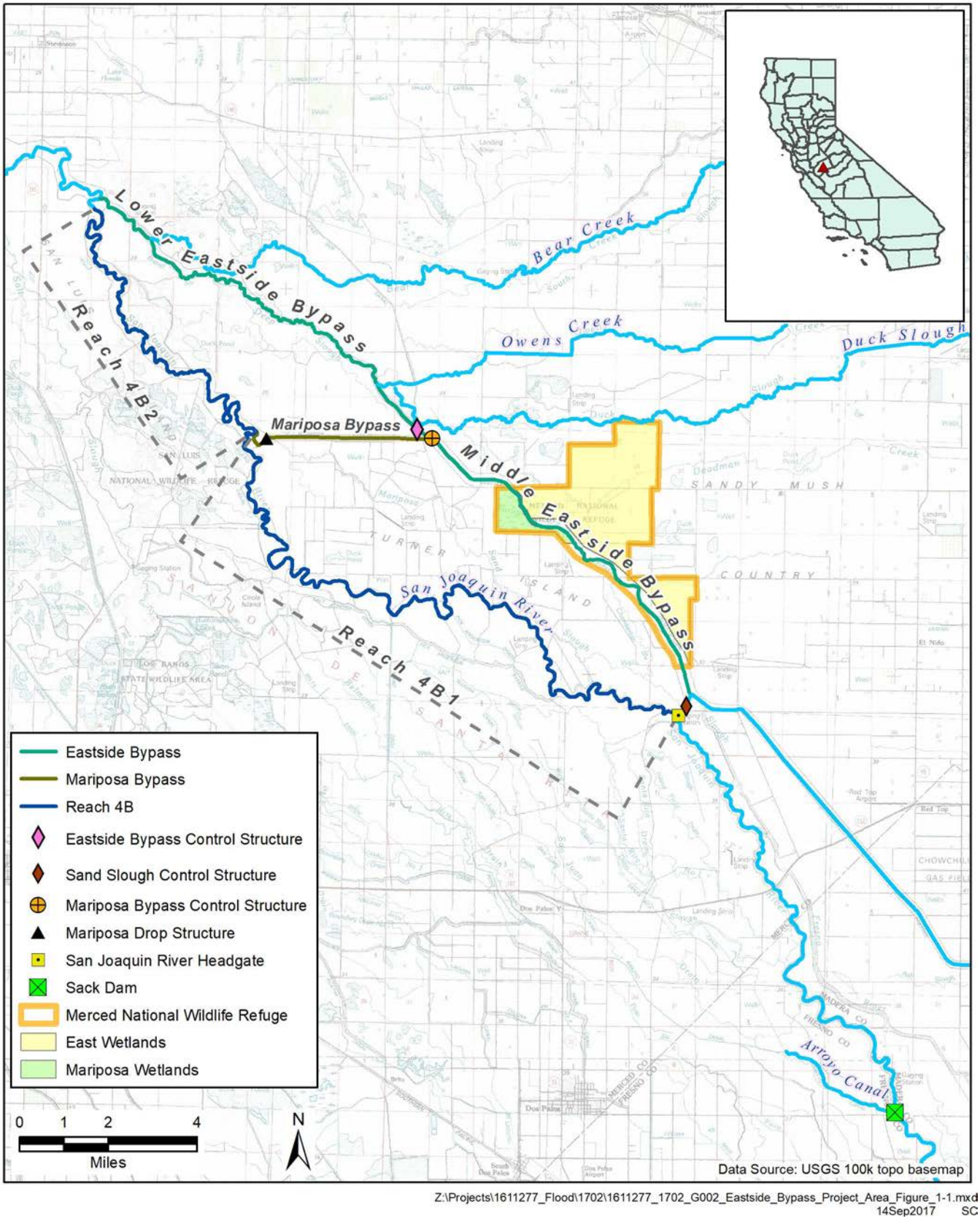
In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit, known as *NRDC, et al., v. Kirk Rodgers, et al.*, challenging the renewal of long-term water service contracts between the United States and the Central Valley Project (CVP) Friant Division 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.

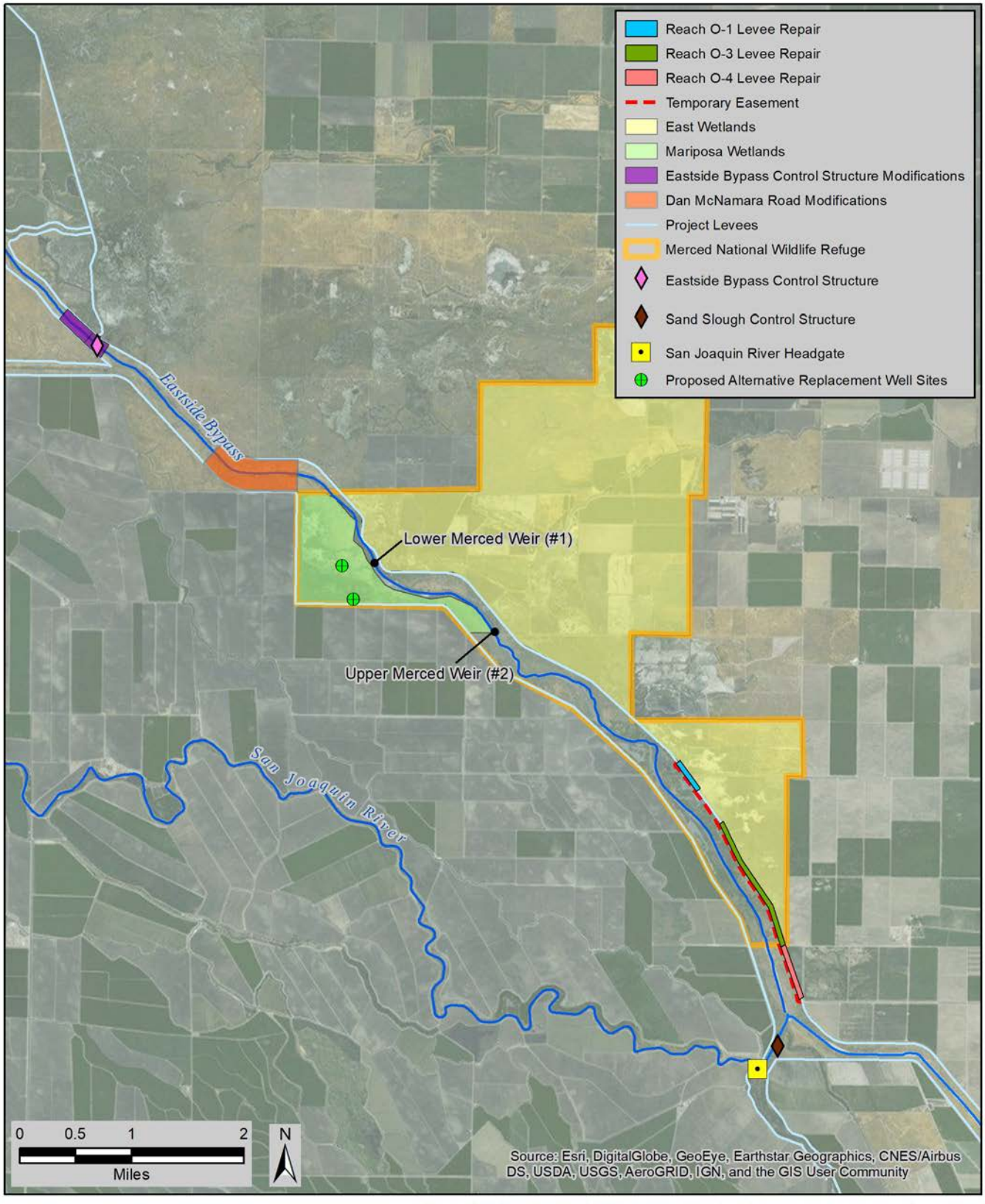
To achieve the Restoration Goal, the Settlement calls for releases of water from Friant Dam to the confluence of the Merced River (referred to as Restoration Flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. 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.

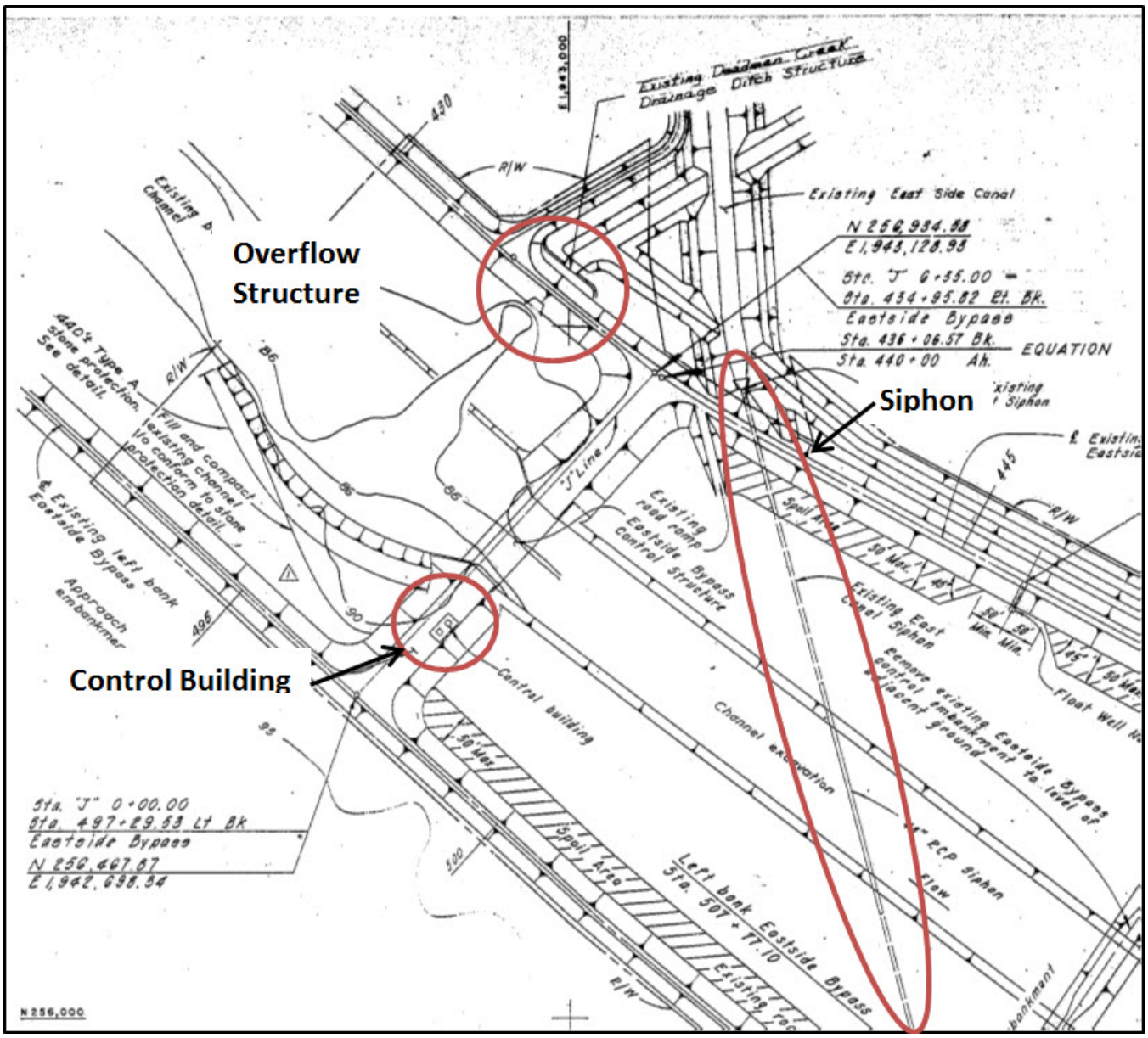
Existing infrastructure at the Eastside Bypass Control Structure is presented in **Figure 2-3**. Infrastructure associated with the structure that would not be modified as part of the proposed project include an underground siphon that conveys water in the Eastside Canal, a gated overflow structure that 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

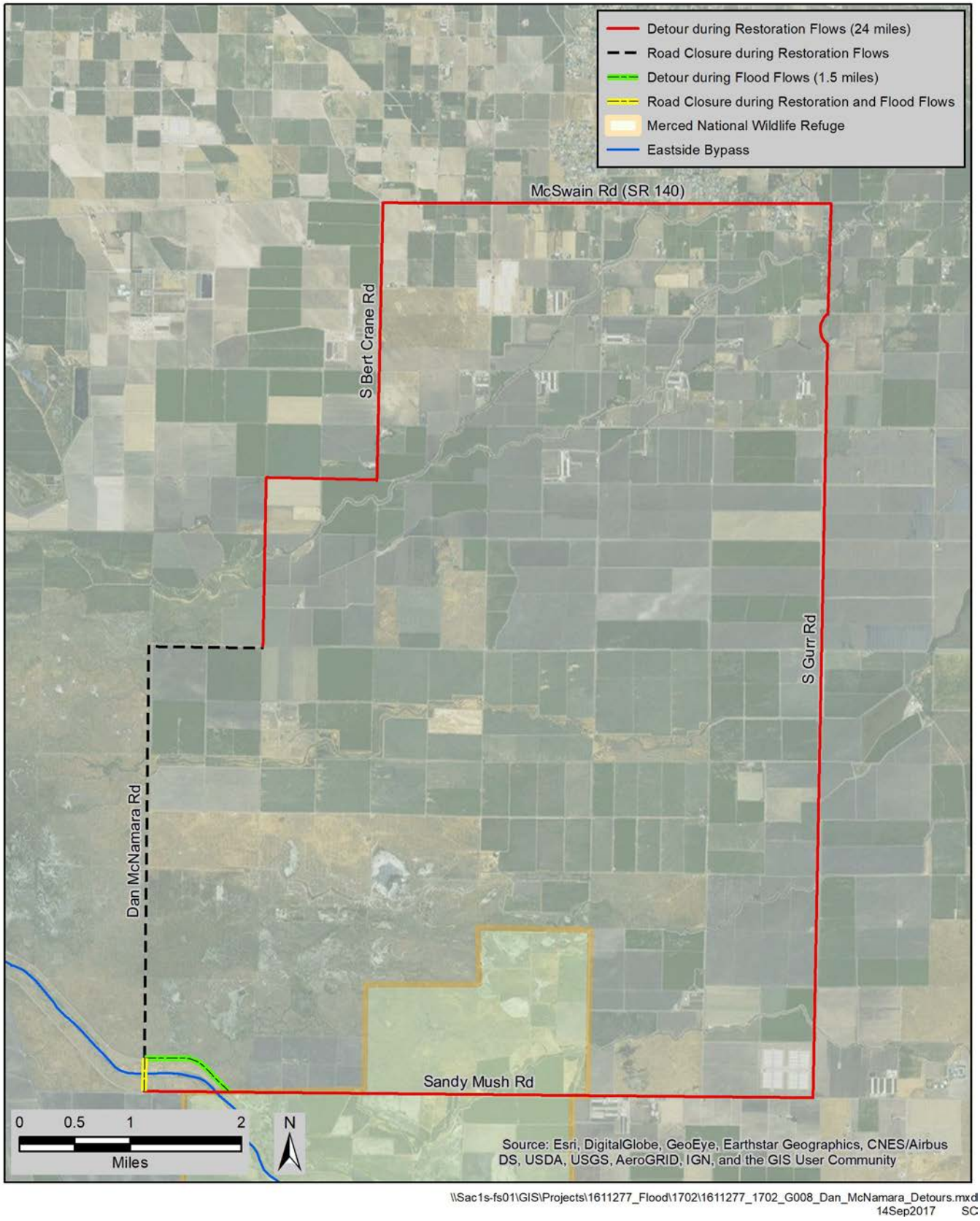
Source: California Department of Water Resources 2017

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

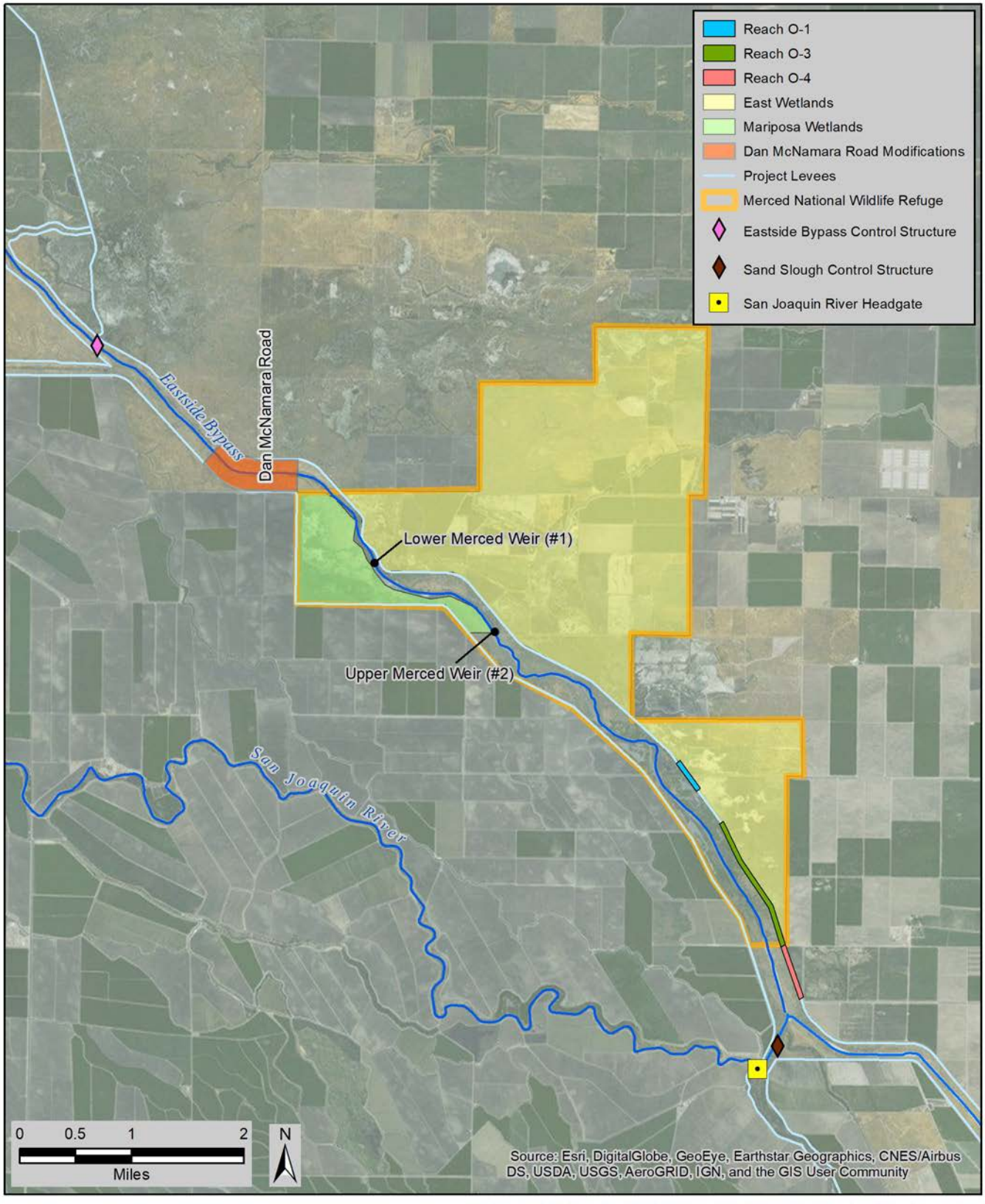
A section of the Eastside Bypass overlays the Merced NWR. Just south of Sandy Mush Road, two weirs have been constructed in the Eastside Bypass that facilitate water diversions to support seasonal wetlands and pools for migratory birds (**Figure 2-8**). The Lower Merced Weir #1 (lower weir) is less than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



Z:\Projects\1611277_Flood\1702\1611277_1702_G012_MNWRW_weir_facilities_Figure2-8.mxd
11OCT2017 SC

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**.

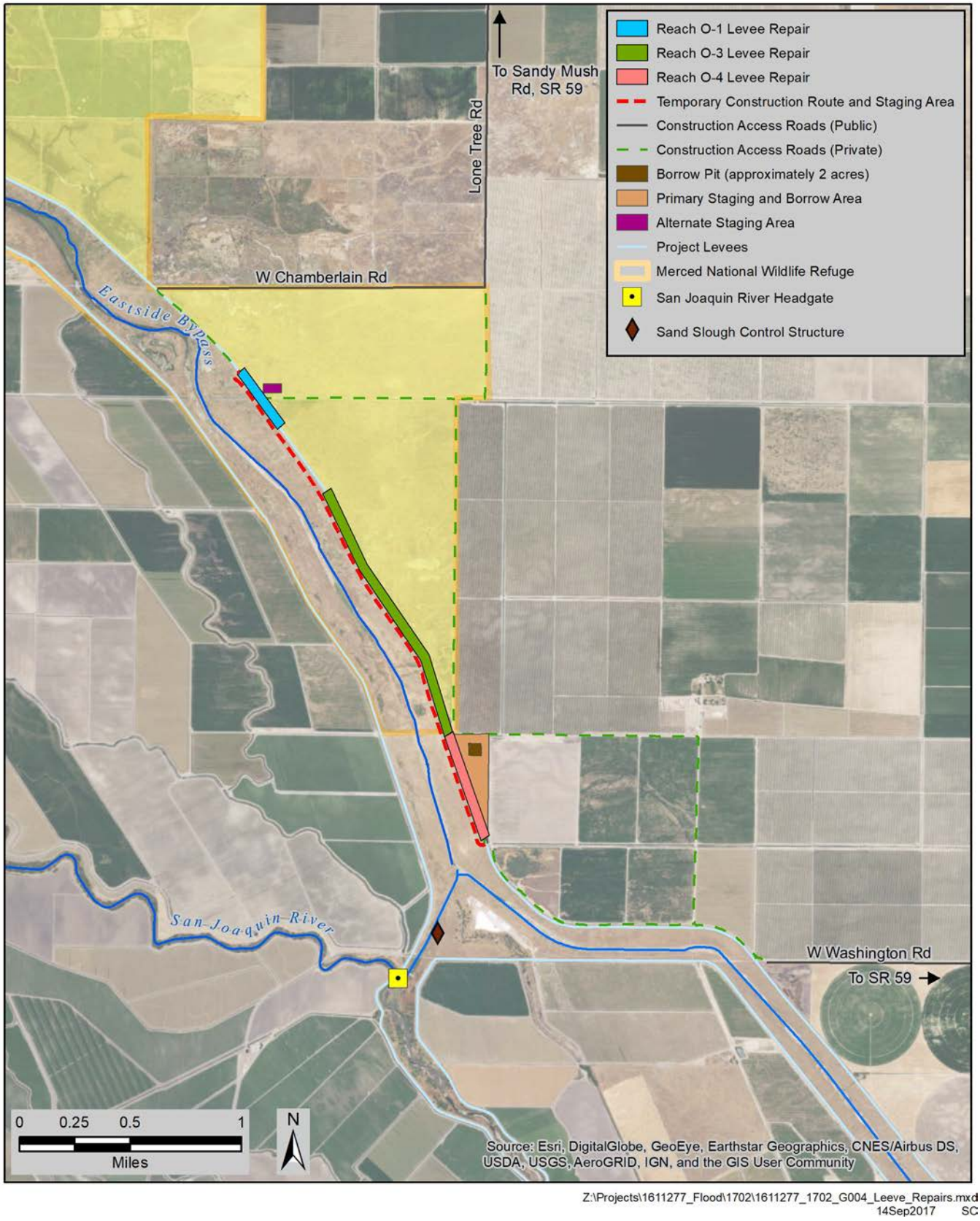
Eastside Bypass Control Structure Modifications

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.

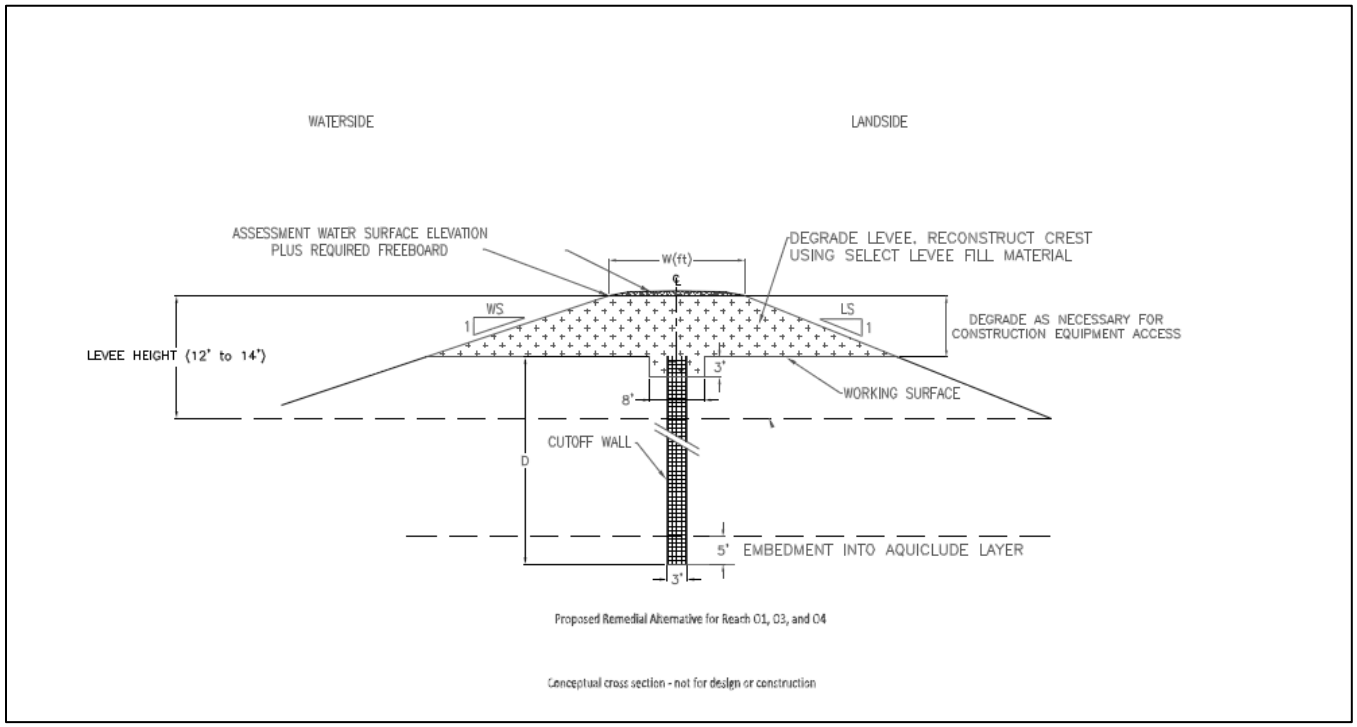
There is currently a stream gage site dedicated to collecting stream flow data approximately 550 feet downstream of the Eastside Bypass Control Structure. To make sure the gage is outside of the influence of the new rock ramp and can accurately measure stage, the gage would be replaced and relocated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

Figure 2-11. Levee Improvement Segments



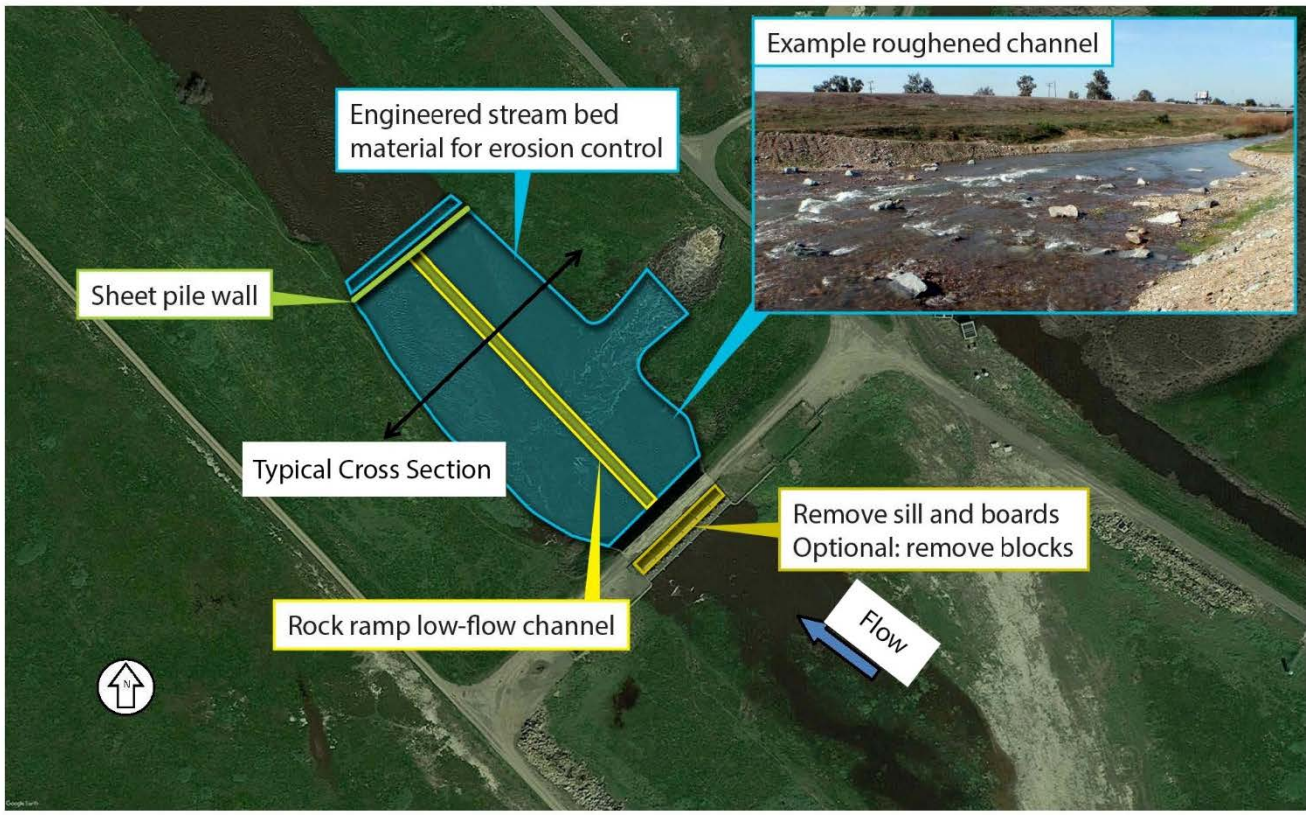
Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

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



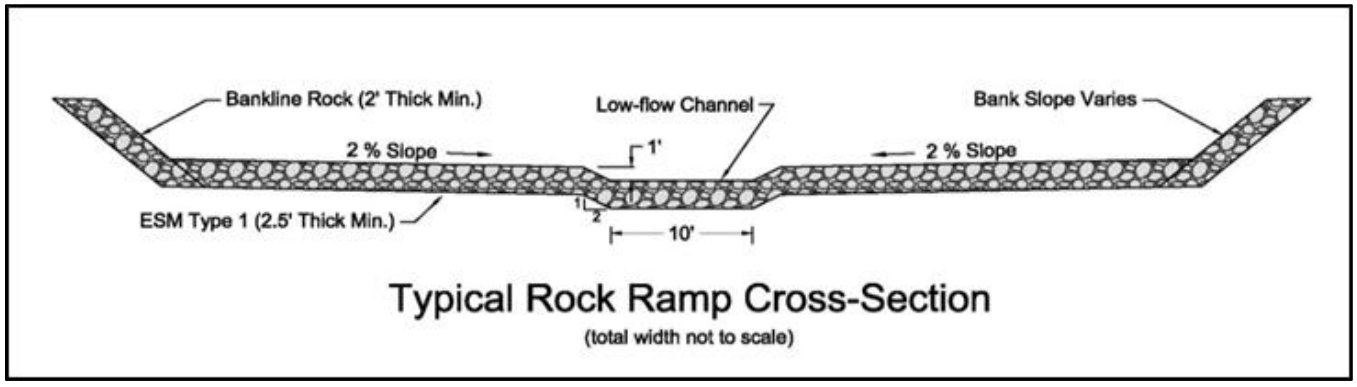
Source: California Department of Water Resources 2017

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**.

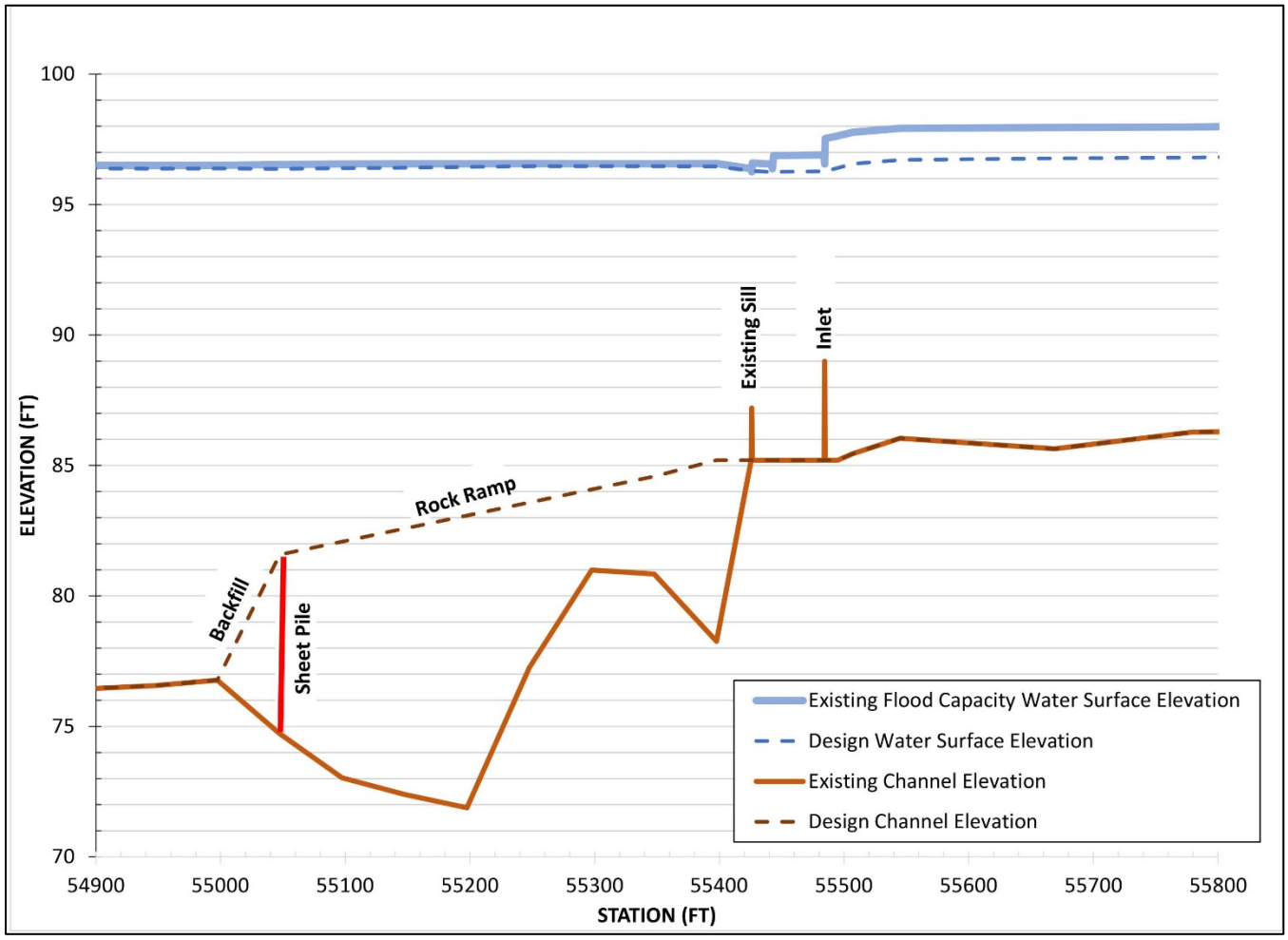
Figure 2-14. Eastside Bypass Control Structure Typical Cross Section



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.

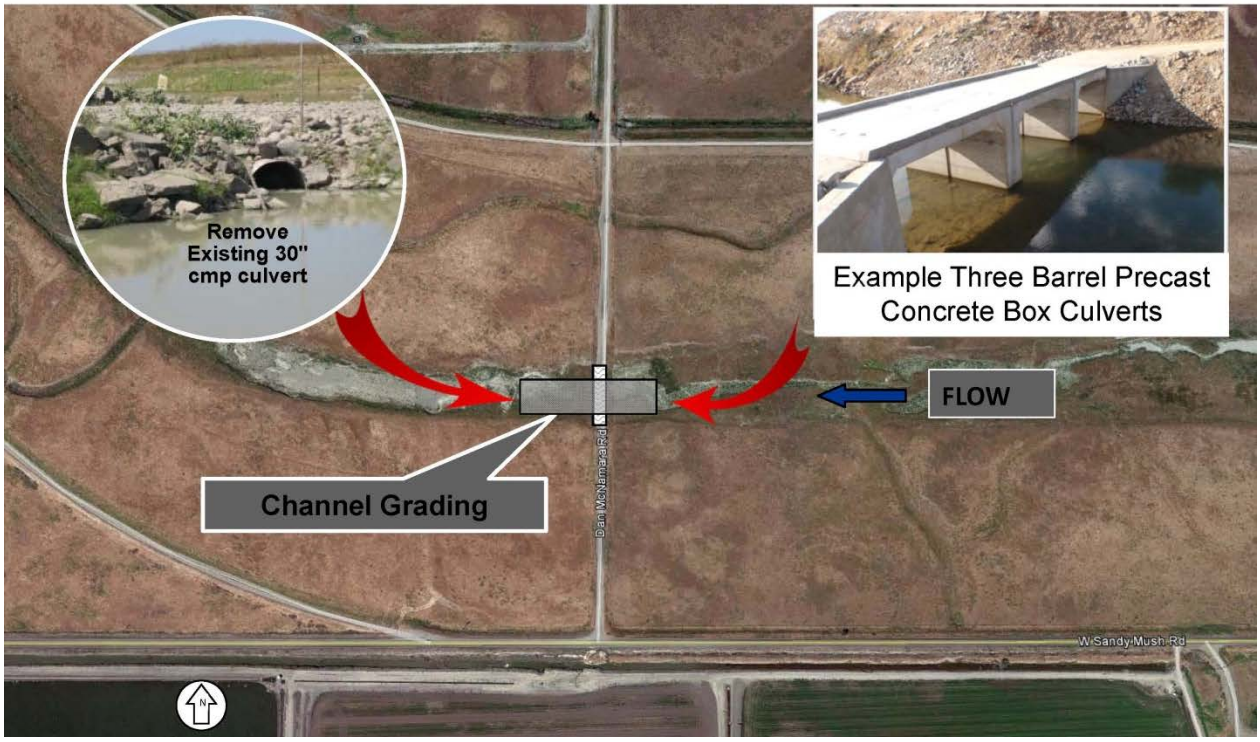
Operating conditions at the modified control structure would influence how the flow is split between the Eastside Bypass and the Mariposa Bypass. The design condition shows there is nearly 700 cfs of additional flows that would be diverted through the Eastside Bypass Control Structure when compared to 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**).

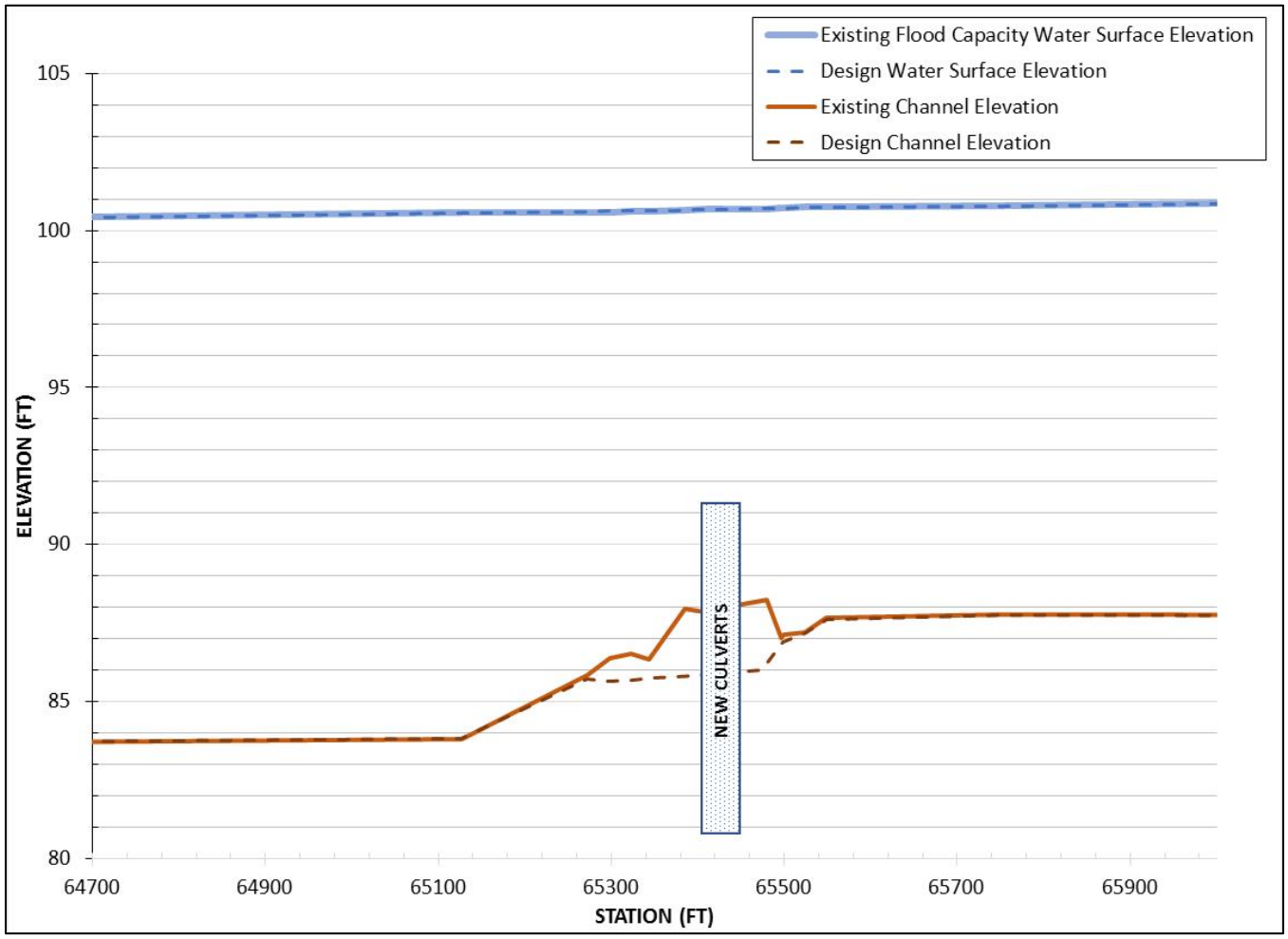
Dan McNamara Road modifications as proposed entail replacing an existing culvert with new and larger culverts, as described above. However, one potential simpler and cost-effective option still under consideration is to remove the culvert without replacement and grade the streambed after culvert removal. 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



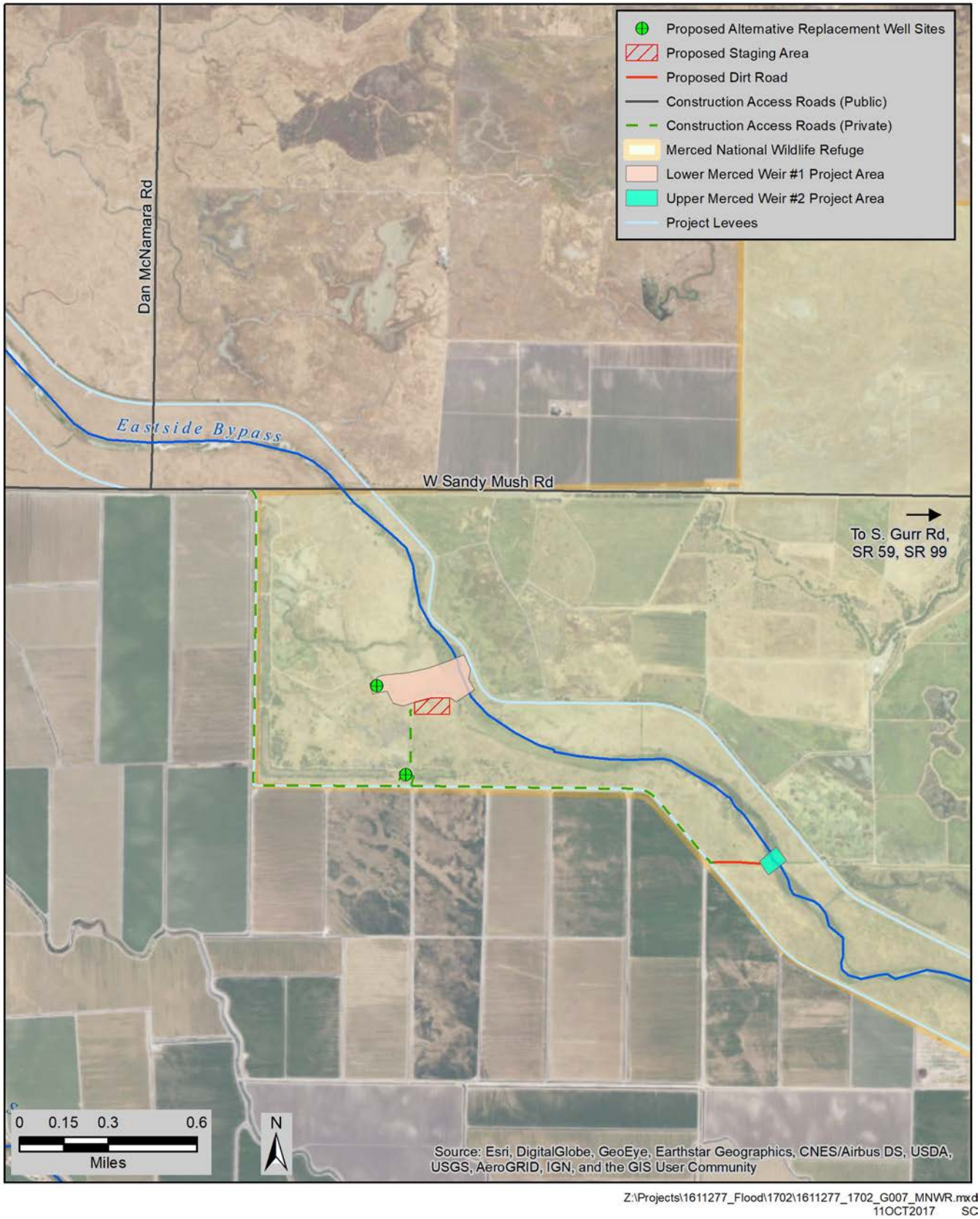
Source: California Department of Water Resources 2017

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



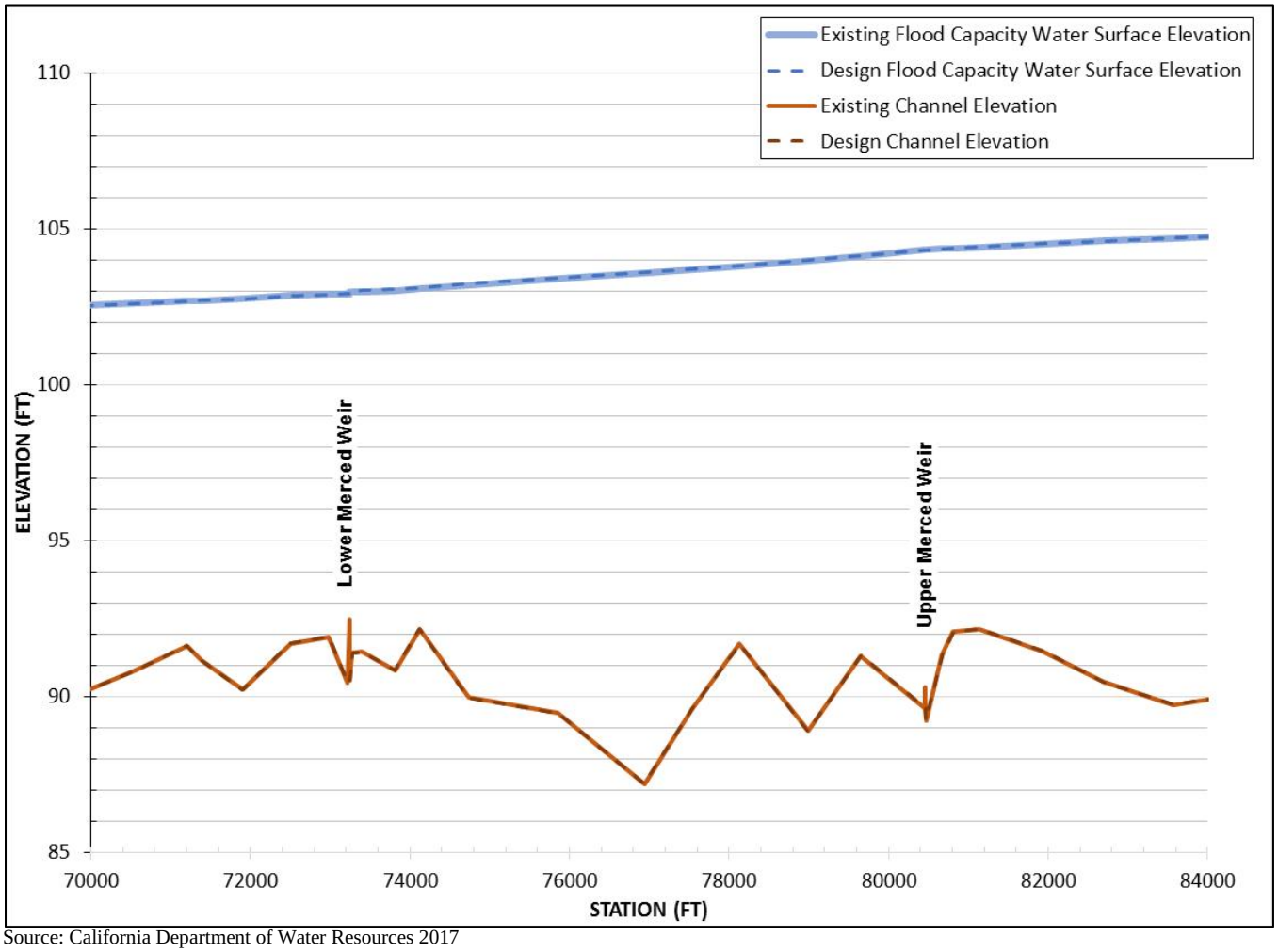
Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

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.

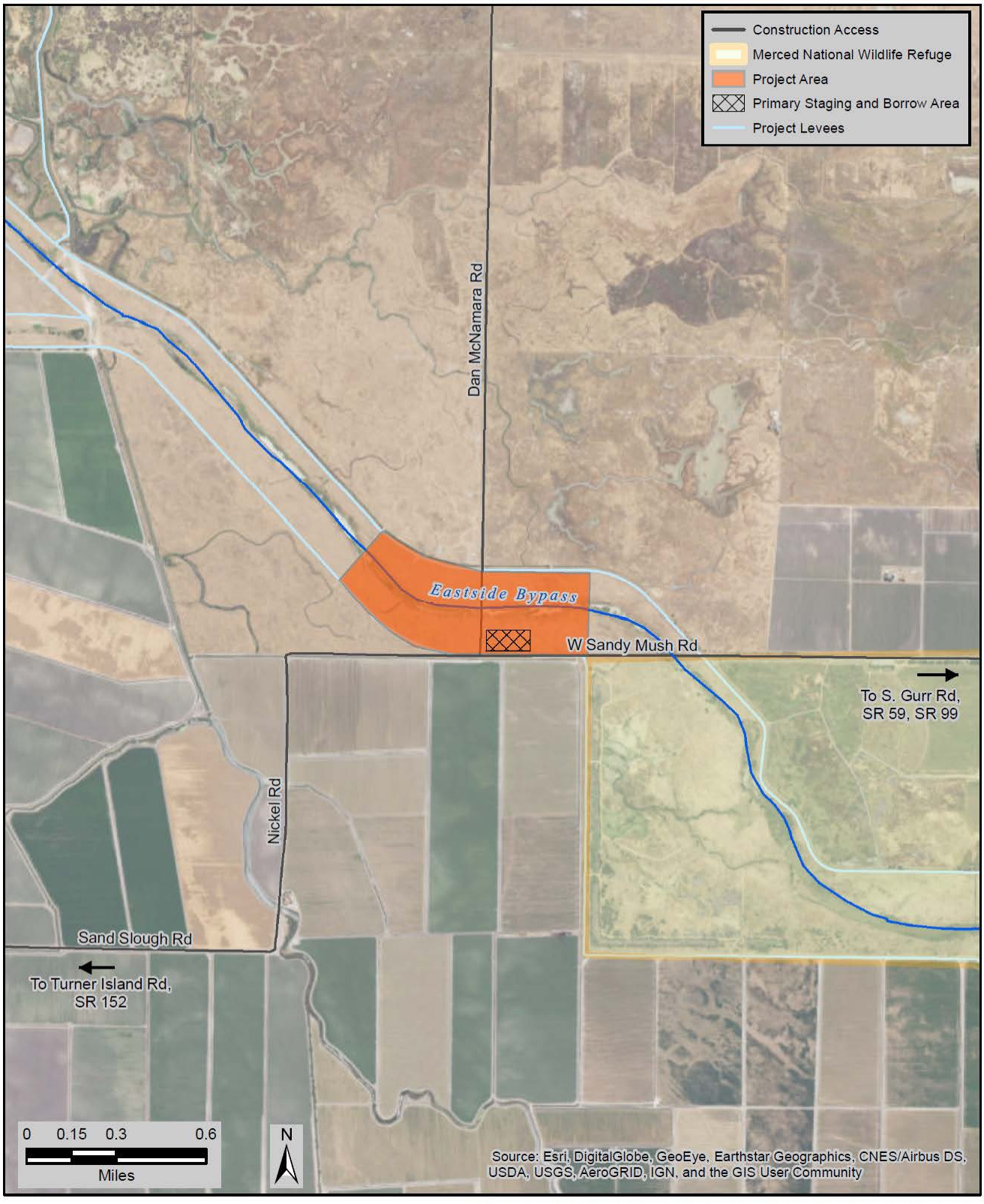
Construction is scheduled to begin after the fall pulse flows when Restoration Flows would be at a minimum so dewatering would be minimal or not needed. However, if water in the channel is present, temporary earthen dams would be constructed upstream and downstream of the low-flow crossing to divert 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.

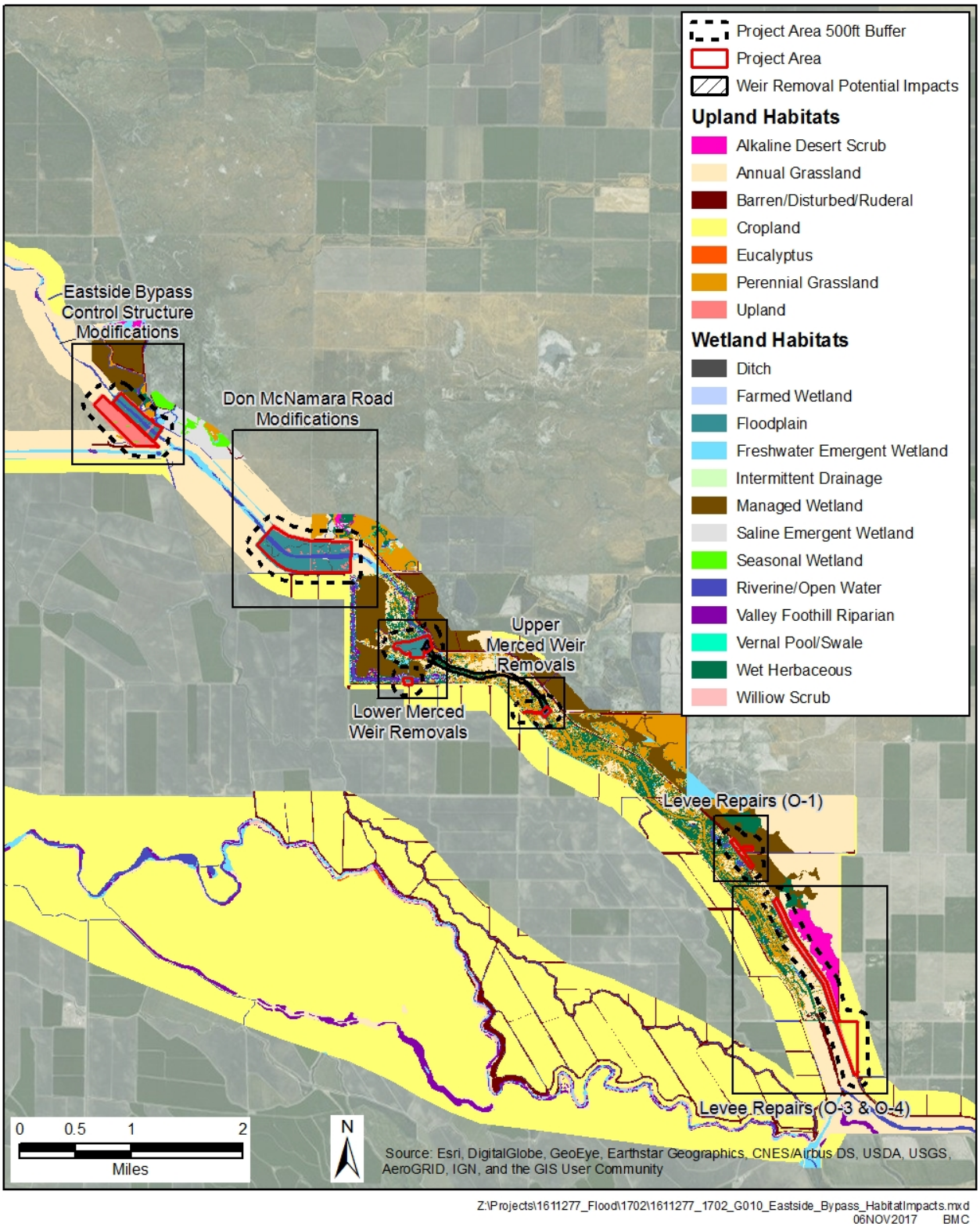
Alkali Desert Scrub

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

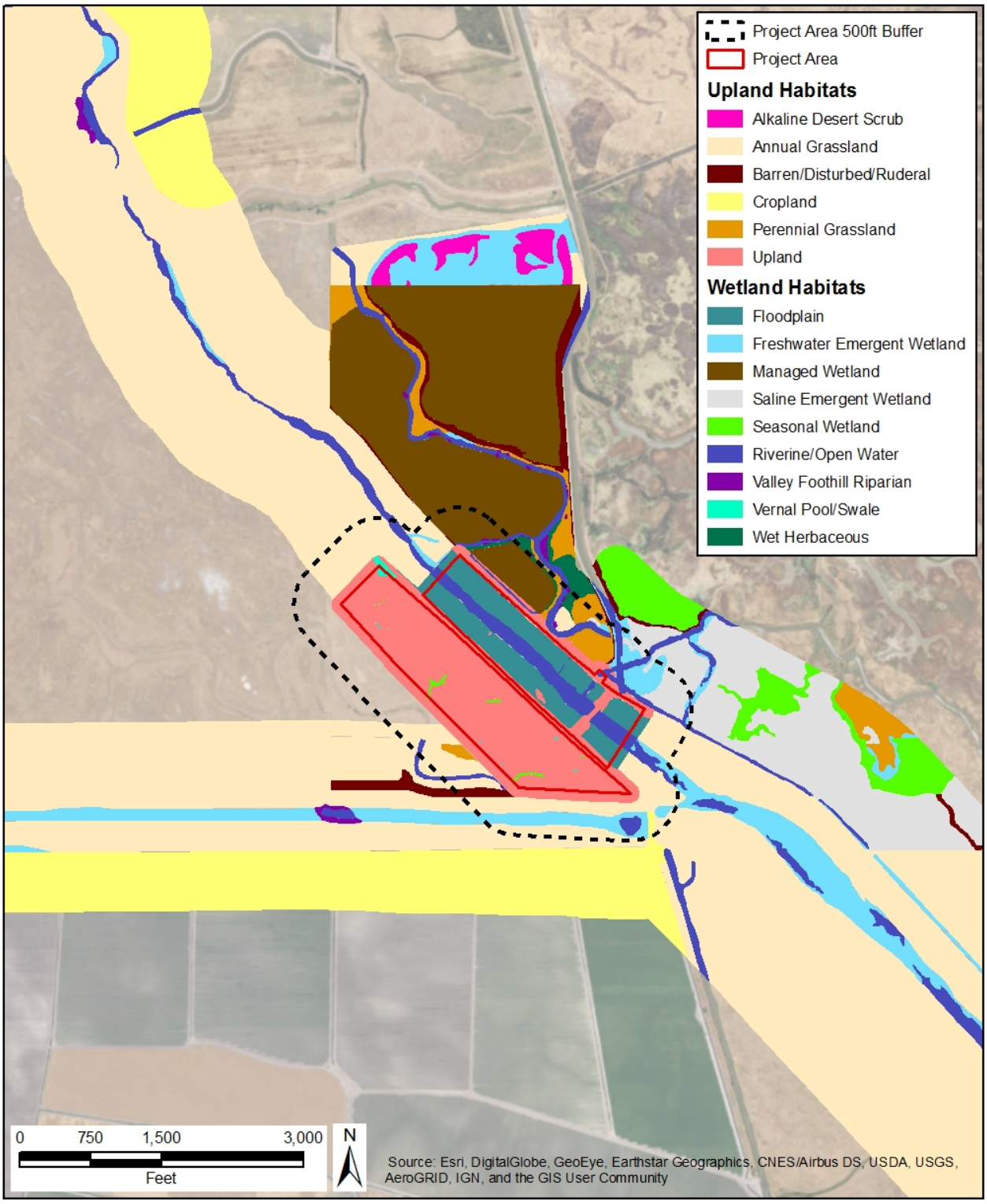
Open grasslands are composed primarily of annual plant species (CWHR 2010). Typical vegetation within this habitat type includes wild oat (*Avena fatua*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), and wild barley (*Hordeum marinum* ssp. *gussoneanum*. This habitat type occurs throughout the project area. Within **Figures 3.5-1a through 3.5-1g**, several acres of the annual

Figure 3.5-1a. Habitat Types



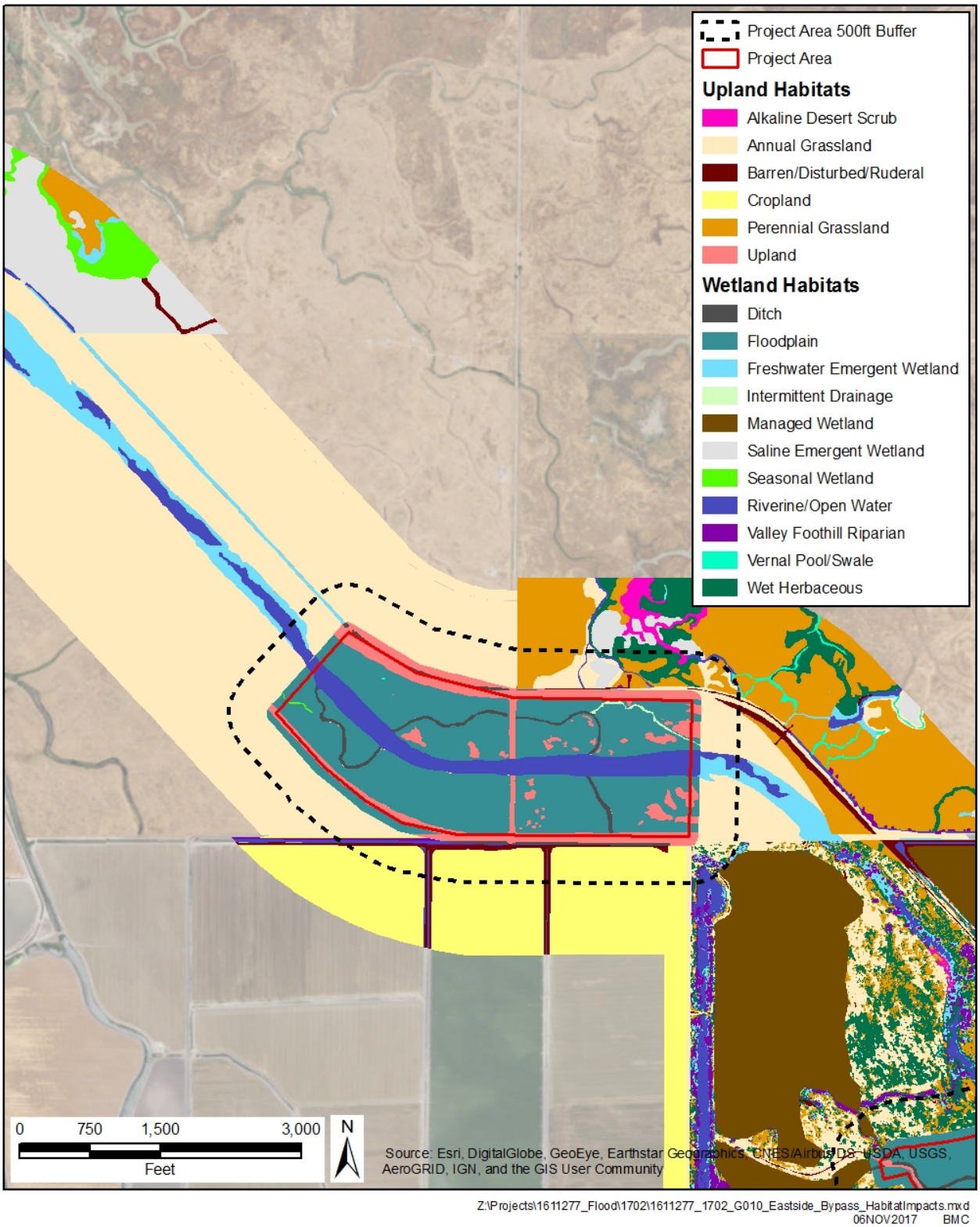
Source: CDM Smith, 2017

Figure 3.5-1b. Habitat Types (Eastside Bypass Control Structure Modifications)



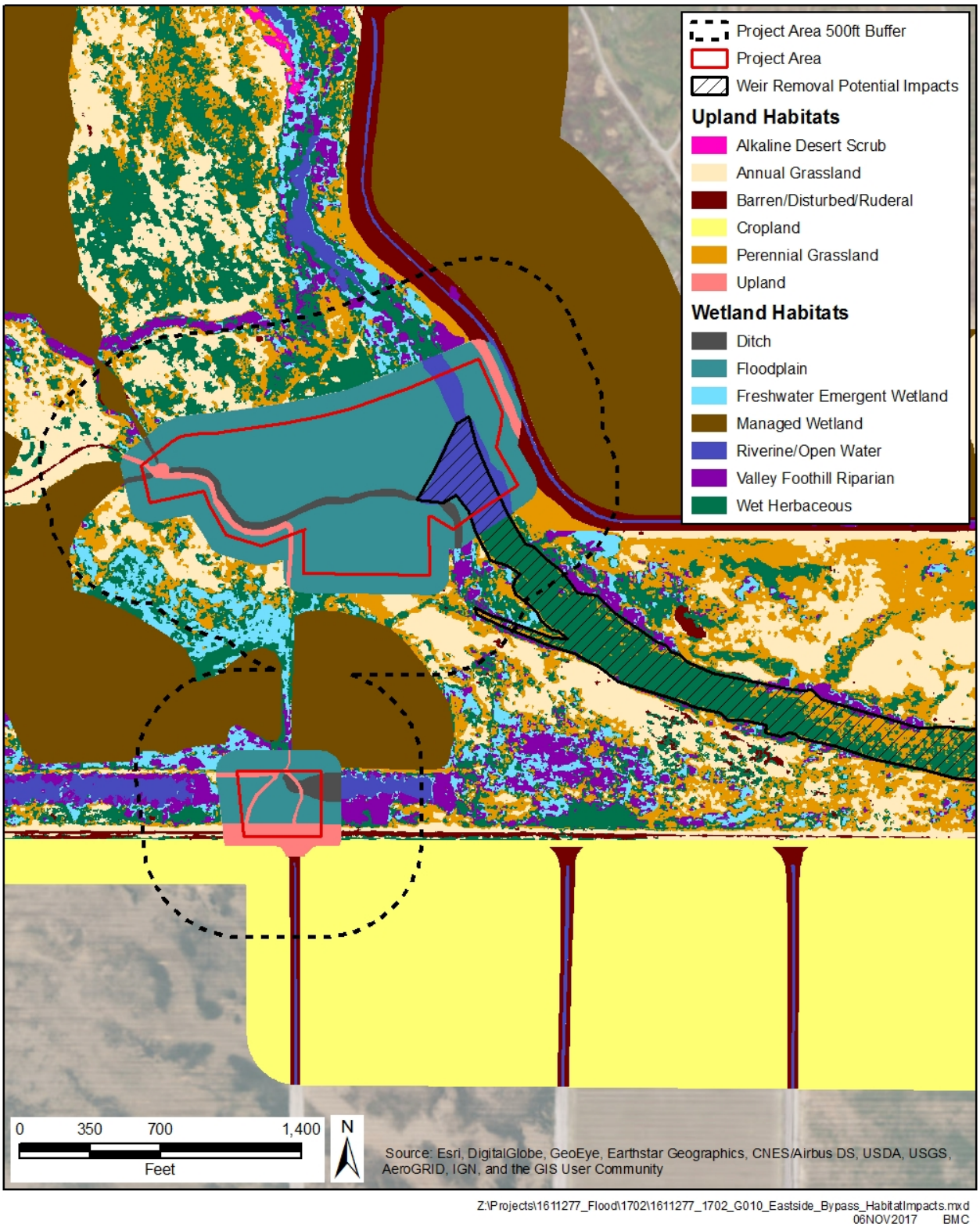
Source: CDM Smith, 2017

Figure 3.5-1c. Habitat Types (Dan McNamara Road Modifications)



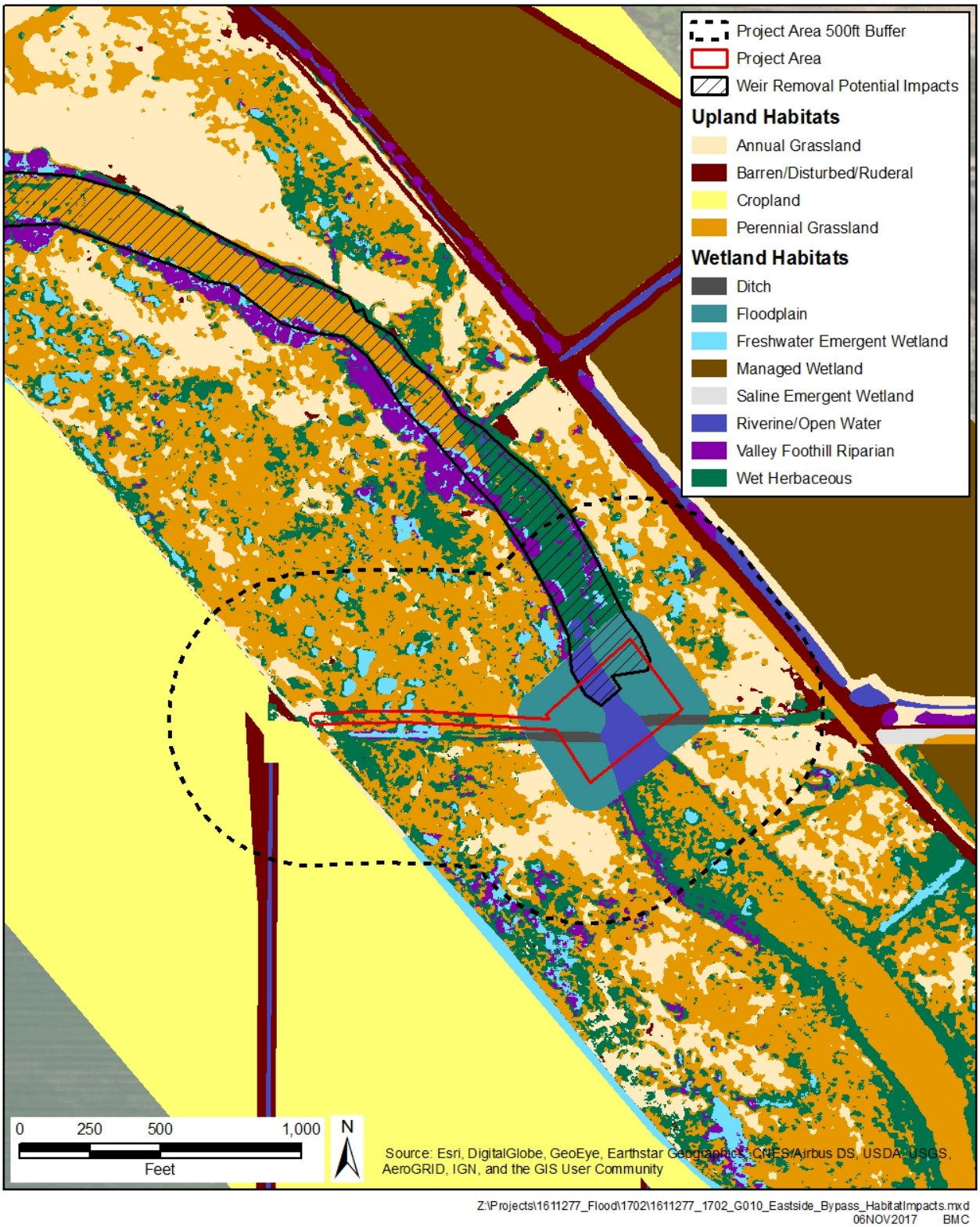
Source: CDM Smith, 2017

Figure 3.5-1d. Habitat Types (Lower Merced Weir Removal)



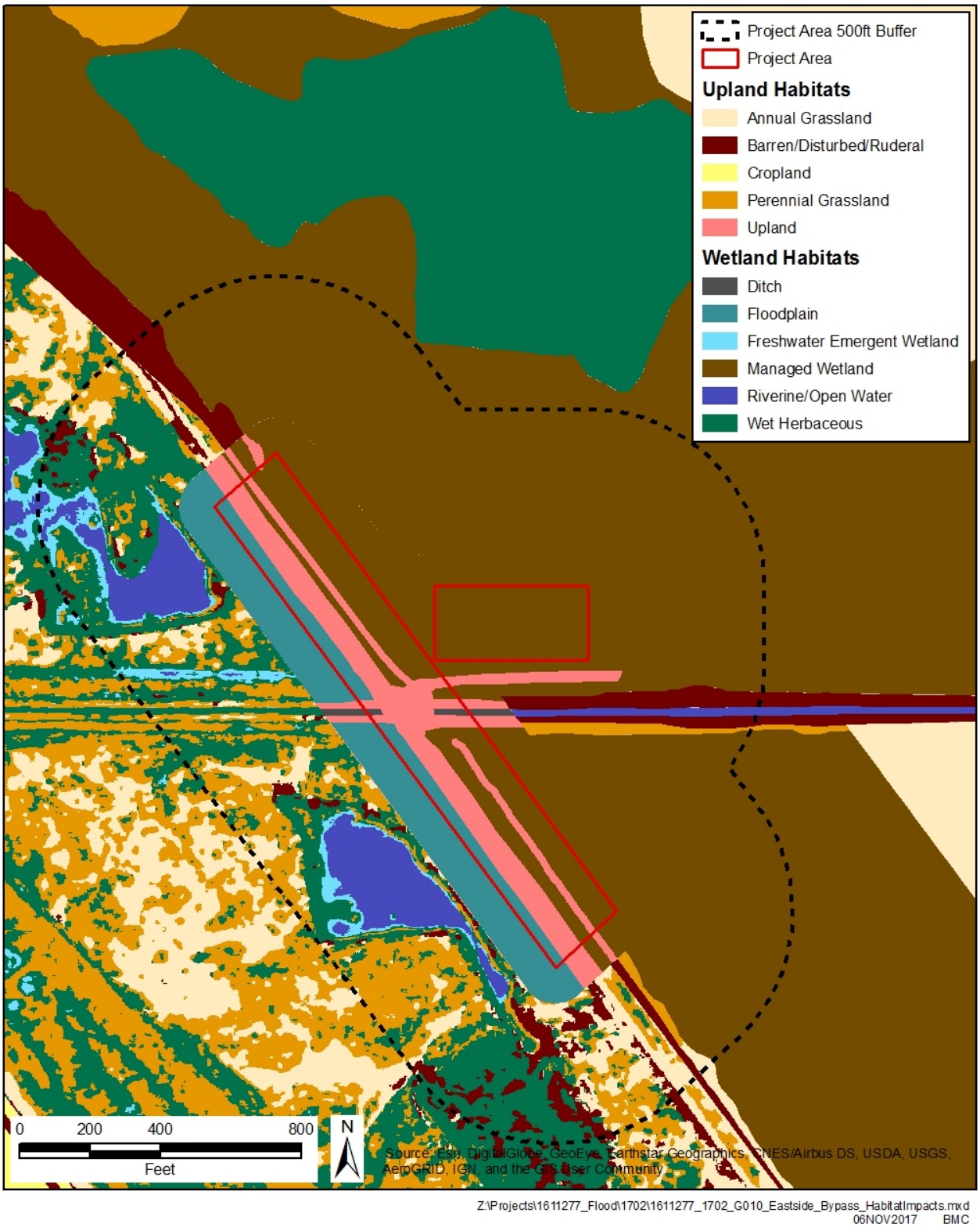
Source: CDM Smith, 2017

Figure 3.5-1e. Habitat Types (Upper Merced Weir Removal)



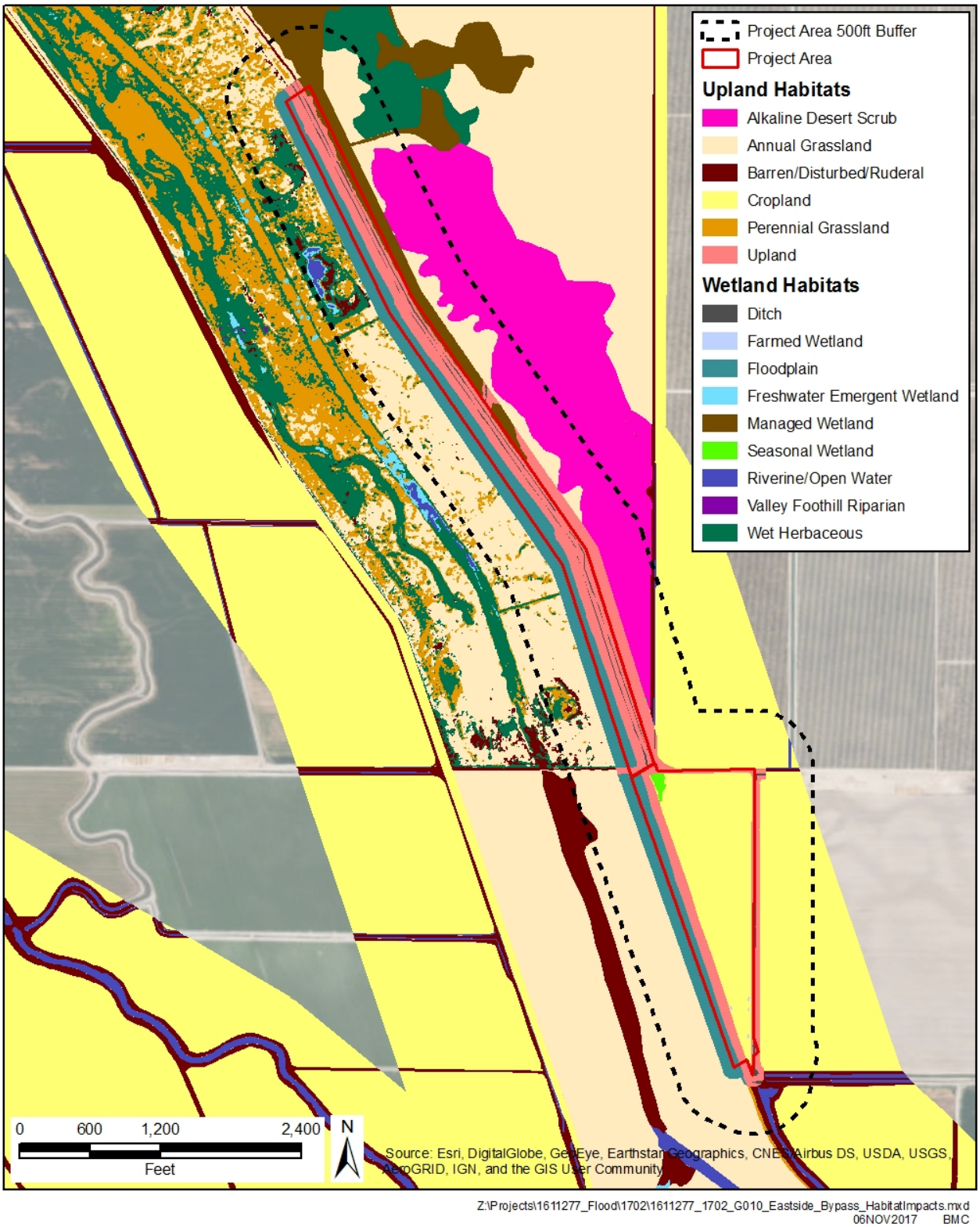
Source: CDM Smith, 2017

Figure 3.5-1f. Habitat Types (Levee Repairs O-1)



Source: CDM Smith, 2017

Figure 3.5-1g. Habitat Types (Levee Repairs O-3 & O-4)



Source: CDM Smith, 2017

Table 3.5-1. Project Area Habitat Types by Acreages and Types of Effects

Habitat Type	Acres (within immediate footprint)	Acres (500 feet around footprint)	Acres (between lower and upper weirs)	Type of Effects
Upland				
Alkali Desert Scrub	0	36.06	0	Areas outside of project footprint should be avoided.
Annual Grassland[1]	226.31	505.87	0.81	Temporary (in project footprint). In all project areas, would be restored to pre-project condition. Areas outside of project footprint should be avoided.
Barren/Disturbed/Ruderal	0	21.24	0	Areas outside of project footprint should be avoided.
Cropland	24.96	88.52	0	Temporary (in project footprint). Cropland would be temporarily affected in borrow and staging areas in levee Reach O-4. Areas outside of project footprint should be avoided.
Perennial Grassland[1]	23.92	100.33	10.08	Temporary (in project footprint). In all project areas, would be restored to pre-project condition. Areas outside of project footprint should be avoided.
Aquatic				
Freshwater Emergent Wetland	0.04	23.53	0.70[2]	Temporary (in project footprint) and potential indirect loss within 500-foot buffer and between weirs. This land cover type would be affected during the removal of the weirs (0.2 acre), the replacement of the culvert at Dan McNamara Road (0.02 acre), and the modifications at the control structure (0.1 acrs), but would be expected to recover. Freshwater emergent wetland surrounding the immediate project footprint may be indirectly affected by sedimentation and runoff from project construction. Approximately 0.70 acre of freshwater emergent wetland occurring between the two weirs (and outside of the immediate project footprint) could be indirectly affected from changes in inundation patterns; however, this land cover type is expected to persist between the weirs as it is located along the edges of the channel.
Managed Wetland	8.16	84.98	0	Temporary, although, in some cases, potentially permanent (in project footprint). Managed wetland would be temporarily affected in borrow and staging areas in levee Reach O-1 (5.99 acres), but could be permanently lost in levee Reach O-3 (2.18 acre). Areas outside of project footprint should be avoided; however, areas surrounding immediate project footprint may be indirectly affected by sedimentation and runoff from project construction.
Riverine/Open Water	40.81	33.93	24.59[2]	Temporary (in project footprint) and potential indirect disturbance within 500-foot buffer and between weirs. Riverine/open water would be temporarily affected during the removal of the weirs (3.98 acres), the replacement of the culvert at Dan McNamara Road (19.97 acres), and the modifications at the control structure (8.77 acres). Areas surrounding immediatete project footprint may be indirectly affected by sedimentation and runoff from project construction. In addition, up to approximately 25 acres of riverine/open water occurring between the two weirs (and outside of the immediate project footprint) may be indirectly affected from changes in inundation patterns, but would be expected to recover.

Table 3.5-1. Project Area Habitat Types by Acreages and Types of Effects

Habitat Type	Acres (within immediate footprint)	Acres (500 feet around footprint)	Acres (between lower and upper weirs)	Type of Effects
Saline Emergent Wetland	0	5.85	0	Avoided (in project footprint). Areas outside of project footprint for the Dan McNamara Road improvements and the Eastside Bypass Control Structure should be avoided.
Seasonal Wetland	1.14	0.05	0	Temporary or avoided (in project footprint). Seasonal wetlands occur within the proposed staging area for the Eastside Bypass Control Structure, within the proposed staging/borrow area for levee Reach O-4, and on the edge of the footprint for the Dan McNamara Road improvements; however, these seasonal wetlands should be avoided or temporarily affected. Areas outside of project footprint for the Dan McNamara Road improvements and the Eastside Bypass Control Structure should be avoided.
Valley Foothill Riparian	0	7.48	2.12[2]	Avoided (in project footprint) and potential indirect disturbance between weirs. Areas outside of project footprint should be avoided; however, changes in inundation patterns from weir removal could indirectly affect up to approximately 2 acres of this habitat type between the two weirs; however, this land cover type is expected to persist between the weirs as it is located along the edges of the channel.
Vernal Pool/Swale	0.29	0.40	0	Temporary or avoided (in project footprint) and potential indirect disturbance within 500-foot buffer. Vernal pools and vernal swales occur within the proposed staging area for the Eastside Bypass Control Structure and on the edge of the footprint for the Dan McNamara Road improvements; however, these features should be avoided, although could be indirectly affected by sedimentation and soil compaction. Areas outside of project footprint should be avoided.
Wet Herbaceous	0.22	51.37	16.76[2]	Temporary (in project footprint) and potential indirect disturbance between weirs. Wet herbaceous would be temporarily affected in weir removal activities (0.22 acre). However, approximately 17 acres of wet herbaceous occurring between the two weirs (and outside of the immediate project footprint) may be indirectly affected. The majority of this land cover type is expected to persist between the weirs as it is located along the edges of the channel; however, up to 5 acres of this land cover type could be permanently lost or altered from changes in inundation patterns, which would result in a change from "wet herbaceous" to "riverine/open water."
Total	**343.94**	**730.45**	**55.06**	

Note:

[1] Several acres of annual and perennial grasslands fall within the designated floodplain along the Eastside Bypass. Outside of the floodplain, these habitat types are also characterized as "upland" associated with vernal pool complexes and managed wetlands.

[2] The removal of the two weirs in the Eastside Bypass operated by the U.S. Fish and Wildlife Service within the Merced National Wildlife Refuge (NWR) would change inundation patterns within the bypass at lower flows. Under existing conditions, depressions within the Bypass and Refuge can inundate at depths of about 1 foot, providing potential wetland habitat for migratory birds. These depressions can be inundated during flood conditions (when there is water from levee toe to levee toe) or by placing the boards in the weirs part way (or "typical operation"), which results in ponding water from different sources. Depending on water availability, some areas either may no longer be inundated at flows of about 100 cubic feet per second from September through March or may become inundated at less frequent intervals. (It should be noted that the weir boards were not installed during the last year due to flood conditions and the presence of Restoration Flows). Additional water in the bypass from Restoration Flows would generally provide the opportunity for additional inundation during drier year types, especially during fall pulse flows when it is highly likely that the Merced NWR does not have water to inundate much of these areas. Inundation also does not occur during flood flows and other times when the weir gates are not in place to impound water. The weirs would be removed to improve fish passage in the bypass thereby changing the channel from a slower flow to a

Table 3.5-1. Project Area Habitat Types by Acreages and Types of Effects

Habitat Type	Acres (within immediate footprint)	Acres (500 feet around footprint)	Acres (between lower and upper weirs)	Type of Effects

less-obstructed flow. Because this section of the bypass has a relatively flat grade, the flow velocity is not expected to be greatly altered, but deeper water in the center of the channel would drain with unobstructed flows (an estimated 5 acres of "wet herbaceous" would change to "riverine/open water"), while the edge habitats would be expected to remain.

Sources: U.S. Bureau of Reclamation 2012b, U.S. Fish and Wildlife Service 2008, California Department of Water Resources 2011, Environmental Science Associates 2017

grasslands are classified as "floodplain," as these are within the designated floodplain along the Eastside Bypass, or as "upland," where this habitat type is associated with vernal pool complexes and managed wetlands.

Cropland

Includes irrigated hayfield, irrigated grain crop, and pasture. This habitat type occurs primarily along west side of Eastside Bypass.

Perennial Grassland

Perennial grassland occurs on the San Joaquin Valley alkaline soils that support alkali heath, alkali weed, salt heliotrope, saltgrass, and alkali sacaton. It occurs throughout the project area, but typically observed on the slightly drier flats above alkaline meadows or floodplains. Within **Figures 3.5-1a through 3.5-1g**, several acres of perennial grasslands are classified as "floodplain," as these are within the designated floodplain along the Eastside Bypass, or as "upland," where this habitat type is associated with vernal pool complexes and managed wetlands.

Wetland vegetation types are discussed below.

Wetlands and Other Waters

This section presents the potentially jurisdictional wetlands and other waters of the United States within the project area. These wetlands and other waters of the United States may be subject to regulation by USACE under Section 404 of the Federal Clean Water Act (CWA). All conclusions presented in this section are subject to a formal wetland delineation and verification or preliminary determination by USACE.

Table 3.5-2 summarizes the acreage of each potential jurisdictional waters of the United States found in the project area and includes the *Classification of Wetlands and Deepwater Habitats of the U.S.* (Cowardin et al. 1979).

Wetlands

Freshwater Emergent Wetland

This habitat type is perennially inundated or has perennially saturated soils. It occurs along the margins of and sometimes as small "islands" within riverine habitats, along drainages within the Merced NWR. It also occurs along the Eastside Bypass.

Table 3.5-2. Potential Wetlands and Other Waters of the United States

Waters of the United States	Cowardin[1] Classification	Total Acres (Footprint / 500-foot Buffer)
Wetlands		
Freshwater Emergent Wetland	PEM1[2]	0.04 / 23.53
Managed Wetland	PEM1	8.16 / 84.98
Saline Emergent Wetland	PEM1	0 / 5.85
Seasonal Wetland	PEM1	1.14 / 0.05
Valley Foothill Riparian	PFO[3]	0 / 7.48
Vernal Pool/Vernal Swale	PEM2	0.29 / 0.40
Wet Herbaceous	PEM1	0.22 / 51.37
	Wetland Total:	9.85 / 173.66
Other Waters		
Riverine (Perennial drainage and agricultural drainages)	Riverine	40.81 / 33.93
	Other Waters Total:	40.81 / 33.93
Total Area of Wetland Features:		57.45 / 207.59

Notes:
[1] Cowardin et al. (1979)
[2] PEM = Palustrine persistent emergent wetland
[3] PFO = Palustrine forested wetland

Managed Wetland

Hydrology and vegetation are heavily managed in some wetland areas within portions of the Merced NWR and a duck club north of the NWR. Vegetation within the managed wetlands within the Merced NWR includes narrow-leaf cattail (*Typha angustifolia*) and hardstem bulrush (*Schoenoplectus acutus*). Vegetation within the managed wetlands within the duck club includes swamp picklegrass (*Crypsis schoenoides*) and Baltic rush (*Juncus balticus*). Occurs within the Eastside Bypass south of Mariposa Bypass.

Saline Emergent Wetland

This habitat type is characterized by saline soils with low permeability that remain inundated or saturated for extended periods, creating a wetland environment. Common species include saltgrass, alkali heath, gumplant (*Grindelia stricta*), Baltic and Mexican rushes (*Juncus balticus*, *J. mexicanus*), and bulrushes (*Schoenoplectus* spp.).

Seasonal Wetland

Seasonal wetlands are ephemeral wetlands that pond or remain flooded for extended periods during a portion of the year, often the wet season, then may dry in spring or early summer. Seasonal wetlands occur in shallow depressions and are dominated by a mixture of native and non-native species.

Valley Foothill Riparian

Valley foothill riparian habitat is characterized by open to continuous tree canopy cover. This habitat is present adjacent to levees and located on high terraces. Valley foothill riparian habitat is characterized

by a moderately dense canopy of valley oak (Quercus lobata) with a predominantly herbaceous understory composed primarily of nonnative annuals. Fremont cottonwood, Oregon ash (*Fraxinus latifolia*), boxelder (*Acer negundo*), western sycamore (*Platanus racemosa*), and willows are also present.

Vernal Pool/Swale

Vernal swales are somewhat linear, concave depressions that form in topographically complex grasslands and commonly connect to vernal pools, *which are e*phemeral features and occur within a matrix of grassland characterized by mound and swale topography. Vegetation within vernal pools and swales is distinguished by a unique host of species adapted to the extreme conditions created by the inundation and drying cycles. Typical vegetation found in vernal pools and swales includes popcornflower (Plagiobothrys stipitatus), vernal pool buttercup (Ranunculus bonariensis var. trisepalus), coyote thistle (Eryngium vaseyi), and smooth goldfields (Lasthenia glaberrima).

Wet Herbaceous

Wet herbaceous habitat is characterized by annual and perennial herbaceous vegetation growing in areas with a high water table or subject to frequent flooding. These areas are typically wetter than annual grassland but not wet enough to be classified as freshwater emergent wetland. Common species in this habitat type include Bermuda grass (*Cynodon dactylon*), ryegrass, tarweed, and cocklebur (*Xanthium strumarium*). This habitat occurs throughout the project area.

Other Waters of the United States and State

Riverine

Characterized as intermittent or continually running water, typical of rivers and streams, and includes perennial and agricultural drainages as well as the Eastside Bypass. Agricultural drainages within the project area include artificially created drainage ditches, which periodically or continuously contain flowing water. Most drainage ditches within the croplands are unlined and highly disturbed because of routine maintenance with only scattered herbaceous vegetation or completely barren. Perennial or near-perennial drainage ditches within the Merced NWR support emergent vegetation. Agricultural drainages occur throughout the farmed areas.

Invasive Plants

Invasive plants are species that are introduced to a region, persist without human assistance, and have serious impacts on the natural environment (Davis and Thompson 2000). The California Invasive Plant Council (Cal-IPC) categorizes invasive plant species and maintains a list of species that have been designated as invasive in California. The term “noxious weed” is used by government agencies for non-native plants that have been defined as pests by law or regulation (California Department of Food and Agriculture [CDFA] 2010). Section 6.1.3 of the SJRRP Draft PEIS/R (SJRRP 2011), incorporated by reference, provides detailed information on the distribution and abundance of invasive plant species in the project area. For the predominant species, accounts of their ecology are provided in Appendix B, “Biological Resources – Vegetation and Wildlife Appendix.”

Distribution of Invasive Plants in the Project Area

Invasive species known to occur in the project area and their associated Cal-IPC category and CDFA rating are identified in **Table 3.5-3.** These species were identified during field surveys (DWR 2002; Reclamation 2011, 2012b). None of the species identified are listed as noxious weeds by the United

States Department of Agriculture (USDA). Species in the Cal-IPC "high" category are described in detail in Appendix B, "Biological Resources – Vegetation and Wildlife Appendix."

Table 3.5-3. Prevalent Invasive Plant Species in the Project Area

Scientific Name	Common Name	Cal-IPC Category[1]	CDFA Rating[2]
Terrestrial Species			
Brassica nigra	black mustard	moderate	--
Bromus diandrus	ripgut brome	moderate	--
Bromus madritensis ssp. *rubens*	foxtail brome	high	--
Centaurea solstitialis	yellow starthistle	high	C
Cirsium vulgare	bull thistle	moderate	C
Conium maculatum	poison hemlock	moderate	--
Cynodon dactylon	Bermuda grass	moderate	C
Festuca perennis	ryegrass	moderate	--
Hirschfeldia incana	short-pod mustard	moderate	--
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	moderate	--
Hordeum murinum ssp. *leporinum*	common foxtail	moderate	--
Lepidium latifolium	perennial pepperweed	high	B
Phalaris aquatica	harding grass	moderate	--
Ricinus communis	castor bean	limited	--
Sesbania punicea	red sesbania	high, red alert	B
Taeniatherum caput-medusae	Medusa head	high	C
Tamarix sp.	salt cedar	high	B
Aquatic Species			
Eichhornia crassipes	water hyacinth	high, red alert	C

Notes:

[1] California Invasive Plant Council Inventory (Cal-IPC) Categories:

- High – Have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- Moderate – Have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Reproductive biology and other attributes are conducive to moderate to high rates of dispersal, but establishment generally depends on ecological disturbance. Ecological amplitude and distribution range from limited to widespread.
- Limited – Invasive but ecological impacts are minor on a Statewide level, or not enough information was available to justify higher rating. Reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are limited, but these species may be locally persistent and problematic.
- Red Alert – Plants with the potential to spread explosively; infestations currently small and localized.

[2] California Department of Food and Agriculture (CDFA) Rating:

B – A pest of known economic or environmental detriment, and if present in California, it is of limited distribution. B-rated pests are eligible to enter the State if the receiving county has agreed to accept them. If found in the State, they are subject to State-endorsed holding action and eradication only to provide for containment, as when found in a nursery. At the discretion of the individual county agricultural commissioner, they are subject to eradication, containment, suppression, control, or other holding action.

C – A pest of known economic or environmental detriment, and if present in California, it is usually widespread. C-rated organisms are eligible to enter the State as long as the commodities with which they are associated conform to pest cleanliness standards when found in nursery stock shipments. If found in the State, they are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no State-enforced action other than providing for pest cleanliness.

Source: Cal-IPC 2006, CDFA 2010, U.S. Department of Agriculture 2017

Invasive Wildlife

Commonly occurring invasive wildlife known or potentially occurring within the project area includes bullfrog (*Lithobates catesbeianus),* crayfish (*Procambarus clarkii),* red-eared sliders (*Trachemys scripta elegans),* Asian clam (*Corbicula* spp.*),* and Chinese mitten crab (*Eriocheir sinensis).*

Special-status Species

For the purposes of this document, "special-status" has been defined to include those species that meet the definitions of rare or endangered plants or animals under CEQA, including species that are:

- Listed as Threatened or Endangered by USFWS pursuant to the ESA (50 CFR Section17.11 and Section17.12)
- Listed as Rare, Threatened, or Endangered by the California Department of Fish and Wildlife (CDFW) pursuant to the California Endangered Species Act (CESA) (California Fish and Game Code Section 2050, et seq.)
- Designated as Fully Protected under Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code
- Designated by CDFW as California Species of Concern
- Listed as Category 1A, 1B, and 2 by the California Native Plant Society (CNPS)
- Not currently protected by statute or regulation but considered rare, threatened, or endangered under CEQA

Regionally occurring special-status species known to occur on the USGS 7.5-minute Turner Ranch, Sandy Mush, and Santa Rita Bridge quadrangles were obtained from CDFW (2017) and CNPS (2017). Federally listed species that could occur on or be affected by the project were obtained from USFWS (2017a). Habitat requirements for each special-status species were assessed and compared to the habitats occurring within the vicinity of the project area – which includes the length of the Eastside Bypass, extending out approximately 0.25 mile along either side (**Table 3.5-4)**.

Recovery Areas

Recovery plans describe reasonable actions that are believed to be required to recover and/or protect listed species. These plans often define recovery units and core habitat recovery areas to focus recovery efforts, and identify target areas to be conserved for the recovery and conservation objectives of each of the species addressed in the respective recovery plan(s).

California Red-legged Frog

While the project area occurs within the Sierra Nevada foothills and Central Valley recovery unit boundary for California red-legged frog (USFWS 2002), it does not occur within a core area. This species is assumed extirpated within the project area.

San Joaquin Kit Fox

The recovery plan identifies several core areas for the San Joaquin kit fox (USFWS 1998). One of these core recovery areas encompasses all of the project area (**Figure 3.5-2**).

Table 3.5-4. Potentially Occurring Special-status Species

Species	Fed/ State/ CRPR Status[1]	General Habitat	Potential to Occur in the Project Area	Type of Suitable Habitat within the Project Area
Plants				
Atriplex cordulata heartscale	--/--/1B.2	Annual herb found in chenopod scrub, meadows and seeps, and valley and foothill grasslands with saline or alkaline soils. Blooms April-Oct. Elevation: 3 to 960 feet.	Present. Suitable habitat may be present in the inaccessible portions of the project area; known occurrences are present in the project area vicinity, including along the east side of the Reach O levee improvement area and on Chamberlin Road. (Reclamation 2017b)	Alkali desert scrub Perennial grassland Annual grassland
Atriplex minuscula lesser saltscale	--/--/1B.1	Annual herb found in chenopod scrub, playas, and valley and foothill grasslands with sandy, alkali soil. Blooms May-Oct. Elevation: 49 to 656 feet.	Present (Reclamation 2017b). Suitable habitat may be present in the inaccessible portions of the project area; known occurrences are present in the project area vicinity, including along West Chamberlin Road. (Reclamation 2017b)	Perennial grassland Annual grassland
Atriplex persistens vernal pool smallscale	--/--/1B.2	Annual herb found in alkali vernal pools. Blooms June-Oct. Elevation: 33 to 377 feet.	Medium. Suitable habitat is present in the project area, and known occurrences are present in the project area vicinity.	Vernal pools
Atriplex subtilis sublte orache	--/--/1B.2	Valley and foothill grassland up to 400 feet.	High. Suitable habitat may be present in the inaccessible portions of the project area; known occurrences are present in the project area vicinity.	Perennial grassland Annual grassland
Cordylanthus palmatus palmate-bracted Bird's Beak	FE/SE/1B.1	Alkaline; chenopod scrub, valley and foothill grassland.	Medium. Suitable habitat may be present in the inaccessible portions of the project area; no occurrences are present in the project area vicinity.	Perennial grassland Annual grassland
Delphinium recurvatum recurved larkspur	--/--/1B.2	Perennial herb occurring in chenopod scrub, cismontane woodland, and in alkali valley and foothill grassland. Blooms March-June. Elevation: 10 to 2,460 feet.	Medium. Suitable habitat is present in the project area, and known occurrences are present in the project area vicinity.	Perennial grassland Annual grassland
Eryngium racemosum delta button-celery	--/SE/1B.1	Annual or perennial herb found within vernally mesic clay depressions in riparian scrub habitat. Blooms June-Oct. Elevation: 10 to 98 feet.	Present. Documented at the Eastside Bypass Control Structure, Dan McNamara staging area, and near the Merced NWR Upper Weir (Reclamation 2017b). Suitable habitat is present in the Merced NWR and has been identified previously during plant surveys on the NWR.	Willow scrub/riparian scrub Valley foothill riparian
Euphorbia hooveri	-FT/--/1B.2	Annual herb found in	Medium. Suitable habitat is	Perennial grassland

Table 3.5-4. Potentially Occurring Special-status Species

Species	Fed/ State/ CRPR Status[1]	General Habitat	Potential to Occur in the Project Area	Type of Suitable Habitat within the Project Area
Hoover's spurge	Critical Habitat	inland dune and sandy soils of valley and foothill grassland habitat. Blooms April-May. Elevation: 30 to 495 feet.	present in the project area, and known occurrences are present in the project area vicinity.	Annual grassland
Navarretia prostrata prostrate vernal pool navarretia	--/--/1B.1	Annual herb found in coastal scrub, meadows and seeps, valley and foothill grassland with alkaline soil, and vernal pools. Blooms April-June. Elevation: 49 to 2,297 feet.	Medium. Suitable habitat may be present in the project area, and there are known occurrences in the project area vicinity (i.e., Merced NWR).	Perennial grassland Annual grassland Vernal pools
Neostapfia colusana Colusa grass	FT/SE/1B.1 Critical Habitat	Annual herb found in large, deep vernal pools with adobe soil. Blooms May-Aug. Elevation: 16 to 656 feet.	Medium. Suitable habitat may be present in the inaccessible portions of the project area; known occurrences are present in the project area vicinity.	Vernal pools
Sagittaria sanfordii Sanford's arrowhead	--/--/1B.2	Perennial rhizomatous emergent herb found in assorted shallow freshwater marshes and swamps. Blooms May-Oct. Elevation: 0 to 2,133 feet.	Medium. Suitable habitat is present in the project area, and known occurrences are present in the project area vicinity.	Lacustrine Riverine/open water
Trichocoronis wrightii var. wrightii Wright's trichocoronis	--/--/2B.1	Alkaline areas of meadows and seeps, marshes and swamps, riparian forest, and vernal pools. Elevation: 16 to 1,427 feet.	Present. This species has a limited range. Documented near the Merced NWR Upper and Lower Weirs (Reclamation 2017b).	Lacustrine Riverine/open water Vernal pools Willow scrub/riparian scrub Valley foothill riparian
Invertebrates				
Branchinecta conservation Conservancy fairy shrimp	FE/--/-- Critical Habitat	Found in ephemeral freshwater habitats, including alkaline pools, clay flats, vernal pools, vernal lakes, vernal swales, and other types of seasonal wetlands.	Present. Suitable habitat is present in the project area vicinity. This species has been observed within the project area during past surveys and documented in the CNDDB.	Vernal pools/vernal swales Seasonal wetlands
Branchinecta lynchi vernal pool fairy shrimp	FT/--/-- Critical Habitat	Found in ephemeral freshwater habitats, including alkaline pools, clay flats, vernal pools, vernal lakes, vernal swales, and other types of seasonal wetlands.	Present. Suitable habitat is present in the project area vicinity. This species has been observed within the project area during past surveys and documented in the CNDDB.	Vernal pools/vernal swales Seasonal wetlands
Desmocerus californicus dimorphus valley elderberry longhorn beetle	FT/--/--	Breeds and forages exclusively on elderberry shrubs (*Sambucus* sp.) with steams at least 1 inch in diameter at ground level, typically associated with riparian	None. Habitat for this species (elderberry shrubs) may be present within the project area vicinity, but was not documented within 165 feet of project footprints (Reclamation 2017a).	Elderberry shrubs could occur in the project vicinity, Valley elderberry longhorn beetle most likely to occur in shrubs near valley foothill riparian

Table 3.5-4. Potentially Occurring Special-status Species

Species	Fed/ State/ CRPR Status[1]	General Habitat	Potential to Occur in the Project Area	Type of Suitable Habitat within the Project Area
		forests, riparian woodlands, elderberry savannas, and other Central Valley habitats. Occurs only in the Central Valley and adjacent foothills of California.		
Lepidurus packardi vernal pool tadpole shrimp	FE/--/-- Critical Habitat	Found in ephemeral freshwater habitats, including alkaline pools, clay flats, vernal pools, vernal lakes, vernal swales, and other types of seasonal wetlands, which range in size from small, clear, well-vegetated vernal pools to highly turbid, alkali scald pools to large winter lakes.	Present. Suitable habitat is present in the project area, vicinity. This species has been observed within the project area during past surveys and documented in the CNDDB.	Vernal pools/vernal swales Seasonal wetlands
Amphibians				
Ambystoma californiense California tiger salamander (central population)	FT/ST/--	Annual grassland and grassy understory of valley-foothill hardwood habitats in central and northern California. Needs underground refuges and vernal pools or other seasonal water sources.	Present. Suitable habitat is present within the project area, with the exception of the active agricultural fields. This species has been observed within the project area during past surveys and documented in the CNDDB.	Vernal pools/vernal swales Seasonal wetlands Managed wetlands Annual grassland Perennial grassland
Rana pipiens Northern leopard frog	--/SSC/--		None. Although suitable habitat is present within the project area, there are no recorded occurrences of this species within the project area or immediate vicinity.	N/A
Rana draytonii California red-legged frog	FT/SSC/--	Breeds in slow moving streams, ponds, and marshes with emergent vegetation; forages in nearby uplands within about 200 feet. Extant records in the Sierra Nevada range are over 800 feet. Below this elevation, aquatic habitat supports stronger populations of non-native predators associated with warm water habitats such as bullfrogs and Centrarchid fish. Believed extirpated from the floor of the Central Valley prior to the 1960s.	None. Although suitable habitat is present within the project area, there are no recorded occurrences of this species within the project area or immediate vicinity. The project area occurs outside of the known extant geographic range for this species.	N/A

Table 3.5-4. Potentially Occurring Special-status Species

Species	Fed/ State/ CRPR Status[1]	General Habitat	Potential to Occur in the Project Area	Type of Suitable Habitat within the Project Area
Spea hammondii western spadefoot	--/SSC/--	Occurs seasonally in grasslands, prairies, chaparral, and woodlands, in and around wet sites. Breeds in shallow, temporary pools formed by winter rains. Takes refuge in burrows.	Present. Suitable habitat is present throughout the project area, with the exception of the active agricultural fields. This species has been observed within the project area during past surveys and documented in the CNDDB.	Vernal pools/vernal swales Seasonal wetlands Managed wetlands Annual grassland Perennial grassland
Reptiles				
Actinemys marmorata western pond turtle	--/SSC/--	Ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires basking sites and suitable upland habitat for egg-laying. Nest sites most often characterized as having gentle slopes (<15%) with little vegetation or sandy banks.	Present. Suitable habitat is present throughout the project area, with the exception of the active agricultural fields. This species has been observed within the project area during past surveys and documented in the CNDDB.	Riverine/open water Lacustrine Freshwater emergent wetland
Gambelia sila blunt-nosed leopard lizard	FE/SE;SFP/--	Found in semiarid grasslands, alkali flats, and washes. Prefers flat areas with open space for running, avoiding densely vegetated areas. Habitat present north of the Mariposa Bypass and west of the Eastside Bypass.	Medium. Marginally suitable habitat is present north of the Mariposa Bypass and west of the Eastside Bypass within the project area; this species has not been observed despite numerous surveys conducted within portions of the project area.	Annual grassland north of the Mariposa Bypass and west of the Eastside Bypass
Thamnophis gigas giant garter snake	FT/ST/--	Found primarily in marshes, sloughs, drainage canals, and irrigation ditches, especially around rice fields and occasionally in slow-moving creeks in California's interior.	High. Suitable habitat is present throughout the project area.	Riverine Freshwater emergent wetland Managed wetland Adjacent annual grassland Perennial drainage
Birds				
Agelaius tricolor tricolored blackbird	--/SC/--	Largely endemic to California, most numerous in the Central Valley and nearby vicinity. Typically requires open water, protected nesting substrate, and foraging grounds within vicinity of the nesting colony. Nests in dense thickets of cattails, tules, willow, blackberry, wild rose, and other tall herbs near fresh water. Also nests in agricultural crops (e.g., silage), where	Present. Suitable habitat is present throughout the project area. This species has been observed within project area vicinity during past surveys and documented in the CNDDB.	Foraging: annual grassland Cropland Nesting: willow scrub/riparian scrub Valley foothill riparian

Table 3.5-4. Potentially Occurring Special-status Species

Species	Fed/ State/ CRPR Status[1]	General Habitat	Potential to Occur in the Project Area	Type of Suitable Habitat within the Project Area
		colonies are threatened during harvest.		
Ardea alba Great egret (rookery)	--/--/--	Great egrets nest in medium to large trees in communal nesting grounds called rookeries and return to these trees year after year.	Present. Suitable habitat is present throughout the project area vicinity; however, there are no recorded occurrences of this species within or adjacent to the project area.	Rookeries in willow scrub/riparian scrub Valley foothill riparian
Athene cunicularia burrowing owl	--/SSC/--	Found in open grasslands with low vegetation, golf courses, and disturbed/ruderal habitat in urban areas.	Present. Suitable habitat is present throughout the project area and there are recorded occurrences of this species within or adjacent to the project area.	Annual grassland Perennial grassland
Buteo swainsonii Swainson's hawk	--/ST/--	Forages in open and agricultural fields and nests in mature trees usually in riparian corridors.	Present. Suitable habitat is present throughout the project area, and this species was observed foraging and nesting during field surveys conducted in 2012.	Foraging: annual grassland Cropland Nesting: Valley foothill riparian and mature trees in the vicinity of aquatic waterways
Circus cyaneus northern harrier	--/SSC/--	Nests in wet meadows and tall grasslands, forages in grasslands and marshes.	Present. Suitable habitat is present throughout the project area, and this species was observed foraging during field surveys conducted in 2012.	Annual grassland Perennial grassland Wet herbaceous
Elanus leucurus white-tailed kite	--/SFP/--	Forages in open grasslands and agricultural fields and marshes. Nests in scattered mature trees within foraging habitat.	Present. Suitable habitat is present within the project area; although this species was not observed during the 2012 field surveys, there are recorded occurrences in the project area vicinity.	Valley foothill riparian and mature trees in the vicinity of cropland, annual grassland, and perennial grassland
Lanius ludovicianus loggerhead shrike	--/SSC/--	Inhabits a variety of woodland and open grassland habitats throughout California.	Present. Suitable habitat is present throughout the project area, and this species was observed foraging during field surveys conducted in 2012.	Throughout
Pelecanus erythrorhynchos American white pelican	--/SSC/--	Breeds primarily in the interior of North America, including areas of northern California. It forages in shallow, inland waters at the edge of marshes, lakes and rivers. During the winter, it roosts on the ground near the water's edge.	Present. Suitable habitat is present along the Eastside Bypass throughout the project area, and this species was observed foraging during field surveys conducted in 2012.	Foraging: managed wetlands Lacustrine Riverine/open water
Vireo bellii pusillus Least Bell's vireo	FE/SE/--	Typically occurs in structurally diverse riparian habitat with dense shrub layer; largely extirpated from the Central Valley	Medium. Suitable habitat is present within the project area; however, this species was not observed during the 2012 field surveys.	Nesting: Valley foothill riparian Willow scrub/riparian scrub

Table 3.5-4. Potentially Occurring Special-status Species

Species	Fed/ State/ CRPR Status[1]	General Habitat	Potential to Occur in the Project Area	Type of Suitable Habitat within the Project Area
Xanthocephalus xanthocephalus Yellow-headed blackbird	--/SSC/--	Nests in shrubs near freshwater marshes or reedy lakes; during migration and winter, prefers open cultivated lands, fields, and pastures.	Present. Suitable habitat is present within the project area; however, this species was not observed during the 2012 field surveys.	Nesting: Valley foothill riparian Willow scrub/riparian scrub
Mammals				
Dipodomys nitradoides exilis Fresno kangaroo rat	FE/SE/--	Restricted to native grasslands in Fresno County within the San Joaquin Valley. Prefers arid, often strongly alkaline, flat plains with sparse vegetation of grasses and alkali forbs.	Low. Suitable habitat is available throughout the project area, with the exception of the active agricultural fields. However, there are no recorded occurrences of this species in project area vicinity, and this species was not captured during trapping events conducted in the lower portion of the Eastside Bypass (Reclamation 2016).	Annual grassland Perennial grassland
Eumops perotis californicus western mastiff bat	--/SSC/--	Cliff-dwelling species that roosts under exfoliating rock slabs (e.g., granite, sandstone or columnar basalt) and in crevices in large boulders and buildings. Roosts are generally high above the ground, usually allowing a clear vertical drop of at least 30 feet below the entrance for flight. Most frequently encountered in broad open areas, and foraging habitat includes dry desert washes, floodplains, chaparral, oak woodland, open ponderosa pine forest, grassland, and agricultural areas.	Medium. Suitable foraging habitat was noted in the project area; however, there are no recorded occurrences within or adjacent to the project area.	Foraging: cropland Annual grassland Perennial grassland
Sylvilagus bachmani riparius riparian brush rabbit	FE/SE/--	Found in dense, brushy areas of Central Valley riparian forests, marked by extensive thickets of wild rose (*Rosa* spp.), blackberries (*Rubus* spp.), and willows (*Salix* spp.).	None. Suitable habitat is available within the project vicinity where a riparian corridor is present. However, no riparian or scrub habitat occurs within the project footprint.	Valley foothill riparian Willow scrub/riparian scrub
Taxidea taxus American badger	--/SSC/--	Found in dry, open grasslands, fields, and pastures. Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	Present. Suitable habitat is available throughout the project area vicinity.	Annual grassland Perennial grassland

Table 3.5-4. Potentially Occurring Special-status Species

Species	Fed/ State/ CRPR Status[1]	General Habitat	Potential to Occur in the Project Area	Type of Suitable Habitat within the Project Area
Vulpes macrotis mutica San Joaquin kit fox	FE/ST/--	Grassland or grassy open stages with scattered shrubby vegetation; requires loose textured sandy soils for burrowing; requires suitable prey base of small rodents.	Medium. Suitable foraging habitat is available throughout the project area. No dens were observed during the 2012 surveys, although this species was documented in the project vicinity in the 1980s. The species may use the project area as a movement corridor to more suitable denning habitat.	Annual grassland Perennial grassland

Notes: CNDDB = California Natural Diversity Database; CRPR = California Rare Plant Rank, CDF-S = Department of Forestry & Fire Protection – Sensitive

Legal Status Definitions:

Federal

FE Species listed as Endangered under the Federal Endangered Species Act.
FT Species listed as Threatened under the Federal Endangered Species Act.
– No listing under the Federal Endangered Species Act.

State

SSC Species identified as a candidate species for listing as threatened or endangered under the California Endangered Species Act.
SE Species listed as Endangered under the California Endangered Species Act.
ST Species listed as Threatened under the California Endangered Species Act.
SFP Species listed as Fully Protected under the California Fish and Game Code.
SSC Species listed as Species of Special Concern by the California Department of Fish and Wildlife.
– No listing under the California Endangered Species Act.

CRPR / California Rare Plant Rank

1B Plant species considered Rare, Threatened, or Endangered in California and elsewhere.
2B Plant species considered Rare or Endangered in California but more common elsewhere.
California Rare Plant Rank Extensions:
.1 Seriously threatened in California (greater than 80 percent of occurrences are threatened and/or have a high degree and immediacy of threat).
.2 Moderately threatened in California (20 to 80 percent of occurrences are threatened and/or have a moderate degree and immediacy of threat).

Sources: California Department of Fish and Wildlife 2017; California Native Plant Society 2017; U.S. Fish and Wildlife Service 2017a; data collected and compiled by GEI Consultants Inc. in 2017

Vernal Pool Species

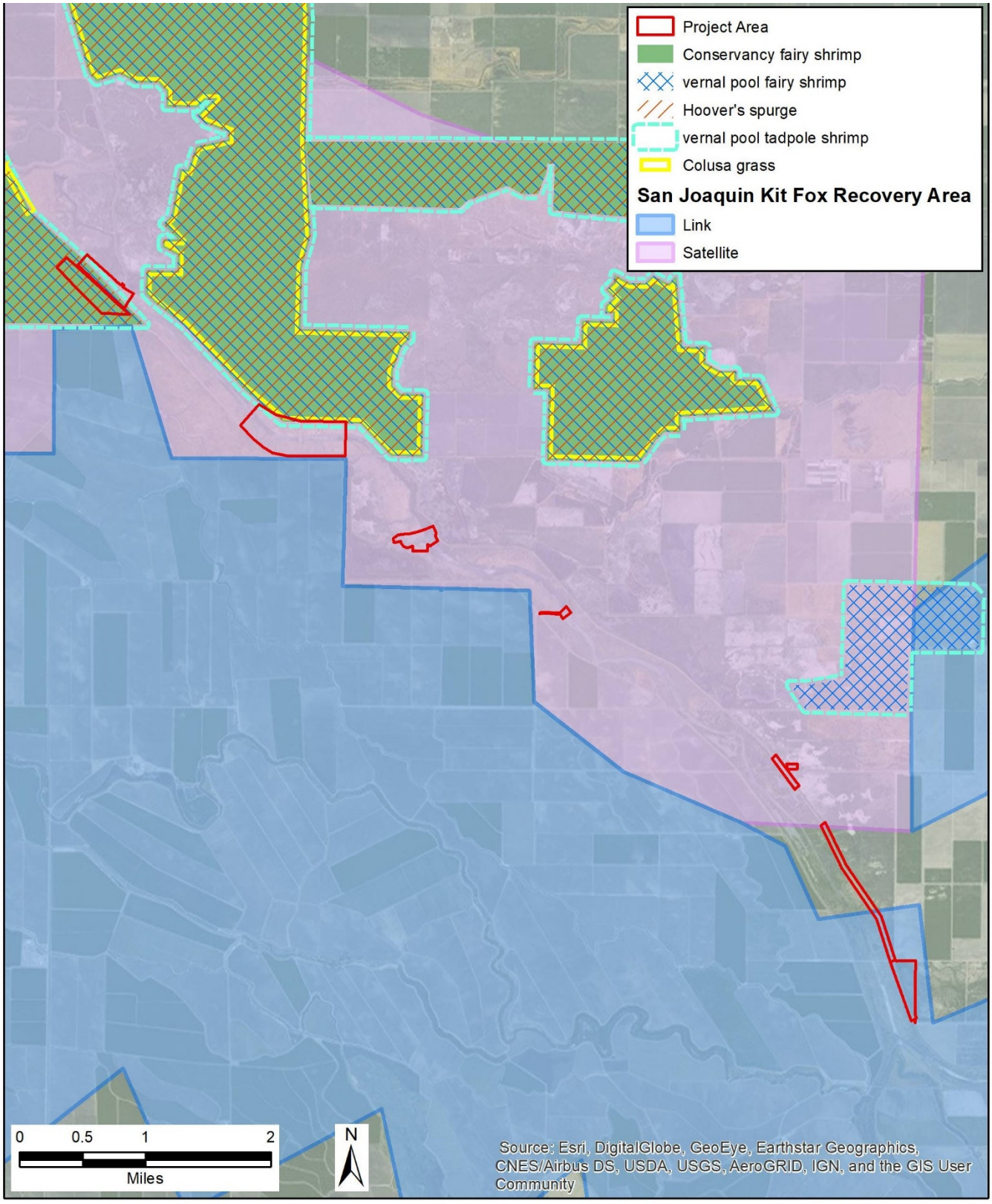
The San Joaquin Valley vernal pool region is a vernal pool species recovery unit that includes the Eastside Bypass (USFWS 2005a). Associated within this vernal pool region is the Grasslands Ecological Area core area. Portions of this core area are within the project area.

Designated Critical Habitat within the Project Area

Vernal Pool Species

There are several designated critical habitat units for vernal pool species, including Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and Hoover's spurge, within portions of the project area (USFWS 2003, 2005b, 2005c, 2006; see also Appendix B, "Biological Resources – Vegetation and Wildlife Appendix") (**Figure 3.5-2**).

Figure 3.5-2. Designated Critical Habitat and Recovery Areas within Project Area



Source: CDM Smith, 2017

Sensitive Natural Communities

Sensitive natural communities include those that are of special concern to resource agencies, such as the CDFW, USACE, or USFWS, or are afforded specific consideration through CEQA, Section 1602 of the California Fish and Game Code, Section 404 of the Federal CWA, and the Porter-Cologne Act, as discussed below in Section 3.5.2, "Regulatory Setting." The following habitat types within the project area are considered sensitive natural communities: alkali desert scrub, riparian scrub, willow scrub, freshwater emergent wetland, saline emergent wetland, seasonal wetland, vernal pool, vernal swale, wet herbaceous, lacustrine, and riverine. The acreages of these habitat types are summarized in **Table 3.5-1**.

3.5.2 Regulatory Setting

Federal

Federal Endangered Species Act

The Federal 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 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 or their designated critical habitats. In addition to Section 7 requirements, Section 9 of the ESA protects listed wildlife 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. Adverse modification or destruction of designated critical habitat for listed species, or activities that prevent or significantly impair essential behavioral patterns, including breeding, feeding, or sheltering, are also considered "take" under the ESA. 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. Federally listed species and designated critical habitat occur within the project area.

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.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 makes it unlawful to take or attempt to take, kill, or possess any migratory bird, any part, nest, or egg of any such bird except under the terms of a permit issued by the United States Department of the Interior. A migratory bird is any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. Numerous birds covered by the Migratory Bird Treaty Act are present in the project area.

Clean Water Act

The CWA established the basic structure for regulating discharges of pollutants into waters of the United States. 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 Waters of the United States unless a permit was obtained under its provisions. Waters of the United States are present in the project area.

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. In California, RWQCBs issue this certification.

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.

Executive Order 11312: Invasive Species

Executive Order 11312 (February 3, 1999) directs all Federal agencies to prevent and control introductions of invasive non-native species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. Executive Order 11312 established a national Invasive Species Council made up of Federal agencies and departments and a supporting Invasive Species Advisory Committee composed of State, local, and private entities. The Invasive Species Council and Advisory Committee oversee and facilitate implementation of the Executive Order, including preparation of a National Invasive Species Management Plan. This is a key area of concern for all SJRRP projects because construction disturbance and Restoration Flows have the potential to spread invasive species.

National Wildlife Refuge System Administration Act/National Wildlife Refuge System Improvement Act

The National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) was recently amended by Public Law 105-57, "The National Wildlife Refuge System Improvement Act of 1997." This new law amends and builds upon the 1966 Act to ensure that the National Wildlife Refuge System is managed as a national system of related lands, waters, and interests for the protection and conservation of the Nation's wildlife resources. The 1966 Act provides guidelines and directives for administering and managing all areas in the system, including "wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas." The Act's main components include: a strong and singular wildlife conservation mission for the Refuge System; a requirement that the Secretary of the Interior maintain the biological integrity, diversity, and environmental health of the Refuge System; a new process for determining compatible uses of refuges; a recognition that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when determined to be compatible, are legitimate and appropriate public uses of the Refuge System; compatible wildlife-dependent recreational uses that are the priority general public uses of the Refuge System; and a requirement for preparing comprehensive conservation plans (CCPs).

Comprehensive Conservation Plans for National Wildlife Refuges

USFWS is directed to develop CCPs to guide the management and resource use for each refuge of the NWR System under requirements of the NWR Improvement Act of 1997. Refuge planning policy also directs the process and development of CCPs. A CCP describes the desired future conditions and long-range guidance necessary for meeting refuge purposes. It also guides management decisions and sets forth strategies for achieving refuge goals and objectives within a 15-year time frame. Several important NWRs are present along the San Joaquin River and elsewhere in the San Joaquin Valley.

The CCPs for the NWRs are relevant to the Project because portions of the Merced NWR are present within the project area. Merced NWR has a draft CCP that is nearing completion and approval (USFWS 2017b). The primary goals of the refuge are to: provide feeding and resting habitat for migrating and wintering waterfowl and other waterbirds; provide habitat and management for endangered species, threatened species, and/or species of special concern; preserve the natural diversity of the flora and fauna representative of the lower San Joaquin Valley and the natural processes that maintain that diversity; provide high-quality wildlife-dependent recreation and environmental education programs; and alleviate crop depredation.

State

California Endangered Species Act

Section 2080 of the CESA prohibits “take” of State-listed threatened and endangered species. The 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 pursuant to Fish and Game Code Section 2081(b) is required from the CDFW. Take of State-listed species is authorized through Section 2081 through a permit process. Take can also be authorized through Section 2835 with an approved Natural Community Conservation Plan. State-listed species occur within the project area.

California Native Plant Protection Act

The California Native Plant Protection Act of 1977 (Fish and Game Code Sections 1900–1913) is intended to preserve, protect, and enhance endangered or rare native plants in California and gives the CDFW authority to designate state endangered, threatened, and rare plants and provides specific protection measures for identified populations. The Act also directs the California Fish and Game Commission to adopt regulations governing taking, possessing, propagation, and sale of any endangered or rare native plant. State-listed and rare plants occur within the project area.

California Native Plant Society

The CNPS is a professional society of plant biologists, scientists, and associated professionals that has accumulated a statewide database on California native plants and their distributions. The CNPS has created five categorical rankings of plants to identify their respective concern for these species as potential rare, threatened, or endangered species. These listings do not afford legal status nor protection for the species, but the lists are utilized by agencies in their planning processes for activities that could impact the species or habitat. Vascular plants listed as rare or endangered by the CNPS (CNPS 2012) are defined as follows:

- California Rare Plant Rank 1A: Plants presumed extinct in California
- California Rare Plant Rank 1B: Plants rare, threatened, or endangered in California and elsewhere
- California Rare Plant Rank 2A: Plants presumed extirpated in California but common elsewhere
- California Rare Plant Rank 2B: Plants rare, threatened, or endangered in California but more common elsewhere
- California Rare Plant Rank 3: Plants about which we need more information – a review list
- California Rare Plant Rank 4: Plants of limited distribution – a watch list

Further, there are two extensions to these California Rare Plant Ranks: (1) .1 is considered seriously threatened in California (greater than 80 percent of occurrences are threatened and/or have a high degree and immediacy of threat) and (2) .2 is considered moderately threatened in California (20 to 80 percent of occurrences are threatened and/or have a moderate degree and immediacy of threat).

In general, plants appearing on California Rare Plant Rank (CRPR) Lists 1A, 1B, or 2 are considered to meet the criteria of endangered, rare, or threatened under the CEQA Guidelines Section 15380. Additionally, plants identified on CNPS Lists 1A, 1B, or 2 meet the definition of Section 1901, Chapter 10 (Native Plant Protection Act) and Sections 2062 and 2067 (CESA) of the California Fish and Game Code as rare or endangered species. Plants identified by CNPS as endangered, threatened, or rare occur within the project area.

California Fish and Game Code Sections 1600–1603, Lake and Streambed Alteration

These sections of the Fish and Game Code 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, desert washes, and watercourses with a subsurface flow. It may also apply to work undertaken within the floodplain of a body of water. The project would affect the bed, channel, and bank of the Eastside Bypass.

California Fish and Game Code Section 3503, Bird Nests and Birds of Prey

Bird nests are protected in California under Section 3503 of the California Fish and Game Code. Section 3503 states that it is "unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." Disturbance during the breeding season can result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered take by CDFW. CDFW may issue permits authorizing take.

Section 3503.5 of the Code specifies that it "is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Birds of prey are present in the project area.

California Fish and Game Code Sections 3511, 4700, 5050, and 5515, Fully Protected Species

Four sections of the California Fish and Game Code—Sections 3511, 4700, 5050, and 5515—list 37 fully protected species. These statutes prohibit take or any possession of fully-protected species. CDFW is unable to authorize incidental take of fully-protected species when activities are proposed in areas inhabited by those species. CDFW has informed non-Federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects. Two fully protected species – blunt-nosed leopard lizard and white-tailed kite – may occur in the project area.

California Fish and Game Code Section 3513, Taking Migratory Bird Treaty Act Birds

Section 3513 of the Code states that "it is unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Treaty Act." Numerous birds covered by the Migratory Bird Treaty Act are present in the project area.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act was enacted in 1969 and established the SWRCB. The Porter-Cologne Act defines water quality objectives as the limits or levels of water constituents that are established for reasonable protection of beneficial uses. Unlike the CWA, the Porter-Cologne Act applies to both surface and groundwater. The Porter-Cologne Act requires that each of nine semi-autonomous RWQCB establish water quality objectives while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. The project area is located within the Central Valley Region, which is the jurisdiction of the Central Valley RWQCB. Beneficial uses, together with the corresponding water quality objectives, are defined as standards, per Federal CWA regulations. Therefore, the regional plans provide the regulatory framework for meeting State and Federal requirements for water quality control. Changes in water quality are only allowed if the change is consistent with the most restrictive beneficial use designation identified by the State, does not

unreasonably affect the present or anticipated beneficial uses, and does not result in water quality less than that prescribed in the water quality control plans (RWQCB 2016). Project construction activities would need to be conducted in compliance with the Porter-Cologne Act.

Special-status Natural Communities

Special-status natural communities are identified as such by the CDFW's Natural Heritage Division and include those that are naturally rare and those whose extent has been greatly diminished through changes in land use. While there is no statewide law that requires protection of all special-status natural communities, CEQA requires consideration of the potential impacts of a project on biological resources of statewide or regional significance. Special-status natural communities are present in the project area.

Local

Merced County General Plan

The *2030 Merced County General Plan* (County of Merced 2013) includes a plan for the comprehensive and long-range management, preservation, and conservation of "open-space lands" and contains provisions for managing and conserving Merced County's natural resources and for protecting life, health, and property from natural hazards. Policies associated with implementing these goals are designed to ensure that the development of Merced County will not substantially interfere with or destroy valuable natural resources, and that development will occur with recognition of sensitive resources. The project occurs within Merced County.

3.5.3 Environmental Effects

Impact Assessment Methodology

The evaluation of effects on vegetation and wildlife is based on field investigations; review of existing biological resources documented in or near the project area; information obtained from the USFWS (2017a), CNPS (2017), and CDFW (2017) species lists; review of aerial photographs; and review of the Geomorphology, Sediment Transport, and Vegetation Assessment, Appendix N of the SJRRP Draft PEIS/R. Impacts on biological resources were determined by evaluating the project plans in relation to the habitat characteristics of the project area, quantifying potential loss of habitat types, and evaluating potential effects of habitat loss to special-status species. Impacts to habitat types are based on the project footprint identified in **Table 3.5-1** and illustrated on **Figure 3.5-1**. Mitigation measures are consistent with, and adapted from, the Conservation Measures included in the SJRRP Draft PEIS/R (SJRRP 2011). All mitigation measures would be implemented by DWR and/or Reclamation.

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 construction-related impacts. Most if not all species would benefit from the increase in Restoration Flows in the Eastside Bypass from a maximum of approximately 300 cfs under existing conditions to a maximum of approximately 580 cfs under the no action alternative. No significant adverse impacts to biological resources would occur from this increase in Eastside Bypass flows.

Proposed Action

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?
(Less-than-Significant with Mitigation Incorporated)

Substantially Affect Special-status Plant Species

The proposed project could impact special-status plant species in upland and aquatic habitats if present within the construction footprint through the removal of plants and their habitat (see **Table 3.5-1**). Occurrences of Delta button-celery *(Eryngium racemosum),* Parry's rough tarplant (*Centromadia parryi* subsp. *rudis*), Wright's trichocoronis *(Trichocoronis wrightii var. wrightii),* heartscale *(Atriplex cordulata),* and lesser saltscale (*Atriplex minuscula)* were recently documented in the project area, around the Eastside Bypass control structure (Delta button celery, Parry's rough tarplant), Dan McNamara Road (Delta button celery), the weirs (Delta button celery, Wright's trichoniosis), and levee Reaches O-3 and O-4 (heartscale, lesser saltscale) (Reclamation 2017b). Therefore, this impact would be potentially significant.

However, DWR and/or Reclamation will implement mitigation measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, and BIO-8 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures PLANTS-1 and 2; DBC-1, 2, and 3; and VP-1, 2, and 3, respectively) to avoid impacts to special-status plants by establishing a 100-foot buffer between construction activities and upland plants, and a 250-foot buffer between construction activities and vernal pools containing vernal pool plants, if feasible, or compensate for impacts through consultation with USFWS and/or CDFW if avoidance is infeasible.

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.

a) 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.

b) 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 conservation 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, as appropriate. 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.

Implementation of these mitigation measures would reduce the potentially significant impact on special-status plant species to a less-than-significant impact level.

Substantially Reduce Habitat or Populations of Special-status Wildlife

As further discussed below, the proposed project could impact special-status wildlife potentially occurring in the action area through removal of vegetation, excavation and grading of uplands and channels, and equipment operation. Potentially affected special-status wildlife are discussed below.

Vernal Pool Branchiopods and Western Spadefoot

Presence is assumed for Federally listed vernal pool branchiopods where vernal pools are present. However, vernal pools that occur within the floodplain may not support suitable habitat for vernal pool branchiopods. Project actions could indirectly impact vernal pool branchiopods and western spadefoot if construction activities occur within 250 feet of vernal pools. Therefore, this impact would be potentially significant.

However, with implementation of mitigation measures BIO-6, BIO-7, and BIO-8 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures VP-1, 2, and 3, respectively), impacts to these species would be avoided by establishing a 250-foot buffer between construction activities and vernal pools, if feasible, or addressed through the Section 7 consultation with USFWS. If avoidance is infeasible, compensation may be necessary and may include dedication of offsite conservation easements or purchase of mitigation credits.

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

Please refer to Mitigation Measure BIO-6 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-7 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-8 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

California Tiger Salamander

Presence is assumed for California tiger salamander. Project activities could impact upland habitat (i.e., annual grassland) and aquatic habitat (i.e., wetlands and vernal pools) where these habitat types occur within the footprint where ground-disturbing activities would occur (see **Table 3.5-1**). Therefore, this impact would be potentially significant.

However, with implementation of mitigation measures BIO-9, BIO-10, and BIO-11 (identified in the SJRRP Draft PEIS/R as Conservation Measure CTS-1, 2, and 3, respectively), impacts to this species would be avoided or minimized through establishing a 250-foot buffer between construction activities and burrows within 1.3 miles of known or potential breeding habitat and having a biological monitor present during construction activities, if feasible. If encroachment within the buffer is required, USFWS and CDFW will be consulted to determine appropriate compensation measures for the loss of this species, as appropriate. Compensation may involve creation, preservation, and/or restoration of habitat or purchase of credits at a mitigation bank approved by the regulatory agencies if avoidance is infeasible.

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, approved 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.

Giant Garter Snake

The proposed project could impact giant garter snake and its upland habitat (i.e., annual grassland) and aquatic habitat (i.e., wetlands) where these habitat types occur within the construction footprint through removal of vegetation, channel grading, equipment usage, and levee improvements (see **Table 3.5-1**). Therefore, this impact would be potentially significant.

However, with implementation of mitigation measures BIO-12 and BIO-13 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures GGS-1 and -2, respectively), impacts would be avoided or minimized through conducting preconstruction surveys within 24 hours of activities, establishing 300-foot buffers around potentially suitable aquatic habitat, hand-clearing vegetation where giant garter snake is suspected to occur, dewatering a minimum of 2 weeks prior to the start of in-water work, and limiting the work period to occur between May 1 and October 1. If avoidance of impacts to this species is not feasible, impacts would be addressed through consultation with USFWS and coordination with CDFW, and unavoidable impacts would be compensated for through preservation and enhancement of existing populations, restoration or creation of suitable habitat, or purchase of credits at a mitigation bank at a ratio approved by USFWS and CDFW.

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.

Western Pond Turtle

Western pond turtles are known to occur within the project area, and their suitable habitat includes annual grassland and wetlands. The proposed project could directly impact this species if any animals are present within these areas. Therefore, this impact would be potentially significant.

However, with implementation of mitigation measure BIO-14 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measure WPT-1), impacts to western pond turtle would be avoided or minimized by requiring that an agency approved biologist conduct a survey of aquatic habitats to relocate any individuals, if present, prior to removal or placement of structures, crossings, or weirs.

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.

Swainson's Hawk

Project actions could directly impact this species if any are nesting within 0.5 mile of the construction activities by disturbing nesting behavior as a result of construction noise and traffic (causing adult abandonment of the nest, eggs or young to be crushed, and/or reproductive failure). The nesting season extends from February 15 through September 15 (SHTAC 2000). Although no nest trees are anticipated to be removed within the construction footprint, construction activities could disturb hawks nesting nearby. Construction activities could also temporarily disturb foraging habitat (e.g., annual and perennial grasslands, cropland) for this species. Therefore, this impact would be potentially significant.

However, implementation of mitigation measure BIO-15 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measure SWH-1) would avoid and minimize impacts to Swainson's hawk by conducting preconstruction surveys for active nests within 0.5 mile of the project areas and establishing a 0.5-mile no-disturbance buffer around the active nest if construction cannot be limited to occur outside the nesting season, if feasible. CDFW will be consulted by DWR to determine appropriate measures for this species, as appropriate.

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.

Loggerhead Shrike and Raptors, including Northern Harrier, White-Tailed Kite

Project actions could directly impact raptors if any are nesting within or adjacent to the construction footprint by disturbing nesting behavior as a result of construction noise and traffic (causing adult abandonment of the nest, eggs or young to be crushed, and/or reproductive failure) or if nest trees/areasare anticipated to be disturbed within the construction footprint. The nesting season extends from February 15 to September 15 (SHTAC 2000). Therefore, this impact would be potentially significant.

However, implementation of mitigation measures BIO-16 and BIO-17 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures RAPTOR-1 and -2, respectively) would avoid and minimize impacts to raptors by conducting preconstruction surveys prior to commencement of construction activities, establishing a no-disturbance buffer if any active raptor nests are observed within the project footprint through coordination with CDFW, and conducting biological monitoring until the biologist determines the nest is no longer active or would compensate for impacts by replacing an appropriate number of trees in coordination with the CDFW for any native trees removed during project activities.

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.

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

Nesting and/or Overwintering Migratory Birds

The Central Valley wetlands support approximately 60% of the Pacific Flyway's and 20% of the United States' waterfowl population. Merced NWR is one of the most significant waterfowl refuges in the Central Valley. Project actions could directly impact migratory birds, including tricolored blackbird, least Bell's vireo, and yellow-headed blackbird, if any are nesting or overwintering within the construction area. Nesting and/or overwintering behavior could be disrupted from construction noise and traffic (causing disruption of foraging behavior, adult abandonment of the nest, eggs or young to be crushed, and/or reproductive failure) or if vegetation used for nests is anticipated to be removed within the construction footprint. The nesting season extends from February 15 to September 15 (SHTAC 2000). Therefore, this impact would be potentially significant.

The removal of the two weirs in the Eastside Bypass operated by USFWS within the Merced NWR would change the inundation patterns within the bypass at lower flows. Under existing conditions, depressions within the Bypass and Refuge can inundate at depths of about 1 foot, providing potential wetland habitat for migratory birds. Depending on water availability, some areas of wetland habitat either may no longer be inundated at flows of about 100 cfs from September through March or may become inundated at less frequent intervals. Over the last 2 years, no installation of the weir boards has occurred due to drought, flood, and the presence of Restoration Flows. This limitation would persist as the presence of Restoration Flows would limit operation of the weirs such that boards could not be installed. Additional water in the bypass from Restoration Flows would generally provide the opportunity for additional inundation during drier year types, especially during fall pulse flows when it is highly likely that the Merced NWR does not have water to inundate much of these areas. However, this effect to these seasonally inundated depressions varies widely. During flood conditions, there is water from levee toe to levee toe, inundating the entire Eastside Bypass. Prior to Restoration Flows, the backwater from the weirs would inundate these depressions that support wetland habitat. However, during the last year, without installation of the boards, less inundated wetland habitat occured behind the weir structures. With the project, the weirs would be removed to improve fish passage in the bypass, thus, changing the channel from a slower flow to a less-obstructed flow, allowing deeper water in the center of the channel draining (an estimated 5 acres of "wet herbaceous" would change to "riverine/open water"), while the edge habitats would be expected to remain. During certain flows rates, the wetland habitat depressions would continue to be inundated. Although for migratory birds, the frequency and function of the wetlands would change somewhat, consistent water in the Eastside Bypass would lead to a connected riparian corridor with potential migratory bird benefits.

With implementation of mitigation measure BIO-18 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measure MBTA-1), impacts to migratory birds would be avoided or minimized to a less-than-significant level by not constructing during the nesting season if species covered under the MBTA and Fish and Game Code Sections 3503, 3503.5, and 3513 are determined to be actively nesting.

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

a) Vegetation removal will only occur March 1 to August 31 within 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.

Burrowing Owl

Project actions could directly impact occupied burrowing owl burrows if any occur in the vicinity of the construction area by disturbing nesting behavior as a result of construction noise and traffic (causing adult abandonment of the nest, eggs or young to be crushed, and/or reproductive failure) or removing burrows. Therefore, this impact would be potentially significant.

However, with implementation of mitigation measures BIO-19 and BIO-20 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures BRO-1 and -2, respectively), impacts to burrowing owl would be avoided or minimized by conducting preconstruction surveys within 30 days prior to commencement of construction activities, establishing buffers around occupied burrows, as required by the Staff Report on Burrowing Owl Mitigation (CDFG 2012), and preparing a plan in coordination with CDFW that includes mitigation measures to offset burrow and foraging habitat if impacts occur to these areas.

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.

Fresno Kangaroo Rat

Project actions could directly impact occupied Fresno kangaroo rat if any occur in the vicinity of the construction area where annual and perennial grasslands occur. Therefore, this impact would be potentially significant.

However, with implementation of mitigation measure BIO-21 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measure FKR-1), impacts to this species will be avoided by conducting preconstruction surveys 30 days prior to commencement of construction activities to determine whether suitable burrows occur within the footprint, in coordination with USFWS and CDFW, and conducting construction activities in potentially suitable habitat outside of the breeding season, which extends from December through September, if feasible.

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.

San Joaquin Kit Fox

Project actions could directly impact San Joaquin kit fox if any dens occur in the vicinity of the construction area by disturbing kit fox behavior as a result of construction noise and traffic (causing

adult abandonment of the den and/or reproductive failure) or removing dens and foraging habitat. Therefore, this impact would be potentially significant.

However, mitigation measures BIO-22 and BIO-23, which are consistent with the SJRRP Conservation Strategy Conseration Measures SJKF-1 and -2 and *U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011), will be implemented to avoid and minimize potential impacts to SJKF associated with the construction, operation, and maintenance activities for Project:

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.

Western Mastiff Bat

Project actions associated with removal of the low flow crossing, installation of the fish passage at the Eastside Bypass Control structure, or removal of trees could directly impact roosting bats if present. Therefore, this impact would be potentially significant.

However, implementation of mitigation measures BIO-24 and BIO-25 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures BAT-1 and -2, respectively) would ensure that impacts to this species are avoided or minimized by conducting surveys prior to commencement of construction activities or by excluding the bats from roost sites if avoidance is infeasible or would be compensated for by replacing roosting habitat in consultation with CDFW.

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.

Substantially Alter Designated Critical Habitat

Project actions associated with the construction footprint within the Eastside Bypass Control Structure could modify the physical and biological features needed for the species life history within critical habitat for Hoover's spurge (critical habitat Unit 6B), Conservancy fairy shrimp (critical habitat Unit 7C), vernal pool fairy shrimp (critical habitat Unit 23C), and vernal pool tadpole shrimp (critical habitat Unit 16C) (see **Figure 3.5-2**). These physical and biological features include annual and perennial grasslands within the associated vernal pool watershed. Therefore, this impact would be potentially significant.

However, implementation of mitigation measures BIO-26 and BIO-27 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures CH-1 and -2, respectively) would ensure that impacts to critical habitat would be avoided or minimized by avoiding the physical and biological features needed for the species life history, or establishing and maintaining buffers around areas of designated critical habitat, if feasible, or would be compensated for by offsite dedication of conservation easements, purchase of mitigation credits, or other offsite conservation measures through Section 7 consultation with USFWS.

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.

The impact on critical habitat would be less than significant after mitigation. The impacts on critical habitat identified above would be a less-than-significant impact with mitigation incorporated because

critical habitat would be avoided, minimized, or compensated for, and the proposed mitigation measures are based on SJRRP Conservation Measures developed and approved by USFWS and CDFW.

The overall impact, 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 CDFW or USFWS would be less than significant after mitigation because these impacts would be avoided, minimized, or compensated for, and the proposed mitigation measures are based on SJRRP Conservation Measures developed and approved by USFWS and CDFW.

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? *(Less-than-Significant Impact with Mitigation Incorporated)*

Substantially Alter Riparian Habitat and Other Sensitive Communities

An aquatic resources delineation was recently completed (Reclamation 2017c). This delineation of waters of the United States will be submitted to USACE for verification. This delineation was conducted according to methods established in the USACE *Wetlands Delineation Manual* (USACE, Environmental Laboratory 1987) and *Arid West Supplement* (USACE, Environmental Laboratory 2008). Although no riparian habitat is expected to be directly removed as a result of the proposed project, the proposed project could temporarily and/or permanently affect other sensitive natural communities, including wetlands, during construction (see **Table 3.5-1**). Project actions that may result in direct adverse impacts to sensitive communities, including vegetation clearing and direct and indirect effects to wetlands. Project actions also would result in indirect effects on riparian and sensitive natural communities through the alteration of the timing, depth, or duration of inundation which could impact sensitive communities that rely on specific inundation regimes.

The removal of the two weirs in the Eastside Bypass operated by USFWS within the Merced NWR would change the inundation patterns within the bypass at lower flows. Under existing conditions, depressions within the Bypass and Refuge can inundate at depths of about 1 foot, supporting wetland habitats, such as freshwater emergent wetland, riparian, and wet herbaceous land cover types. Depending on water availability, some areas of wetland habitat either may no longer be inundated at flows of about 100 cfs from September through March or may become inundated at less frequent intervals. Over the last year, no installation of the weir boards has occurred due to flood conditions and the presence of Restoration Flows. Additional water in the bypass from Restoration Flows would generally provide the opportunity for additional inundation during drier year types, especially during fall pulse flows when it is highly likely that the Merced NWR does not have water to inundate much of these areas. The weir removal would change the channel from a slower flow to a less-obstructed flow, allowing deeper water in the center of the channel to drain, and likely converting an estimated 5 acres of "wet herbaceous" to "riverine/open water."

Although, the frequency and function of inundated habitat would change somewhat, consistent water in the Eastside Bypass would lead to a connected riparian corridor. However, this impact could be potentially significant because of the changed inundation pattern. Implementing mitigation measures BIO-28, BIO-29, BIO-6, BIO-7, and BIO-8 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures RHSNC-1, RHSNC-2, VP-1, VP-2, and VP-3, respectively) would ensure that other sensitive communities are avoided or compensated for at no net loss.

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-6: Avoid Effects to Vernal Pool Species.

Please refer to Mitigation Measure BIO-6 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-7 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-8 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

The impacts on riparian and sensitive natural communities would be a less-than-significant impact with mitigation incorporated because sensitive communities are avoided or compensated for at no net loss.

Facilitate an Increase in Distribution and Abundance of Invasive Plants

The proposed project could facilitate an increase in the disturbance and abundance of invasive plants by directly transporting invasive seed sources on site (and between sites) via equipment and by creating

ideal seed beds through ground disturbance and resulting bare soils. Therefore, this impact would be potentially significant.

However, implementing mitigation measure BIO-30 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measure INV-1), which includes the implementation of an invasive plant prevention, monitoring, and management plan to control or eradicate invasive plant infestations and to control weed species within sensitive communities, would ensure that impacts associated with invasive species are controlled or eradicated.

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).

The impact of invasive species would be a less-than-significant impact with mitigation incorporated.

Overall, the impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by CDFW or USFWS would be less than significant after mitigation. Potential impacts would be avoided, minimized, or compensated for, and the proposed mitigation measures are based on SJRRP Conservation Measures developed and approved by USFWS and CDFW.

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?
(Less-than-Significant with Mitigation Incorporated)

Project construction actions could temporarily or permanently impact waters of the United States (see **Table 3.5-1**). An aquatic resources delineation was recently completed (Reclamation 2017c). This delineation of waters of the United States will be submitted to USACE for verification. This delineation was conducted according to methods established in the USACE *Wetlands Delineation Manual* (USACE, Environmental Laboratory 1987) and *Arid West Supplement* (USACE, Environmental Laboratory 2008). Project actions that may result in temporary and permanent impacts to waters of the United States include instream vegetation clearing, fill of waterways, stabilization actions associated with the Eastside Bypass levee, construction equipment, staging areas, and access routes. Therefore, this impact would be

potentially significant. However, implementation of Mitigation Measures BIO-31, BIO-32, BIO-6, BIO-7, and BIO-8 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures WUS-1, WUS-2, VP-1, VP-2, and VP-3, respectively) would ensure that all wetlands and waters of the United States are mapped and quantified within potential construction areas and that all waters found within 250 feet of impacts areas would be avoided, as feasible. If infeasible, implementation of Conservation Measures WUS-2 and VP-3 would ensure that any loss of wetlands, vernal pools, or other waters of the United States are compensated on a no net loss basis.

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 BIO-6: Avoid Effects to Vernal Pool Species.

Please refer to Mitigation Measure BIO-6 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-7 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-8 in "Substantially Affect Special-status Plant Species" above for the full text of this mitigation measure.

The impact to waters of the United States/waters of the State would be a less-than-significant impact with mitigation incorporated because these habitats would be avoided or compensated for at no net loss.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites? *(Less-than-Significant Impact)*

The proposed project would result in localized and small disturbance that would not affect native wildlife nursery sites, or substantially interfere with the movement of native resident or migratory wildlife species. Therefore, this impact would be less than significant.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance? *(Less-than-Significant Impact with Mitigation Incorporated)*

Merced County General Plan Policy NR-1.5 (Wetland and Riparian Habitat Buffer), Policy NR-1.12 (Wetland Avoidance), and Policy NR-1.13 (Wetland Setbacks) require that wetlands and riparian habitat areas are identified and a designated buffer zone is established to protect from degradation, encroachment, or loss. The Merced NWR maintains its own related policies and ordinances (see "Regulatory Setting" in Section 3, "Land Use and Planning"). Project actions associated with instream work could impact wetlands and other waters of the United States and riparian habitat. Therefore, this impact would be potentially significant.

However, implementation of mitigation measures BIO-28, BIO-29, BIO-31, and BIO-32 (adapted from and identified in the SJRRP Draft PEIS/R as Conservation Measures WUS-1 and -2, and RHSNC-1 and -2, respectively) would ensure that waters of the United States and riparian habitat would be avoided or compensated for to ensure a no net loss of waterways.

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

Please refer to Mitigation Measure BIO-31 in "Substantially Alter Riparian Habitat and Other Sensitive Communities" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-31 in "Substantially Alter Riparian Habitat and Other Sensitive Communities" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-33 in "Fill, Fragment, Isolate, Divert, or Substantially Alter Jurisdictional Waters of the United States (including, but not limited to, marsh, vernal pool, coastal)" above for the full text of this mitigation measure.

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

Please refer to Mitigation Measure BIO-34 in "Fill, Fragment, Isolate, Divert, or Substantially Alter Jurisdictional Waters of the United States (including, but not limited to, marsh, vernal pool, coastal)" above for the full text of this mitigation measure.

The conflict with local policies or ordinances protecting biological resources or local tree ordinances would be a less-than-significant impact with mitigation incorporated.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, state, or federal 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 draft acts, plans, and policies described in Section 3.5.2, "Regulatory Setting." Therefore, the proposed project would have no impact.

3.6 Cultural Resources

Environmental Issue (CEQA-only)	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
VI. CULTURAL RESOURCES – Would the project:					
a) Cause a substantial adverse change in the significance of a historical resources as defined in section 15064.5?	☐	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☐	☒	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature? (See Section 3.15, "Paleontological Resources," for response)					
d) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐	☐
e) Cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resources Code 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:					
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC section 5020.1(k), or	☐	☐	☒	☐	☐
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☒	☐	☐

3.6.1 Environmental Setting

This section describes existing conditions for cultural resources, Tribal Cultural Resources (TCRs), and Indian Sacred Sites within the project area. All information regarding existing conditions was collected through an examination of current literature, archival and record search information, and archaeological

inventory survey data related to the project area. Information regarding archaeological and ethnographic context is contained in a confidential cultural resources inventory report submitted to Reclamation in 2017 (Holm et. al. 2017). Paleontological resources are addressed in Section 3.15, "Paleontological Resources." Indian Trust Assets are addressed in Section 3.21, "Indian Trust Assets."

For information regarding Reclamation's and DWR's Native American and Tribal consultations pursuant to Federal and State regulatory requirements, respectively, including DWR's Assembly Bill (AB) 52 Tribal consultation compliance, see Section 5.1.3, "Native American Consultation."

Archaeological Context

The project area is located in the Central Valley Region of California, which is bound by the Siskiyou Mountains to the north, the Tehachapi Mountains to the south, the Coast Ranges to the west, and the Sierra Nevada and Cascade ranges to the east. The archaeological record within the Central Valley Region encompasses the full range of hunter-gatherer adaptation. Rosenthal et al. (2007) have noted that prehistoric peoples within the Central Valley Region developed a sophisticated material culture, became the nexus for an extensive trade system incorporating distant and neighboring regions, and reached population densities equaled only by agricultural societies in the American Southwest and Southeast.

No single cultural historical framework has been established that accommodates the entire prehistoric record of the Central Valley Region. In discussing the cultural history of the Central Valley Region and, more specifically, the project area, it is therefore appropriate to use the broad period and stage classification system developed by Fredrickson (1973, 1974) and refined by Rosenthal et al. (2007:150) while referencing more localized cultural historical sequences put forth by Olsen and Payen (1969) and Moratto (1984). Broad periods identified for the Central Valley Region include the Paleo-Indian (11,550-8,550 BC), Lower Archaic (8,550-5,550 BC), Middle Archaic (5,550-550 BC), Upper Archaic (550 BC-1100 AD), and Emergent (1000 AD-Historic) periods. A more localized sequence relevant to the project area is defined largely by distinctive artifact types and mortuary practices, and includes the Positas (ca. 3,300-2,600 BC), Pacheco (2,600 BC-AD 300), Gonzaga (AD 300-1000), and Panoche (AD 1500-1850) complexes.

Prehistoric Context

This summary of the Prehistoric Context is adapted from Holm et al. 2017.

There is little evidence for Paleo-Indian (during the termional Pleistocene) habitation in the San Joaquin Valley, most evidence being in the form of isolated fluted project points. Paleo-Indian groups are thought to have been small, highly mobile, and economically focused targeting large fauna.

Ealy Holocene sites are more numerous throughout California, but in the San Joaquin Valley there is only one site, CA-KER-116, that has been reliably identified to this period. The site assemblage yielded flaked stone crescents, an atlatl spur, and various flaked stone tools. The presence of large, finely worked projectile points has led some researchers to conclude that hunting of large artiodactyls was an important component of the diet.

During the Middle Holocene, climate changes led to the disappearance or reduction of many pluvial lakes, the stabilization of several alluvial fans and flood plains, and the formation of the extensive wetland habitat of the Sacramento-San Joaquin River Delta. Groups adapted to the the changing climate by developing complex socio-economic strategies focused on riverine and marsh resoruces and a more

elaborate material culture, examples of which include the Positas Complex and the Pacheco Complex (which extended intot the Late Holocene).

Late Holocene environmental changes were characterizec by cooler, wetter, and more stable climatic conditions. Complexes associated with the Late Holocene include the Gongaza and Panoche complexes. Very generally, Late Hoocene assemblages were substantial and regionally specific. The bow and arrow was introduced and mortuary practices became more complex. Large settlements were established along rivers for seasonal salmon runs and villages and other, smaller communities continued to be established along streams in the foothills and river channels and slough on the valley floor.

Ethnographic Context

The project area falls within the traditional territory of the Northern Valley Yokuts (Kroeber 1925; Wallace 1978). The Yokuts were hunter-gatherers who divided themselves into tribelets organized by kin and shared dialects, resulting in a mosaic of smaller territories and discrete settlements (Kroeber 1925:474). Yokuts' populations numbered approximately 41,000 at contact and primarily clustered at a narrow strip of land bordering the San Joaquin River and its tributaries, as well as lands east of the river along the Sierra Nevada foothills.

Historic Context

As ranching and agriculture developed along the San Joaquin River, irrigation and levee systems became important tools for managing water resources and controlling flooding. As part of this process, large tracts of tule swamp were drained to create ranching and agricultural lands. The earliest irrigation system developed within the project area was that established by Miller and Lux. They formed the San Joaquin and Kings River Canal and Irrigation Company, which constructed the Main Canal in 1871, and the Outside Canal, which paralleled the Main Canal to the west, in the 1890s (Igler 2001:76). Miller and Lux also built the Dos Palos and Temple Slough Canals in about 1882 by improving existing natural sloughs along the San Joaquin River (Byrd et al. 2009:25). From these main canals grew a network of smaller canals and ditches, generally hand-built and fairly small by later standards, for irrigation and drainage of swamp lands.

Captain Thomas Jackson of USACE came to California in 1905 and began studying the Sacramento River. He understood that there was a linkage between the mining debris, making the river navigable, and flood control. Jackson undertook a comprehensive flood management plan for the Sacramento Valley. Jackson's plan, known as the Jackson Report, received Congressional approval and became the foundation for the Sacramento River Flood Control Project (Russo 2010:20; Kelley 1989:278, 280). In 1913, the San Joaquin River was added to the plan. By 1955, the Lower San Joaquin Levee District was established and a flood control plan, Plan A, was proposed. Plan A would eventually include the Eastside Bypass and Mariposa Bypass. Plan A was adopted in 1958, and all elements were completed by 1966 (Byrd et al. 2009:30).

Archival and Records Searches of the Project Area

An archival and records search was conducted of the project area at the Central California Information Center (CCIC), California State University, Stanislaus in 2007, 2008, and 2016.

No prehistoric resources were identified within the project area. Two historic period resources (P-24-000580 and P-24-001962) had been previously recorded and were rerecorded during the inventory survey (**Table 3.6-1**). Both cultural resources are detailed at length in an inventory survey report that has

been submitted to Reclamation. P-24-000580 has been previously evaluated and found not eligible for listing in the National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR); P-24-001962 has not been formally evaluated.

The Stevinson/East Side Canal (P-24-000580) was previously determined not eligible for the CRHR/NRHP and will not be discussed further in this analysis.

Table 3-6-1. Summary of Cultural Resources Recorded during Inventory Survey within the Project Area.

Site Number	Type	Description
P-24-000580 (Update)	Historical	Two segments of the Stevinson/East Side Canal
P-24-001962	Historical	Three segments of the Eastside Bypass; levee, earthen dam; lower weir; dredge tailing; upper weir; earthen ditch; and concrete bridge
PL-2823-11-01	Historical	Irrigation canal extending east from Eastside Bypass
PL-SJRRP-FEAT-06	Historical	Portion of Mariposa Bypass and Control Structure
PL-2823-11-ISO-01	Historical	Two historic period bottles; isolated find, not a site
PL-2823-11-ISO-02	Historical	Historic period bottle; isolated find, not a site

Inventory Surveys within the Project Area

Cultural resources inventory surveys were conducted within the project area between May and November 2012 (Schneider et al. 2017). An additional pedestrian survey was conducted the week of August 7, 2017 (Holson 2017); only areas within the river channel were not surveyed, or 94% of the APE was surveyed while approximatley 6% was unsurveyed. A draft Historic Inventory and Evaluation Report was recently completed by JRP under contract to Reclamation (Norby and Wee 2017).

3.6.2 Regulatory Setting

The following section describes the laws, rules, regulations, and policies applicable to cultural resources in the project area at the Federal, State, and local level.

Federal

Cultural resources is a term used to describe both “archaeological sites” depicting evidence of past human use of the landscape through material culture and the “built environment,” which is represented in structures (such as dams and roadways) and buildings. Cultural resources also include traditional cultural properties, sites of religious or cultural significance, and sacred sites. The National Historic Preservation Act (NHPA) of 1966 (now Title 54 USC § 306108) is the primary Federal legislation which outlines the Federal Government’s responsibility to consider historic preservation. Other applicable cultural resources laws that could apply include, but are not limited to, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 USC 3001 et seq.), the Archaeological Resources Protection Act (ARPA), Advisory Council on Historic Preservation (ACHP) procedures outlined in the “Protection of Historic Properties” (36 CFR 800), and the Secretary of the Interior's Standards and Guidelines (FR 190: 44716–44742).

Section 106 of the NHPA requires the Federal government to take into consideration the effects of their actions on historic properties, defined as cultural resources that are listed or eligible for inclusion in the

National Register of Historic Places (National Register) and to allow the Advisory Council on Historic Preservation an opportunity to comment. The Section 106 process, outlined in the Federal regulations at 36 CFR Part 800, is a consultative process involving consultations with the State Historic Preservation Officer (SHPO), Indian tribes, and other interested parties. Although the Section 106 and NEPA processes are independent statutes, Reclamation uses the Section 106 process as its primary effort to identify cultural resources and to evaluate potential impacts as they apply to NEPA.

Native American Graves Protection and Repatriation Act

Much of the project will occur on land administered by USFWS and thereby triggering NAGPRA. NAGPRA requires Federal agencies and institutions that receive Federal funding to return Native American cultural items to lineal descendents of Indian tribes. Cultural items include human remains, funerary objects, sacred objects, and objects of cultural patrimony. NAGPRA also requires that Indian tribes be consulted whenever archaeological investigations encounter or are expected to encounter Native American cultural items or are unexpectedly discovered; all excavation or removal of such items must be done under procedures required by ARPA.

Indian Sacred Sites

Indian Sacred Sites are defined in Executive Order 13007 (May 24, 1996) as "any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." Federal lands potentially affected by the proposed project are the Merced NWR lands.

Other statutes, executive orders, regulations, and guidelines may be applicable to the proposed project depending on the Federal agencies involved, the nature of the permits or authorizations required, and whether or not cultural resources on Federal lands are affected.

National Register of Historic Places

The identification of historic properties, or cultural resources that have been listed or found eligible for listing in the NRHP, is outlined under 36 CFR Part 800.4. Criteria for evaluating the eligibility of cultural resources for listing in the NRHP may be found under NPS regulation 36 CFR 60.4. These criteria state that:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
>
> 1) That are associated with events that have made a significant contribution to the broad patterns of our history, or
>
> 2) That are associated with the lives of persons significant in our past, or
>
> 3) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or

4) That have yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting one or more of the above criteria, a cultural resource must also retain integrity to be considered eligible for listing in the NRHP. Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a Native American tribe to be eligible for inclusion in the NRHP.

State

California Environmental Quality Act

Under CEQA, historical resources are considered part of the environment, and a project that may cause a substantial adverse change to the significance of a historical resource is one that may have a significant impact on the environment. CEQA Guidelines (14 CCR Section 15064.5) define a historical resource as:

1) A resource listed or determined eligible for listing in the CRHR;

2) A resource included in a local register of historical resources, as defined in PRC Section 5020.1(k), or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or

3) Any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record (14 CCR Section 15064.5[a][3]).

If a lead agency determines that a cultural resource constitutes a "historical resource," the provisions of PRC Section 21084.1 and *CEQA Guidelines* Section 15064.5 would apply. If a cultural resource does not meet the *CEQA Guidelines* criteria for a historical resource, then the site may yet be regarded as a "unique" archaeological resource following the provisions of PRC Section 21083.

CEQA Guidelines note that if a resource is neither a unique archaeological resource nor a historical resource, the effects of a project on that resource shall not be considered a significant effect on the environment (Section 15064[c][4]). Human remains, including those interred outside formal cemeteries, are protected under several State laws, including PRC Section 5097.98 and Health and Safety Code Section 7050.5. Impacts include intentional disturbance, mutilation, or removal of human remains.

California Environmental Quality Act — Tribal Cultural Resources

AB 52, effective on July 1, 2015, amends CEQA and adds new sections relating to Native American consultation and certain types of cultural resources, Tribal Cultural Resources (TCRs). TCRs are either (1) sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe that is either on or eligible for inclusion in the CRHR or a local historic register; or (2) the lead CEQA agency (in this case, DWR), at its discretion and supported by substantial evidence, chooses to treat the resource as a TCR. Additionally, a cultural landscape may also qualify as a TCR if it meets the criteria to be eligible for inclusion in the CRHR and is geographically defined in terms of the size and scope of the landscape. Other historical resources (as described in California PRC 21084.1), a unique archaeological resource (as defined in California PRC 21083.2[g]),

or non-unique archaeological resources (as described in California PRC 21083.2[h]), may also be TCRs if they conform to the criteria to be eligible for inclusion in the CRHR.

AB 52 provides that a project with an effect that may cause a substantial adverse change in the significance of a TCR may have a significant effect on the environment. AB 52 requires the lead agency (in this case, DWR) to begin consultation with a California Native American Tribe that is traditionally and culturally affiliated with the geographic area of the project if the tribe requests the lead agency, in writing, to be informed by the lead agency through formal notification of projects that are proposed in that geographic area and the tribe subsequently requests consultation. California PRC Section 21084.3 states that "public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource."

Consultation with California Native American Tribes

Under PRC sections 21080.3.1 and 21082.3, the State must consult with tribes traditionally and culturally affiliated with the project area that have requested formal notification and responded with a request for consultation. The parties must consult in good faith. Consultation is deemed concluded when the parties agree to measures to mitigate or avoid a significant effect on a tribal cultural resource when one is present or when a party concludes that mutual agreement cannot be reached. Mitigation measures agreed on during the consultation process must be recommended for inclusion in the environmental document. AB 52 consultation with Native American Tribes is described in Section 5.1.3, "Native American Consultation."

California Register of Historical Resources

The CRHR is "an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). Criteria for evaluating the eligibility of prehistoric and historic period cultural resources for listing to the CRHR are based on NRHP criteria (PRC Section 5024.1[b]). Certain resources are determined to be automatically included in the CRHR, including California properties formally determined eligible for, or listed in, the NRHP; California Historical Landmarks from No. 770 onward; and California Points of Historical Interest that have been recommended by the State Historical Resources Commission for inclusion in the CRHR.

To be eligible for the CRHR, a resource must meet one or more of the following criteria:

1. It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

2. It is associated with the lives of persons important in our past;

3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

4. It has yielded, or is likely to yield, information important in prehistory or history.

If nominated for listing in accordance with 5024.1(f), the CRHR may include individual historical resources; historical resources contributing to the significance of a historic district; historical resources identified as significant in historical resource surveys; and historical resources and historic districts

designated or listed as city or county landmarks pursuant to any city or county ordinance, if the criteria for designation or listing under the ordinance is consistent with CRHR criteria.

For a cultural resource to be eligible for the NRHP and/or the CRHR, it must also retain integrity. Integrity is the ability to convey the resource's significance. These characteristics are expressed through integrity of location, design, setting, materials, workmanship, feeling, and association. It should be noted that a property found to retain insufficient integrity to be NRHP eligible may be found to possess sufficient integrity to be CRHR eligible.

Local

Merced County General Plan

The *2030 Merced County General Plan* (County of Merced 2013) states that archeological, historical, architectural, and Native American cultural resources and values must be considered in all phases of planning and subsequent development projects, including design, permitting, construction, and long-term maintenance.

3.6.3 Environmental Effects

The following sections describe the environmental consequences or impacts of the project on cultural resources. The methods used to assess environmental impacts to cultural resources, the criteria used to define potential adverse effects or significant impacts, and the environmental consequences and mitigation measures of each alternative are detailed below.

Assessment Methods

An assessment of effects/impacts to prehistoric and historic period cultural resources within the project area relied on information gathered through archival and records searches, inventory surveys, agency consultation, meetings with Native American tribes, and sensitivity analyses (Reclamation and DWR 2012). For each project component, the horizontal extent and depth of disturbance was considered in the assessment.

Significance Criteria

Criteria for assessing adverse effects or significant impacts to cultural resources are outlined in Federal (36 CFR Part 800.5) and State (PRC Section 5024.1) regulations.

Federal Criteria

The analysis of potential effects to historic properties employs the Criteria of Adverse Effect as developed by the ACHP in its regulations for the "Protection of Historic Properties" (36 CFR Part 800.5).

Examples of adverse effects are outlined under regulation 36 CFR Part 800.5(2) and may be summarized as follows:

- Physical destruction of or damage to all or part of a property;
- Alteration of a property (e.g., restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation) that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR Part 68) and applicable guidelines;

- Removal of the property from its historic location or alteration of the character of the property's use, physical features, or setting as they contribute to the property's historic significance;
- Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;
- Neglect of a property that causes its deterioration; and
- Transfer, lease, or sale of the property from federal ownership or control without adequate restrictions to ensure long-term preservation of the property's historic significance.

State Criteria

California regulations require that project impacts to cultural resources must be considered for resources listed in, or eligible for listing, in the CRHR (PRC Section 5024.1). Per PRC Section 21084.1, a "project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment." Substantial adverse change is defined under CEQA *Guidelines* (14 CCR Section 15064.5[b][1]) as "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired."

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 to cultural resources or TCRs.

Proposed Project (NEPA Analysis)

The Proposed Project has the potential to adversely affect one National Register-eligible property (Eastside Bypass and associated features) through modifications to the levees and control structures of the cultural resource. The Eastside Bypass is currently recommended as eligible for the NRHP under Criteria A and C. Contributing structures to the Eastside Bypass are the Eastside Bypass Control Structure, San Joaquin River Control Structure, Sand Slough Control Structure, and the levees that form the bypass. Non-contributing structures that do not appear eligible for the NRHP are the lower and upper USFWS weirs, earthen dam, dredge tailings, earthen ditch, and the concrete bridge. Additionally, one cultural resource (irrigation canal) was evaluated and recommended as not contributing to the significance of the Eastside Bypass and was evaluated as not eligible for the NRHP (Norby 2017).

Reclamation will initiate and continue Section 106 consultation with the SHPO and interested parties on direct and indirect effects to any historic properties, including the Eastside Bypass, and the resolution of any adverse effects, pursuant to 36 CFR Part 800.6. At this time, impacts to cultural resources cannot be fully determined, but will be completed prior to the final decision of this EA.

Indian Sacred Sites

Indian Sacred Sites are defined in Executive Order 13007 (May 24, 1996) as "any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the

existence of such a site." Federal lands potentially affected by the proposed project are the Merced NWR lands.

As part of cultural resources identification efforts, the NAHC was contacted on March 14, 2013. A request was made of the NAHC to conduct a search of their Sacred Lands File as well as to provide a list of Native American representatives who might have knowledge of cultural resources within the project area. The NAHC responded on March 25, 2013 that a search of their Sacred Lands File had failed to indicate the presence of Native American sacred sites in the project area. As a result of Reclamation's Tribal consultation effort, see Section 5.1.3, "Native American Consultation," no Sacred Sites have been identified through the consultation process.

There are no known Indian Sacred Sites on the Merced NWR. Since no known Indian Sacred Sites have been identified on Federal lands within the project area, there would be no direct, indirect, or cumulative impacts to Indian Sacred Sites from the proposed project. The proposed project would not have the potential to affect or prohibit access to any ceremonial use of Indian Sacred Sites. No further analysis is warranted.

Proposed Project (CEQA Analysis)

a) Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5? *(Less-than-Significant Impact)*

No Historical Resources/Historic Properties (i.e., resources previously identified either on or eligible for listing on the CRHR or NRHP, respectively) were identified during the records search or previous pedestrian surveys in the project area. However, three resources, P-24-001962 (Eastside Bypass/Levee and earthen dam, lower weir, dredge tailing, upper weir, earthen ditch, and concrete bridge), PL-SJRRP-FEAT-06 (portion of Mariposa Bypass/Levee and Control Structure), and PL-2823-11-01 (irrigation canal), are in the project area. DWR is not proposing modifications to PL-2823-11-01 (irrigation canal) and this irrigation canal is not discussed further in this analysis. DWR is treating the Eastside Bypass/Levee and associated features as a potentially historically significant district for the purposes of the CEQA impact analysis in this document. However, the only feature of that district that would be impacted by the proposed project is the Eastside Bypass levee. PL-SJRRP-FEAT-06 (portion of Mariposa Bypass/Levee and Control Structure) is being treated as potentially historically and individually significant for the purposes of the CEQA impact analysis in this document.

For the proposed project, DWR is responsible for reinforcing approximately 2 miles of the Eastside Bypass levee. Given the size of the Eastside Bypass and the contributing features, the proposed project would entail minor modifications to the levee, considered a contributing resource to the bypass. Improving the existing levees would not impact the levee's ability to convey its significance as a contributing resource. Its character-defining features (slope, crown, and shape) would be retained. Reinforcing approximately 2 miles would introduce a portion of new materials, but most of the levee's material (earth) would remain intact. It would keep integrity of location (it is not being moved); design (it will remain an earthen levee used for flood control purposes); setting (it is still in a rural area and levee improvements would not introduce new visual impacts to the setting); and feeling and association (it would retain its ability to provide a sense of its function). These six of the seven aspects of integrity are needed to convey its importance as an engineered structure and contributor to the Eastside Bypass district. This impact would be less than significant under CEQA.

The only portion of PL-SJRRP-FEAT-06 (portion of Mariposa Bypass/Levee and Control Structure) that is part of the proposed project is the modification to the Eastside Bypass Control Structure to improve fish passage. These modifications would not detract from the structure's ability to convey its significance. Its character-defining features would be retained (shape, number of bays, flood control gates) and would not result in a sufficient loss of the necessary aspects of integrity needed to explain its importance as an engineering feature. It would not be moved so integrity of location is retained. The removal of the boards would marginally impact its integrity of design and materials. There is enough of the structure not being altered such that there would be a minor loss of these aspects of integrity. The setting would not be changed because of the proposed project, and feeling and association would remain because the proposed project would continue to maintain its historic character. This impact would be less than significant under CEQA.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5? *(Less-than-Significant Impact)*

There is no evidence of the presence of buried archaeological sites in the project area. Without substantial evidence of an archaeological site, this impact would be less than significant. It is nevertheless possible that archaeological resources could be discovered during construction. In the event that archaeological resources are discovered during construction, DWR would implement Mitigation Measure CR-2a and CR-2b before and during project construction to reduce this potential impact under CEQA.

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.

Although potential impacts to unanticipated cultural resources is less than significant without mitigation, implementation of Mitigation Measures CR-2a and -2b would further reduce any potential impacts to unanticipated cultural resources under CEQA.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Impacts related to destroying a unique paleontological resource or site or unique geologic feature are discussed in Section 3.15, "Paleontological Resources."

d) Disturb any human remains, including those interred outside of dedicated cemeteries? *(Less-than-Significant Impact)*

Although no human remains have been discovered in the project area, earth-moving activities could result in damage to or destruction of previously unidentified human remains which could be present within the project site. Because there is no evidence of the presence of human remains in the project area, this impact would be less than significant. It is nevertheless possible that human remains could be discovered during construction. In the event that human remains are discovered during construction, DWR would implement Mitigation Measure CR-3 before and during construction to reduce this impact under CEQA.

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.

Implementation of Mitigation Measure CR-3 would reduce any potential impacts from inadvertent discovery of human remains. The impact remains a less-than-significant impact under CEQA.

e) Cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resources Code 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and

scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources code section 5020.1(k), or

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.
(*Less-than-Significant Impact)*

No TCRs have been identified in the proposed project area as a result of consultation with Tribes that are culturally or traditionally affiliated with the proposed project area or as a result of archaeological investigations. Because no TCRs have been identified in or near the proposed project area, there would be no impact to TCRs.

Although no TCRs have been identified, it is nevertheless possible that such resources could be discovered during construction. In the event that TCRs such as Native American archaeological sites, features, sacred places, or objects with value to a Tribe that is culturally or traditionally affiliated with the proposed project area are discovered during construction, Mitigation Measure CR-4 shall be implemented. Although tribal consultation is ongoing, the current assessment is that impacts would be less than significant without mitigation, but mitigation is provided nonetheless.

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.

Although potential impacts to TCRs are less than significant without mitigation, implementation of Mitigation Measure CR-4 would further reduce any potential impacts to unanticipated cultural resources under CEQA.

3.7 Environmental Justice

Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
VII. ENVIRONMENTAL JUSTICE – Would the project:					
a) Result in a disproportionately high and adverse effect on a minority or low-income population, which requires that the following three conditions be met simultaneously: 1) a minority or low-income population must reside in the affected area; 2) a high and adverse effect must exist; and 3) the effect on the minority or low-income population must be disproportionately high and adverse.	☐	☐	☐	☒	☐

3.7.1 Environmental Setting

Project-related construction and operations would occur in a rural agricultural area of Merced County, within the San Joaquin Valley. To characterize the environmental setting for environmental justice, data were evaluated to determine the geographic extent in which project-specific effects on proximate and adjacent minority and low-income populations could occur. The project area is located within U.S. Census Bureau Census Tract (CT) 9.01, which is composed of an area south of Merced that is roughly bounded by State Route 140 on the north, State Route 99 on the east, and the San Joaquin River on the west and south. By evaluating CT 9.01, the environmental justice analysis focuses on the smallest geographic area where U.S. Census data are available and has been applied to assess the effects specific to the populations in the vicinity of the project site. In addition, to provide a basis for comparing the localized study areas, environmental justice demographic data were evaluated for Merced County and the State of California.

Table 3.7-1 presents the racial and ethnic composition of CT 9.01, Merced County, and the State as a whole. As shown in **Table 3.7-1**, the Hispanic or Latino population in Merced County is greater than the corresponding population in the State as a whole. However, the Hispanic or Latino population in CT 9.01, where the project area is located, is substantially less than that of Merced County, and is not 50% greater than the State as a whole.

Table 3.7-2 presents the median household income, mean household income, proportion of unemployed individuals, and proportion of individuals living below the poverty threshold for CT 9.01, Merced County, and the State as a whole. The household incomes in CT 9.01, Merced County, and the State were all well above the poverty level in 2015.

Table 3.7-1. 2015 Demographic Characteristics

	Number of People (Percentage of the Total Population in Parentheses)		
	CT 9.01	Merced County	California
Population	4,072	268,455	39,144,818
Ethnicity[1]			
Hispanic or Latino	2,005 (49.2%)	156,110 (58.2%)	15,184,545 (38.8%)
White Alone, Not Hispanic	1,873 (46.0%)	77,568 (28.9%)	14,815,122 (37.8%)
Race[2]			
White	2,841 (69.8%)	154,331 (57.5%)	23,824,254 (60.9%)
Black/African American	129 (3.2%)	8,873 (3.3%)	2,277,229 (5.8%)
American Indian and Alaska Native	9 (0.2%)	1,519 (0.6%)	282,777 (0.7%)
Asian	71 (1.7%)	19,689 (7.3%)	5,548,936 (14.2%)
Native Hawaiian/Pacific Islander	0 (0%)	660 (0.2%)	157,554 (0.4%)
Some Other Race	829 (20.4%)	70,482 (26.3%)	5,300,297 (13.5%)
Two or More Races	193 (4.7%)	12,901 (4.8%)	1,753,771 (4.5%)
Total Minority[3]	**2,199 (54.0%)**	**190,887 (71.1%)**	**24,329,696 (62.2%)**

Notes: CT = census tract

[1] The term "Hispanic" is an ethnic category and can apply to members of any race, including respondents who self-identified as "White." The total numbers of Hispanic residents for each geographic region are tabulated separately from the racial distribution by the U.S. Census Bureau.

[2] A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic.

[3] Total Minority" is the aggregation of all non-white racial groups with the addition of all Hispanics, regardless of race, with the total for "While Alone, Not Hispanic" subtracted from the total population.

Source: U.S. Census Bureau 2015a, data compiled by CDM Smith in 2017.

Table 3.7-2. 2015 Income, Unemployment, and Poverty Characteristics

Geographic Area	Median Household Income	Mean Household Income	Unemployment Rate	Percent of Population Below Poverty Threshold
CT 9.01	$45,109	$84,059	9.9%	14.3%
Merced County	$41,997	$59,213	12.0	22.5%
California	$64,500	$91,757	7.3	11.3%

Note: CT = census tract

Source: U.S. Census Bureau 2015b, data compiled by CDM Smith in 2017

The data show that CT 9.01 and Merced County have a higher proportion of low-income residents (below the poverty threshold) and a higher unemployment rate as compared to the State as a whole. For the purposes of this analysis, areas where poverty levels are 50 percent greater than the State average of 11 percent (i.e., 22 percent or more of the population) would be considered meaningfully greater. Therefore, the percentages of the population below the poverty level in Merced County are meaningfully greater than the percentage of the general population in the State living in poverty.

3.7.2 Regulatory Setting

Federal

Executive Order 12898

The concept of environmental justice is rooted in the Civil Rights Act of 1964, which prohibits discrimination in Federally assisted programs, and Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* issued February 11, 1994. EO 12898 requires all Federal agencies to conduct "programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin." Section 1-101 of the EO requires Federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of programs on minority and low-income populations.

Council on Environmental Quality and U.S. Environmental Protection Agency Guidelines

According to CEQ's *Environmental Justice: Guidance under the National Environmental Policy Act* (1997) and EPA's *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis* (EPA 1998), the first step in conducting an environmental justice analysis is to define minority and low-income populations. The second step of an environmental justice analysis requires that a determination be made as to whether a "high and adverse" effect would occur. The CEQ guidance indicates that when determining whether the effects are high and adverse, agencies are to consider whether the risks or rates of effect "are significant (as that term is defined by the NEPA lead agency) or above generally accepted norms." The final step requires a determination as to whether the effect on the minority or low-income population would be "disproportionately high and adverse." Although none of the published guidelines define the term "disproportionately high and adverse," CEQ (1997) includes a non-quantitative definition stating that an effect is disproportionate if it appreciably exceeds the risk to the general population.

Identification of an area that is potentially affected by the project and contains a disproportionate amount of low-income or minority residents does not, by itself, constitute an environmental justice effect. Rather, an environmental justice effect would occur if the project would disproportionately affect a population that is made up of 50 percent or greater of either the minority or low-income categories. If the jurisdiction has a population of 50 percent or greater for either the minority or low-income categories or has a population meaningfully greater (50 percent or greater) than the minority or low-income population percentage in the general population of the regional area, it is identified for more detailed analysis.

State

California Government Code Section 65040.12

California Government Code (CGC) Section 65040.12(e), defines environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws, regulations, and policies." CGC Section 65040.12(a) designates the Governor's Office of Planning and Research (OPR) as the coordinating agency in State government for environmental justice programs.

Senate Bill 115

In 1999, the legislature passed and Governor Gray Davis signed into law California's first environmental justice law, Senate Bill (SB) 115 (Solis, Chapter 690, Statutes of 1999). It established a definition of "environmental justice" in the CGC and directed the California Environmental Protection Agency (CalEPA) to conduct its programs, policies, and activities and promote the enforcement of all its existing health and environmental statutes "...in a manner that ensures the fair treatment of people of all races, cultures, and income levels, including minority populations and low-income populations in the state." The bill also designated OPR as the lead agency for coordinating environmental justice programs and several of the State's environmental and planning programs. Further, SB 115 also directed CalEPA to ensure greater public participation in the development, adoption, and implementation of environmental regulations and policies, and to improve research and data collection. SB 115 provided the procedural framework for environmental justice in California.

Senate Bill 89

Shortly after the passage of SB 115, California enacted SB 89 (Escutia, Chapter 728, Statutes of 2000) to guide and assist CalEPA in the implementation of SB 115. The bill required the establishment of the CalEPA Interagency Working Group on Environmental Justice to assist CalEPA in "...developing an agency-wide strategy for identifying and addressing any gaps in existing programs, policies, or activities that may impede the achievement of environmental justice."

CalEPA adopted the Intra-Agency Environmental Justice Strategy in 2004. Pursuant to California Public Resources Code Sections 71110–71113, CalEPA developed this policy to support the state's goal of "achieving fair treatment of people of all races, cultures and incomes with respect to the development, adoption, implementation and enforcement of environmental laws and policies." Under SB 89, CalEPA is required to prepare a report to the Governor and Legislature every 3 years on the activities it has undertaken in achieving the objectives identified in the Intra-Agency Environmental Justice Strategy.

Local

There are no local plans, policies, regulations, or ordinances related to environmental justice that would apply to the proposed project.

3.7.3 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) Result in a disproportionately high and adverse effect on a minority or low-income population, which requires that the following three conditions be met simultaneously: a minority or low-income population must reside in the affected area, a high and adverse effect must exist, and the effect on the minority or low-income population must be disproportionately high and adverse? ***(No Impact)***

As shown in **Table 3.7-1**, the Hispanic or Latino population in Merced County is greater than the corresponding population in the State as a whole. However, the Hispanic or Latino population in CT 9.01, where the project area is located, is substantially less than that of Merced County, and is not 50% greater or meaningfully greater than the State as a whole.

As shown in **Table 3.7-2**, the household income levels are lower and percentages of population living below the poverty level in Merced County are higher than the State as a whole. However, the household income levels are higher, and the percentage of low-income population is substantially lower, in CT 9.01 as compared to Merced County. Furthermore, the population percentage below the poverty level in CT 9.01, Merced County, and the State does not exceed 50 percent, and the low-income population percentage in CT 9.01 is not meaningfully greater than either Merced County or the State.

Therefore, no disproportionately high and adverse effects on minority or low-income populations in CT 9.01 would occur, and there would be no impact. Even if the minority or low-income population was 50% greater or meaningfully greater than the State as a whole, the proposed project to improve fish passage and levee conditions would not disproportionately affect minority or low-income populations.

3.8 Geology and Soils

Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
VIII. GEOLOGY AND SOILS – Would the project:					
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☒	☐	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)	☐	☐	☒	☐	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐	☐
iv) Landslides?	☐	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial risks to life or property?	☐	☐	☒	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒	☐

3.8.1 Environmental Setting

Regional Geology

The proposed project is located in the Central Valley Geomorphic Province, which encompasses the Sacramento and San Joaquin Valleys. It is an alluvial plain about 50 miles wide and 400 miles long, stretching from Redding to just south of Bakersfield. Alternating marine and continental deposits of Tertiary age underlie much of the Central Valley Province. The San Joaquin Valley is a structural trough into which sediments have been deposited as much as 6 miles deep, and is drained by the San Joaquin River. A review of the geologic map of the San Francisco-San Jose Quadrangle (Wagner et al. 1991)

indicates that the project area is composed of the Modesto Formation. The Eastside Bypass levee and Dan McNamara Road are composed of artificial fill, underlain by the Modesto Formation.

Local Soils

A review of U.S. Natural Resources Conservation Service (NRCS 2016) soil survey data indicates that the project elements would be constructed in several soil types consisting primarily of clay and clay loam. Relevant characteristics of each soil are presented in **Table 3.8-1**.

Based on soil boring data obtained by DWR, the foundation soils in Reach O where levee improvements are proposed generally consist of 1–20 feet of 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 approximately 2–10 feet. The foundation clay soils are generally classified as low to medium plasticity and stiff to hard consistency. Shallow clay soils were observed in landside far field borings drilled near Stations 1366+00, 1375+00, and 1396+00 and in a crest boring near Station 1428+00. Shallow silty soils were observed in borings drilled near Stations 1375+00, 1447+00, 1465+00 and 1494+00.

Seismicity and Neotectonics

Both the Sierra and Central Valley geologic provinces are subject to minor tectonic activity because they are part of the Sierra Nevada microplate, which is a component of a broad tectonically active belt that accommodates motion between the North American plate to the east and the Pacific plate to the west. The nearest "active" fault (i.e., evidence of displacement during the Holocene epoch) is the Ortigalita Fault, located in the Coast Ranges to the west. The Ortigalita Fault runs in a northwest to southeast direction through the San Luis Reservoir, approximately 25 miles west of the project area (Jennings and Bryant 2010). Under the Alquist-Priolo Act, active faults are considered to have a relatively high potential for surface rupture. The Ortigalita Fault is zoned under the Alquist-Priolo Act (California Geological Survey [CGS] 2017). The Kings Canyon Lineament (i.e., a geologic fault or surface fracture that is interpreted based on aerial imagery) crosses Dan McNamara Road approximately 1 mile north of the Eastside Bypass. However, the Kings Canyon Lineament has not shown evidence of displacement in the last 1.6 million years (Jennings and Bryant 2010) and therefore is not zoned under the Alquist-Priolo Act.

The intensity of ground shaking depends on the distance from the earthquake epicenter to the site, the magnitude of the earthquake, and site soil conditions. Ground motions from seismic activity can be estimated by probabilistic method at specified hazard levels and by site-specific design calculations using a computer model. The CGS Probabilistic Seismic Hazards Assessment Model (CGS 2008) indicates there is a 1-in-10 probability that an earthquake will occur within 50 years that would result in a peak horizontal ground acceleration exceeding 0.238 *g* (where *g* is the percentage of gravity). This indicates that a relatively low level of seismic ground shaking would be anticipated in the project area.

A liquefaction risk exists throughout the Central Valley in areas where unconsolidated, Holocene-age sediments and a high water table coincide such as near rivers and in wetland areas.

Table 3.8-1. Project Site Soil Types and Characteristics

Soil Type	Shrink-Swell Potential[1]	Permeability[2]	Drainage Class	Wind Erosion Hazard[3]	Water Erosion Hazard[4]	NRCS Soil Limitations for Roads and Levees
Eastside Bypass Control Structure						
Rossi clay loam, strongly saline-alkali, 0 to 1 percent slopes	Moderate	Moderately low	Poorly drained	6	Moderate	N/A
Dan McNamara Road Crossing						
Rossi clay, moderately saline-alkali, 0 to 1 percent slopes	Moderate	Moderately low	Poorly drained	4	Moderate	Very limited: shallow depth to saturated zone, low bearing strength, high shrink swell potential, flooding
Merced National Wildlife Refuge Weirs and Groundwater Well						
Rossi clay loam, moderately saline-alkali, 0 to 1 percent slopes	Moderate	Moderately low	Poorly drained	6	Moderate	N/A
Rossi clay, strongly saline-alkali, 0 to 1 percent slopes	Moderate	Moderately low	Poorly drained	4	Moderate	N/A
Eastside Bypass Levee Improvements						
Fresno loam, slightly saline-alkali, 0 to 1 percent slopes	Low	Moderately high	Moderately well drained	6	Moderate	Very limited: soil piping, thin soil layer
Fresno loam, moderately saline alkali, 0 to 1 percent slopes	Low	Moderately high	Moderately well drained	6	Moderate	Very limited: soil piping, thin soil layer
Fresno loam, strongly saline-alkali, 0 to 1 percent slopes	Low	Moderately high	Moderately well drained	6	Moderate	Very limited: soil piping, thin soil layer
Pozo clay loam, slightly saline, 0 to 1 percent slopes	Moderate	Moderately high	Moderately well drained	6	Low	Somewhat limited: soil piping, thin soil layer
Pozo clay loam, moderately saline, 0 to 1 percent slopes	Moderate	Moderately high	Moderately well drained	6	Low	Somewhat limited: soil piping, thin soil layer
Rossi clay loam, moderately saline-alkali, 0 to 1 percent slope	Moderate	Moderately low	Poorly drained	66	Moderate	Very limited: shallow depth to saturated zone, soil piping

Notes: N/A = not applicable; NRCS = U.S. Natural Resources Conservation Service

[1] Based on percentage of linear extensibility; shrink-swell potential ratings of "moderate" to "very high" can result in damage to buildings, roads, and other structures.

[2] Based on standard NRCS saturated hydraulic conductivity (Ksat) class limits. Ksat refers to the ease with which pores in a saturated soil transmit water.

[3] Soils assigned to wind erodibility group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

[4] Based on the erosion factor "Kw whole soil," which is a measurement of relative soil susceptibility to sheet and rill erosion by water.

Source: NRCS 2016

3.8.2 Regulatory Setting

Federal

Clean Water Act

Section 402 of the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES) are applicable to the proposed project related to sediment loading as a result of construction activities. Descriptions of Section 402 of the CWA and NPDES are provided in Section 3.11, "Hydrology and Water Quality." Section 404 of the CWA provides that whenever any person discharges dredged or fill material into waters of the United States (e.g., streams, wetlands, lakes, bays) a permit is required from USACE. Compliance with CWA Section 404 permit requirements is discussed in Section 3.5, "Biological Resources - Vegetation and Wildlife."

Section 408 of the Rivers and Harbors Act

Section 14 of the Rivers and Harbors Act (commonly known as Section 408) provides that the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for the temporary occupation or use of any sea wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States. The intent and function of permits under Section 408 are to ensure that the function of flood protection systems is not modified. An examination of sediment transport is often a requirement during the permitting process. Compliance with Section 408 of the Rivers and Harbors Act is discussed in Section 3.5, "Biological Resources - Vegetation and Wildlife." Section 408 does not apply to the proposed project.

U.S. Army Corps of Engineers Engineering Manuals and Technical Letters

Several engineering manuals (EMs) prepared by USACE contain guidelines for design and construction of embankments, levees, and seepage berms. The primary USACE guidance is contained in EM 1110-2-1913, *Design and Construction of Levees* (USACE 2000). In addition, engineering technical letter (ETL) 1110-2-569, *Design Guidance for Levee Underseepage* (USACE 2005), ETL 1110-2-555, *Design Guidance on Levees* (USACE 1997), and Engineering Regulation (ER) 1110-2-806, *Earthquake Design and Evaluation for Civil Works Projects* (USACE 2016), contain guidance applicable to the proposed levee improvements. The proposed levee improvements were designed in accordance with these manuals and technical letters.

Federal Emergency Management Agency

For levees to be certified by FEMA as providing flood protection, evidence also must be provided that adequate design and operation and maintenance systems are in place to provide reasonable assurance that protection exists from a base flood (in the case of the proposed project, the Urban Levee Design Criteria [ULDC]). Specific requirements pertaining to amount of freeboard, closure devices, embankment protection from floods, embankment and foundation stability, settlement, interior drainage, operation plans, and maintenance plans are contained in 44 CFR Section 65.10. Additional information related to FEMA requirements is presented in Section 3.11, "Hydrology and Water Quality."

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act to reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program. To accomplish this goal, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was

substantially amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA), which refined the description of agency responsibilities, program goals, and objectives.

The mission of NEHRP includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk-reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRPA designates FEMA as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities. Other NEHRPA agencies include the National Institute of Standards and Technology, National Science Foundation, and U.S. Geological Survey.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Act (PRC Sections 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as Earthquake Fault Zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults. The proposed project would not be located within an Alquist-Priolo Earthquake Fault Zone.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) addresses earthquake hazards from nonsurface fault rupture, including liquefaction and seismically induced landslides. The act established a mapping program for areas that have the potential for liquefaction, landslide, strong ground shaking, or other earthquake and geologic hazards. The act also specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

National Pollutant Discharge Elimination System Permit

In California, the State Water Resources Control Board (SWRCB) administers regulations promulgated by EPA (55 CFR Section 47990) requiring the permitting of stormwater-generated pollution under the NPDES program. In turn, SWRCB's jurisdiction is administered through nine regional water quality control boards. The SWRCB and the regional boards have adopted specific NPDES permits for a variety of activities that have the potential to discharge wastes (including sediment) to waters of the State. Under these regulations, an operator must obtain a general permit through the NPDES Stormwater Program (stormwater general permit for construction activity, Order 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-006-DWQ) for all construction activities with ground disturbance of 1 acre or more. Compliance with the NPDES permit requires submittal to the Central Valley RWQCB of notices of intent to discharge, and implementation of stormwater pollution prevention plans (SWPPPs) that include best management practices (BMPs) to minimize erosion and degradation of water quality

during construction activities. Additional information related to FEMA requirements is presented in Section 3.11, "Hydrology and Water Quality."

Urban Levee Design Criteria

California Government Code (CGC) Sections 65865.5, 65962, and 66474.5 requires that levees and floodwalls in the Sacramento-San Joaquin Valley provide protection against a flood that has a 1-in-200 chance of occurring in any given year. The ULDC prepared by DWR (2012) provides engineering criteria and guidance for civil engineers in meeting the government code requirements, and offers this same guidance to civil engineers working on levees and floodwalls anywhere in California. The ULDC also provides engineering criteria and guidance for DWR's levee evaluations and designs for levee remediations.

Central Valley Flood Protection Board Standards

California Code of Regulations (CCR) Title 23, Division 1, Article 8, Sections 111–137 are the primary State standards applicable to the proposed levee improvements. These Central Valley Flood Protection Board (CVFPB) standards govern the design and construction of encroachments that affect all flood control works and floodways, and are used by CVFPB for the regulation of encroachments. The standards apply to any work within the limits of, or which can affect, any authorized flood control project or any adopted plan of flood control. These standards also provide the public with information needed to prepare and submit encroachment applications. Article 8 contains a list of the regulated streams in California and dates of the allowable periods when work in the streams may occur, and contains regulations related to the types of structures that may and may not be placed in floodways, along with associated permit requirements. In addition to levees, Article 8 also covers borrow and spoil materials, borrow excavation activities, and dams and related structures that are located within floodways or could affect flood control works.

Local

Merced County General Plan

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

- **Policy NR-3.1: Soil Protection.** Protect soil resources from erosion, contamination, and other effects that substantially reduce their value or lead to the creation of hazards.

- **Policy NR-3.2: Soil Erosion and Contamination.** Require minimal disturbance of vegetation during construction to improve soil stability, reduce erosion, and improve stormwater quality.

The *2030 Merced County General Plan* Health and Safety Element (Merced County 2013) identifies the following policies related to geology and seismicity that are applicable to the proposed project.

- **Policy HS-1.4: Ensure Earthquake Resistant Design**. Require earthquake resistant design for proposed critical structures such as hospitals, fire stations, emergency communication centers, private schools, high occupancy buildings, bridges and freeway overpasses, and dams that are subject to County permitting requirements.

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.

3.8.3 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) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i), ii), iii) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault, strong seismic ground shaking, or seismic-related ground failure, including liquefaction?
(Less-than-Significant Impact)

The nearest known active fault and the nearest fault zoned under the Alquist-Priolo Act is the Ortigalita Fault, approximately 25 miles west of the project area (Jennings and Bryant 2010, CGS 2017). Although the Kings Canyon Lineament is located approximately 1 mile from the proposed Dan McNamara Road culvert replacement, the fault has not shown any evidence of activity in the last 1.6 million years (Jennings and Bryant 2010). Therefore, surface fault rupture in the project area is unlikely. The CGS Probabilistic Seismic Hazards Assessment Model indicates there is a 1-in-10 probability that an earthquake will occur within 50 years that would result in a peak horizontal ground acceleration exceeding 0.238*g* (CGS 2008). This indicates that a relatively low level of seismic ground shaking would be anticipated in the project area. However, most of the project elements would be constructed in unstable, unconsolidated riverine sediments in areas where a high water table is present. Thus, there is a potential for liquefaction to occur.

All levee improvements would be designed based on the results of geotechnical engineering studies and would be required to comply with standard engineering practices for levee design. CVFPB standards are the primary State standards applicable to the proposed levee improvements; these are stated in Title 23, Division 1, Article 8, Sections 111–137 of the CCR. CVFPB standards direct that levee design and construction be in accordance with EM 1110-2-1913 *Engineering Design and Construction of Levees* (USACE 2000), the primary Federal standards applicable to levee improvements. CVFPB standards also require that an engineering analysis evaluating levee embankment and foundation stability be submitted for review along with the CVFPB permit application, and that the analysis must verify that the levee is adequately designed and will be constructed to remain stable under appropriate loading conditions. A geotechnical analysis must also be provided to CVFPB as part of the permit application package. Finally, the levee improvements must also comply with DWR's Urban Levee Design Criteria (DWR 2012). Because the design, construction, and maintenance of levee improvements must comply with the regulatory standards of USACE, CVFPB, and DWR, the design and construction of all levee modifications would meet or exceed applicable design standards for static and dynamic stability, seismic

ground shaking, liquefaction, subsidence, and seepage. Furthermore, design and construction of the Dan McNamara Road crossing improvements would occur in compliance with the *Merced County Improvement Standards and Specifications* (Merced County 2015), which are designed to reduce damage from geologic hazards. Therefore, this impact would be less than significant.

iv) Landslides? *(No Impact)*

Construction of the project elements would occur in areas that are topographically flat where there is no possibility of landslides; therefore, no impact would occur.

b) Result in substantial soil erosion or the loss of topsoil? *(Less-than-Significant Impact with Mitigation Incorporated)*

Operations of the proposed improvements to structures in the Eastside Bypass and the Eastside Bypass levee improvements could affect erosion to a negligible degree. Removing the Merced NWR weirs, modifying the Eastside Bypass Control Structure and Dan McNamara Road culverts, and improving the levees would have minimal effects on long-term erosion and would be less than significant. Potential erosion- and flood-related impacts from Restoration Flow releases were addressed in the SJRRP PEIS/R (SJRRP 2012, Draft PEIS/R pages 2-22 through 2-28, incorporated by reference) through implementation of the measures contained therein, including, "Closely Monitor Erosion and Perform Maintenance and/or Reduce Interim and Restoration Flows as Necessary to Avoid Erosion-Related Impacts." Reclamation is committed to implement erosion monitoring and management, including monitoring potential erosion sites, reducing Interim and Restoration Flows as necessary, and reporting ongoing results of monitoring and management actions to the Channel Capacity Advisory Group. Consequently, long-term operational impacts from any increases in channel erosion, sediment transport, and/or meander migration would be less than significant. (See also additional hydrologic impacts evaluated in Section 3.11, "Hydrology and Water Quality.")

Project-related construction activities involving soil disturbance, channel alteration, dredging, excavation, cutting/filling, and grading could result in an increased volume of, or an accelerated rate of soil erosion and sedimentation, to local surface waters. Furthermore, clearing vegetation (where necessary to construct the proposed elements) may also destabilize soils and result in inadvertent permanent soil loss. Soil particles may become dislodged and transported downstream during winter storm events or Restoration Flow releases. Loss of topsoil could also occur from wind erosion during summer. In addition, construction of the proposed project could result in erosion or sedimentation immediately upstream or downstream of the proposed facilities due to increased scour and increased backwater conditions. Therefore, this temporary construction-related impact would be potentially significant.

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

> **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.

The construction-related impact would be less than significant after mitigation because DWR and Reclamation would comply with Central Valley RWQCB NPDES permit requirements.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?
(Less-than-Significant Impact)

Most project elements would be constructed in unstable, unconsolidated riverine sediments in areas where a high water table is present. Therefore, some project elements would be subject to geologic hazards from construction in unstable soils. However, as discussed in item a) i) above, project-related engineering design and construction would comply with Federal and State requirements, which are designed to reduce damage from geologic hazards. Therefore, this impact would be less than significant.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial risks to life or property?
(Less-than-Significant Impact)

As shown in **Table 3.8-1**, most soils in the project area have a moderate to high shrink-well potential. However, as discussed in item a) i) above, project-related engineering design and construction would comply with Federal and State requirements, which are designed to reduce damage from geologic hazards. Therefore, this impact would be less than significant.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?
(No Impact)

The project would not require the development of wastewater disposal systems of any kind. Portable restrooms would be provided for construction workers. Thus, there would be no impact related to the ability of project area soils to support the use of septic systems.

3.9 Greenhouse Gas Emissions

Environmental Issue		Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
IX.	**GREENHOUSE GAS EMISSIONS– Would the project:**					
a)	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐	☐
b)	Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒	☐

3.9.1 Affected Environment

When sunlight reaches the earth's surface, shortwave energy heats the surface while longer-wave energy (infrared heat) is reradiated to the atmosphere. Greenhouse gases (GHGs) absorb this energy and trap the heat in the lower atmosphere.

Naturally occurring GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Synthetic GHGs include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). All of these GHGs, with the exception of water vapor, are targeted for reduction in Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006. Nitrogen trifluoride (NF_3) was not initially listed in AB 32 but was subsequently added to the list via legislation.

While CO_2 occurs naturally in the atmosphere, such human activities as burning coal, oil, gas, and wood move carbon from solid storage to its gaseous state, thereby increasing atmospheric concentrations.

Sources of CH_4 are both natural (through biological processes in low-oxygen environments) and artificial (through rice farming, cattle production, natural gas use, and coal mining). Sources of N_2O include agricultural and industrial processes, as well as vehicle emissions. HFCs and PFCs are synthesized compounds used as refrigerants or in manufacturing. SF_6 is a synthetic gas used in the electricity and magnesium industries. NF_3 is a chemical used in the manufacture of electronics.

The current global concentration of GHGs in the atmosphere is at unprecedented levels when compared with the past 800,000 years. Concentrations of CO_2, CH_4, and N_2O have increased greatly since 1750 (40 percent, 150 percent, and 20 percent, respectively) (Intergovernmental Panel on Climate Change 2014). The long-lived GHGs (CO_2, CH_4, N_2O, CFCs, HFCs, and SF_4) are considered to be the largest and most important anthropogenic driver of climate change. Among long-lived GHGs, CO_2 is responsible for 64 percent of *radiative forcing*, which refers to a change in the earth's radiative balance resulting from an imbalance between incoming solar radiation energy and outgoing thermal infrared emission energy. CH_4 contributes approximately 18 percent of total radiative forcing. To analyze the warming potential of GHGs, GHG emissions are typically quantified and reported as CO_2 equivalents (CO_2e).

Climate change refers to changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system over a long period of time. In California, observations of climate change include an increase in average annual air temperatures, a change in the trend toward more rain than snow, a change in runoff timing, an increase in extreme heat events, a decrease in winter chill times, a rise in sea level, and warmer conditions at higher elevations. Changes in climatic and environmental conditions can also strongly affect terrestrial, marine, and freshwater biological systems. Climate risk in the Sacramento River Hydrologic Region, within which the project area is located, includes stress on ecosystems and species resulting from increased temperatures, reduced reliability of water supplies caused by decreased snowpack storage, greater flood risks, and decreased water quality.

GHG Emissions Analysis

In May, 2012, DWR adopted the *Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan* (GGERP), which details DWR's efforts to reduce its GHG emissions consistent with EO S-3-05 and AB 32. DWR also adopted the initial study/negative declaration (IS/ND) prepared for the GGERP in accordance with the CEQA Guidelines review and public process. Both the GGERP and IS/ND are incorporated herein by reference (California Department of Water Resources 2012a; California Department of Water Resources 2012b). The GGERP provides estimates of historical (back to 1990), current, and future GHG emissions related to operations, construction, maintenance, and business practices (e.g., building-related energy use). The GGERP specifies aggressive 2020 and 2050 emission reduction goals and identifies a list of GHG emissions reduction measures to achieve those goals.

DWR specifically prepared its GGERP as a "Plan for the Reduction of Greenhouse Gas Emissions" for purposes of CEQA Guidelines Section 15183.5. Section 15183.5 provides that such a document, which must meet certain specified requirements, "may be used in the cumulative impacts analysis of later projects." Because global climate change, by its very nature, is a global cumulative impact, an individual project's compliance with a qualifying GHG reduction plan may suffice to mitigate the project's incremental contribution to that cumulative impact, to a level that is not "cumulatively considerable" (see CEQA Guidelines, Section 15064, Subdivision [h][3]).

Section 15064 further states that "[l]ater project-specific environmental documents may tier from and/or incorporate by reference" the "programmatic review" conducted for the GHG emissions reduction plan. "An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project" (CEQA Guidelines Section 15183.5, Subdivision [b][2]).

Section 12 of the GGERP outlines five steps that each DWR project must take to demonstrate consistency with the GGERP.

1. Analysis of GHG emissions from construction of the proposed project.

2. Determination that the construction emissions from the project do not exceed the levels of construction emissions analyzed in the GGERP.

3. Incorporation of DWR's project-level GHG emissions-reduction strategies into the design of the project.

4. Determination that the project does not conflict with DWR's ability to implement any of the "Specific-Action" GHG emissions-reduction measures identified in the GGERP.

5. Determination that the project would not add electricity demands to the State Water Project system that could alter DWR's emissions-reduction trajectory in such a way as to impede its ability to meet its emissions reduction goals.

Consistent with these requirements, Appendix A, "Air Quality and Greenhouse Gas Emissions Modeling Results and Consistency Determination," demonstrates that the proposed project would meet each of the required elements and would be consistent with the GGERP.

3.9.2 Regulatory Framework

Key policies, guidance, executive orders, regulations, and legislation regarding GHGs and climate change are summarized below. For additional information on air quality regulations, refer to Section 3.3, "Air Quality."

Federal

Federal Clean Air Act

At the Federal level, EPA administers the Clean Air Act (CAA). In 2007, the United States Supreme Court ruled that GHGs are "pollutants" under CAA. In 2009, EPA found, under Section 202(a) of the CAA, that six GHGs constitute a threat to public health and welfare, and that the combined emissions from motor vehicles cause and contribute to climate change. These findings serve as a prerequisite to any CAA regulations of GHG emissions from vehicles.

State

California's approach to addressing GHG emissions and climate change involves the passage of several pieces of legislation.

Executive Order S-3-05

EO S-3-05 included the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050 reduce GHG emissions to 80 percent below 1990 levels. The executive order directs the Secretary of the California Environmental Protection Agency to develop and lead a climate action team of State agency representatives and report on the progress made toward meeting the targets to the Governor and the Legislature.

Assembly Bill 32

AB 32 requires that GHG emissions in California be reduced to 1990 levels by 2020. To comply with AB 32, the California Air Resources Board prepared the AB 32 Scoping Plan, which lays out a GHG-reduction emission framework and identifies measures to meet the GHG emissions target. In May 2014, the *First Update to the Climate Change Scoping Plan* was released.

Senate Bill 97

In 2007, Senate Bill 97 required the Office of Planning and Research to develop amendments to the CEQA Guidelines that address the analysis and mitigation of GHG emissions. The California Natural

Resources Agency adopted the amendments to the CEQA Guidelines in 2010. Key points are summarized as follows:

- Lead agencies must analyze the GHG emissions of proposed projects and reach a conclusion regarding the significance of those emissions (see CEQA Guidelines Section 15064.4).
- When a project's GHG emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions (see CEQA Guidelines Section 15126.4[c]).
- Lead agencies may significantly streamline the analysis of GHGs on a project level by using a programmatic GHG emissions-reduction plan that meets certain criteria (see CEQA Guidelines Section 15183.5[b]). (Office of Planning and Research 2016.)

California Climate Adaptation Strategy

The California Natural Resources Agency updated its *2009 California Climate Adaptation Strategy* with *Safeguarding California: Reducing Climate Risk* in 2014. These policy guidance documents describe advances in climate science, climate risks, work done to date, and recommendations to manage climate risk.

Executive Order B-30-15

Per EO B-30-15, additional goals were set to reduce GHG emissions in California. By 2030, State agencies are further committed to reduce GHG emissions by 40 percent below 1990 levels and by 2050, reduce GHG emissions by 80 percent below 1990 levels.

Local

San Joaquin Valley Air Pollution Control District

The project area is located within Merced County and is regulated by the SJVAPCD. SJVAPCD is the local agency that is primarily responsible for controlling emissions from stationary sources. It also develops plans and implements control measures as required by State and Federal requirements. To assist lead agencies with analyzing GHG emission and climate change impacts under CEQA, SJVAPCD recommends two resources:

- *Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency* (SJVAPCD 2009a)
- *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* (SJVAPCD 2009b)

SJVAPCD has not adopted a quantitative threshold for evaluating the significance of GHG emissions; however, SJVAPCD's guidance document for San Joaquin Valley land-use agencies (2009b) would be most relevant for assessing GHG-related impacts from the proposed project. In this guidance document, SJVAPCD relies on the implementation of best performance standards (BPS), defined as the most effective achieved-in-practice means of reducing or limiting GHG emissions from a GHG emissions source, for evaluating a project's significance. Projects implementing BPS would be determined to have less-than-significant individual and cumulative impacts on global climate change. If a project does not implement BPS, then quantification of project-specific GHG emissions would be required. If project-related emissions would be reduced or mitigated by at least 29 percent compared to business-as-usual,

then the project would be determined to have a less-than-significant individual and cumulative impact for GHG.

Merced County General Plan

The 2030 Merced County General Plan (2013) does not include a standalone element for addressing climate change but rather incorporates goals and policies related to climate change throughout the plan. Key goals and policies that address GHG emissions and climate change include the following:

GOAL HS-6: Plan for the eventual impacts of climate change through adaptive management strategies and responses in order to mitigate climate change impacts while protecting the quality of life for current and future county residents.

- **Policy HS-6.1:** Development Restrictions in High Risk Areas – Prohibit development in areas that may be more severely impacted by climate change, including areas at high risk of wildfire or flooding, unless proper design mitigation is included in the project.
- **Policy HS-6.2:** Climate Change Monitoring and Adaptation – Prepare an analysis that monitors the impacts of climate change and use adaptive management to develop new strategies and modify existing strategies to respond to the impacts of climate change.
- **Policy HS-6.3:** New Agricultural Crops – Coordinate with University of California Cooperative Extension in efforts to identify new agricultural crop choices/varieties that accommodate a longer growing season and are resistant to heat, insects, and disease. Also, identify agricultural production methods, such as planting dates and irrigation methods, to adapt to changes in the climate.
- **Policy HS-6.4:** Public Health Facilities and Program – Support the expansion of public health facilities and programs that address increases in extreme weather events (e.g., heat waves) and reduced air quality.
- **Policy HS-6.5:** Early Warning System – Prepare and maintain an early warning system for disease outbreaks and extreme heat events.
- **Policy HS-6.6:** Emergency Planning – Support emergency planning for disease outbreaks and extreme weather events.
- **Policy HS-6.7:** Public Awareness – Support public awareness of water conservation measures, agricultural changes, storm and flood preparedness, forest/range fire protection, air quality issues, extreme weather events, and disease prevention.

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

- **Policy AQ-1.3:** Agricultural Operations Emission Reduction Strategies – Promote GHG emission reductions by encouraging agricultural operators to use carbon efficient farming methods (e.g., no-till farming, crop rotation, cover cropping); install renewable energy technologies; protect grasslands, open space, oak woodlands, riparian forest and farmlands from conversion to other uses; and develop energy-efficient structures.

- **Policy AQ-1.4:** CH_4 Digesters – Encourage large dairies to capture CH_4 through use of manure digester systems to generate an alternative source of energy, reduce GHG emissions, and serve as a source of profit for agricultural operations.

- **Policy AQ-1.5:** Climate Action Plan – Prepare a Climate Action Plan that includes an inventory of 1990 and 2010 GHG emissions, determines project air quality impacts using analysis methods and significance thresholds recommended by the SJVAPCD, and identify strategies to achieve State emission reduction targets.

- **Policy AQ-1.10:** Public Awareness – Increase public awareness about climate change and encourage county residents and businesses to become involved in activities and lifestyle changes that will aid in reduction of GHG emissions.

3.9.3 Environmental Effects

The proposed project could affect GHG emissions through construction activities, including off-road construction equipment and increased traffic from trucks and construction workers. Proposed project operations and maintenance activities would be negligible.

Construction emissions are described as temporary or "short term" in duration. These temporary and short-term emissions have the potential to represent a significant impact to GHG emissions and climate change. GHG emissions are caused by on- and off-road vehicle exhaust. Construction-related emissions were estimated using CalEEMod Version 2016.3.1. Appendix A, "Air Quality and Greenhouse Gas Emissions Modeling Results and Consistency Determination," provides detailed information on the emissions calculations resulting from proposed project construction.

SJVAPCD published *Guidance for Assessing and Mitigating Air Quality Impacts* (SJVAPCD 2015) to assist lead agencies with uniform procedures for addressing GHG and climate change impacts in environmental documentation. SJVAPCD does not establish a specific quantitative level of GHG emissions increase above which a project would have a significant impact on the environment. As a result, SJVAPCD uses a tiered approach for assessing the significance of a project based on the following criteria:

- Projects complying with an approved GHG emission reduction plan or GHG mitigation program that avoids or substantially reduces GHG emissions within the geographic area in which the project is located would be determined to have a less-than-significant individual and cumulative impact for GHG emissions.

- Projects implementing BPS would not require quantification of project-specific emissions. Such projects would be determined to have a less-than-significant individual and cumulative impact for GHG emissions.

- Projects not implementing BPS would require quantification of project-specific GHG emissions and demonstration that project-specific GHG emissions would be reduced or mitigated by at least 29 percent compared to business as usual.

The proposed project does not include the installation of any stationary sources that would be subject to the SJVAPCD's BPS provisions. The BPS classes are generally geared toward stationary source fossil fuel-combustion equipment like boilers, engines, and heaters. In addition, the proposed project does not

consist of "traditional" land use development projects like proposed residential, commercial, industrial, or governmental operations that primarily increase GHG emissions through energy consumption and vehicle miles traveled.

The South Coast Air Quality Management District (SCAQMD), which has regional air quality similar to SJVAPCD, has an approved quantitative threshold for GHG emissions of 10,000 metric tons CO_2e per year ($MTCO_2e$/year) (2015). Furthermore, SCAQMD requires that construction emissions be amortized over the lifetime of the project (assumed to be 30 years if unknown) and then added to operational emissions. The total emissions (operational plus amortized construction) are then compared to the 10,000 $MTCO_2e$/year threshold. SCAQMD considers this threshold to be adequate to capture GHG emissions increases above which could hinder implementation of the State's GHG reduction goals, including AB 32. Because of the inclusion of construction-related emissions in this quantitative threshold and the relationship with complying with an approved GHG emissions reduction plan (AB 32), SCAQMD's method of quantifying emissions and the associated significance threshold was used in this analysis.

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. However, other projects under the SJRRP have been implemented and will be implemented in the future. These projects were evaluated at a program level in the SJRRP Draft PEIS/R and are not evaluated herein as construction of the proposed project is not known to coincide with the construction of any other SJRRP project in the area.

Proposed Project

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? *(Less-than-Significant Impact)*

The proposed project would directly emit GHG emissions because of construction activities. Construction-related emissions were estimated for off-road construction equipment, on-road haul trucks and delivery vehicles, and construction worker commuting. As shown in Appendix A, "Air Quality and Greenhouse Gas Emissions Modeling Results and Consistency Determination," annual emissions in 2019 would equal 1,411 $MTCO_2e$/year. Assuming a 30-year project lifetime, amortized emissions would be 47 $MTCO_2e$/year.

Based on the analysis provided in the GGERP and the demonstration that the proposed project is consistent with the Inventory and Calculation of Greenhouse Gas Emissions (see Appendix A), DWR, as lead agency, has determined that the proposed project's incremental contribution to the cumulative impact of increasing atmospheric levels of GHGs would be less than cumulatively considerable and, therefore, less than significant. DWR would further reduce the proposed project's incremental contribution to the cumulative impact of increasing atmospheric levels of GHGs by implementing DWR's project-level GHG emissions-reduction best management practices (BMPs) for construction activities. Implementation of these BMPs would reduce GHG emissions from construction projects by minimizing fuel usage by construction equipment, reducing fuel consumption for transportation of construction materials, reducing the amount of landfill material, and reducing emissions from the production of cement.

Pre-Construction and Final Design BMPs

Pre-construction and Final Design BMPs are designed to ensure that individual projects are evaluated and their unique characteristics taken into consideration when determining if specific equipment, procedures, or material requirements are feasible and efficacious for reducing GHG emissions from the proposed project. The following BMPs will be evaluated to determine which would be appropriate for the proposed project and these BMPs would be implemented:

- **GHG 1.** Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project.

- **GHG 2.** Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.

- **GHG 3.** Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane or solar, to power generators to the maximum extent feasible.

- **GHG 4.** Evaluate the feasibility and efficacy of producing concrete on-site and specify that batch plants be set up on-site or as close to the site as possible.

- **GHG 5.** Evaluate the performance requirements for concrete used on the project and specify concrete mix designs that minimize GHG emissions from cement production and curing while preserving all required performance characteristics.

- **GHG 6.** Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours. Construction BMPs apply to all construction and maintenance projects that DWR completes or for which DWR issues contracts. All projects are expected to implement all construction BMPs unless a variance is granted by the Division of Engineering Chief, Division of Operation and Maintenance Chief, or Division of Flood Management Chief (as applicable) and the variance is approved by the DWR CEQA Climate 18 Change Committee. Variances will be granted when specific project conditions or characteristics make implementation of the BMP infeasible and where omitting the BMP will not be detrimental to the project's consistency with the GGERP.

Construction BMPs

Construction BMPs apply to all construction and maintenance projects that DWR completes or for which DWR issues contracts. All projects are expected to implement all Construction BMPs unless a variance is granted by the Division of Engineering Chief, Division of Operation and Maintenance Chief, or Division of Flood Management Chief (as applicable), and the variance is approved by the DWR CEQA Climate Change Committee. Variances will be granted when specific project conditions or characteristics make implementation of the BMP infeasible and where omitting the BMP will not be detrimental to the project's consistency with the GGERP:

- **GHG 7.** Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by California Code of Regulations, Title 13, Section 2485, the State's airborne toxics control measure). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.

- **GHG 8.** Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an air quality control plan prior to commencement of construction.

- **GHG 9.** Implement a tire inflation program on the job site to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an air quality management plan prior to commencement of construction.

- **GHG 10.** Develop a project-specific ride share program to encourage carpools, shuttle vans, transit passes, and/or secure bicycle parking for construction worker commutes.

- **GHG 11.** Reduce electricity use in temporary construction offices by using high-efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

- **GHG 12.** For deliveries to project sites where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box-type trailer is used for hauling, a SmartWay2 certified truck will be used to the maximum extent feasible.

- **GHG 13.** Minimize the amount of cement in concrete by specifying higher levels of cementitious material alternatives, larger aggregate, longer final set times, or lower maximum strength, where appropriate.

- **GHG 14.** Develop a project-specific construction debris recycling and diversion program to achieve a documented 50-percent diversion of construction waste.

- **GHG 15.** Evaluate the feasibility of restricting all material hauling on public roadways to off-peak traffic congestion hours. During construction scheduling and execution, minimize, to the extent possible, uses of public roadways that would increase traffic congestion.

The proposed project would result in a less-than-significant impact on GHG emissions without implementation of the GHG BMPs identified above. With implementation of the GHG BMPs identified above, the proposed project's less-than-significant impact with respect to GHG emissions would be further reduced.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases? *(No Impact)*

DWR's GGERP is in compliance with all applicable plans and policies. The proposed project is consistent with the GGERP. Therefore, there would be no impact.

3.10 Hazards and Hazardous Materials

Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
X. HAZARDS AND HAZARDOUS MATERIALS– Would the project:					
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☒	☐	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒	☐
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒	☐
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒	☐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☒	☐	☐	☐
i) Expose people to a substantial hazard through increased risk of exposure to disease vectors?	☐	☒	☐	☐	☐

3.10.1 Environmental Setting

The project area is predominantly agricultural in nature, with large tracts of land on either side of the Eastside and Mariposa Bypasses dedicated to cropland and agricultural infrastructure. Public health and safety issues associated with the agricultural character of the area include low-flying aircraft used for aerial spraying and the regular use, storage, and transportation of fuel, pesticides, herbicides, and fertilizers used for agricultural equipment and crops.

Other safety issues in the area are inherent to the landscape such as seismic and other geologic hazards, floods, and fire. In addition, there are anthropogenic hazards such as the storage, transport, and management of hazardous materials and waste not associated with agriculture. Many of these topics are covered in other dedicated resource sections, including Sections 3.3, "Air Quality"; 3.8, "Geology and Soils"; 3.11, "Hydrology and Water Quality" (including flood management); and 3.17, "Public Services" (including fire and police services).

The area of analysis for this section includes the construction sites associated with the proposed project, the public roads that access those sites, and routes that may be used to transport construction debris to area landfills. These areas would have construction and physical changes to the environment that may result in public health and safety concerns, including increased risk from disease vectors.

Finally, there are a number of invasive plant species that could require the use of glyphosate or imazapyr to control existing infestations and prevent the spread of the species during project activities. The use, storage, and disposal of these herbicides are regulated by numerous laws and regulations under Federal and State jurisdictions to minimize impacts on the public and the environment from exposure to the chemicals.

Solid Waste and Hazardous Materials

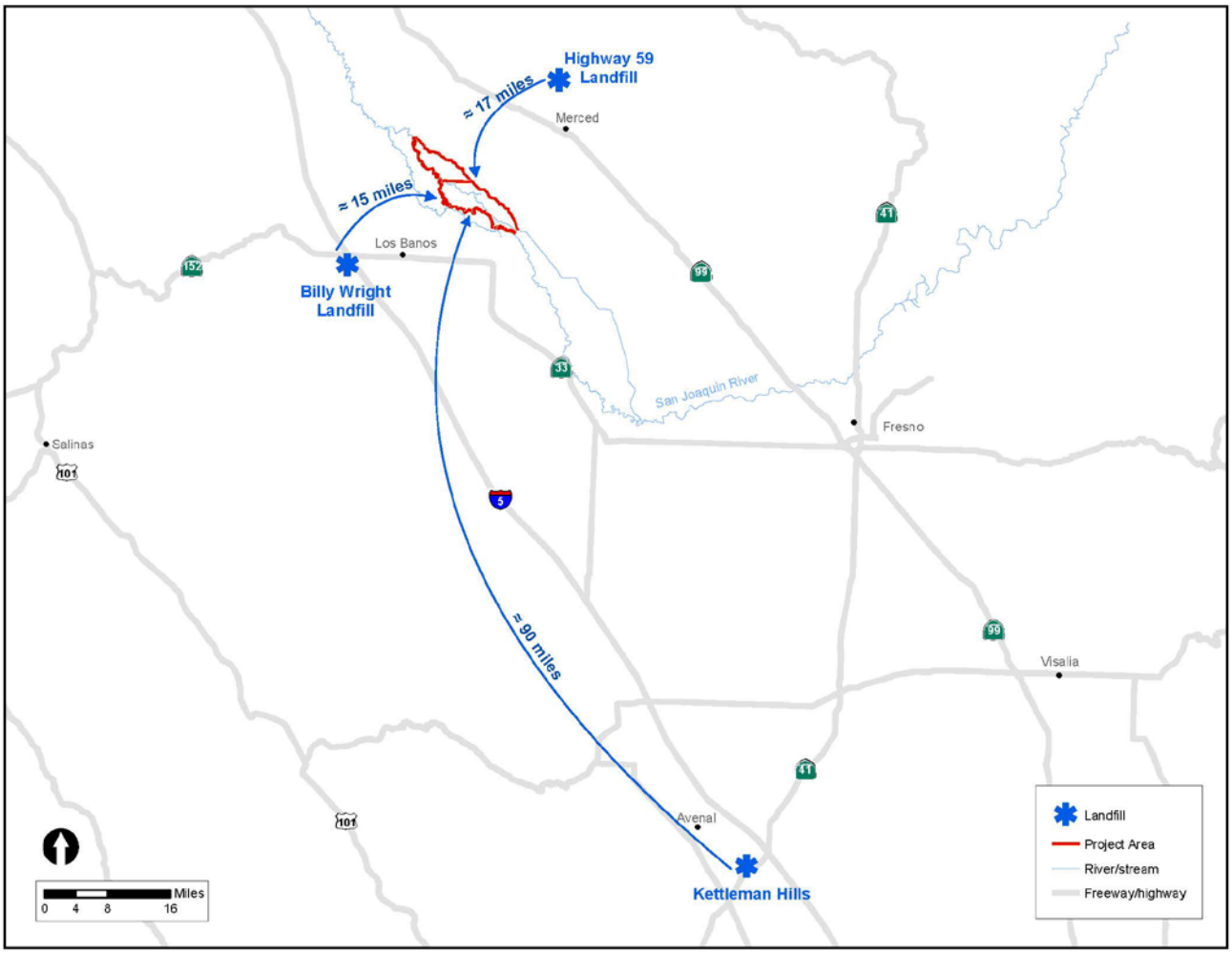
Hazardous waste is defined by California Health and Safety Code Section 25501 as "…any material that because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment."

Any hazardous waste found or generated during project construction would need to be disposed of in designated hazardous waste landfills. This would include treated wood waste, polychlorinated biphenyls (PCBs) present in transformers, pesticides, fuels and oils, and contaminated soils.

The Merced County General Plan shows no transfer stations for hazardous waste in the County although there are two solid waste disposal/landfill facilities owned and operated by the Merced County Regional Waste Management Authority (MCRWMA). These landfills, shown on **Figure 3.10-1** are the Highway 59 Landfill and the Billy Wright Landfill (County of Merced 2013).

The Highway 59 Landfill, located approximately 17 miles northeast of the study area, about 2 miles north of Bellevue and Highway 59 in Merced, collects construction waste, such as tree stumps, tires, or other materials. The Billy Wright Landfill, located approximately 15 miles southwest of the study area in Los Banos, accepts uncontaminated green waste, concrete, wood, and fill material.

Figure 3.10-1. Closest Landfills to the Project Area



Source: GEI Consultants, Inc., 2017

For any large volumes of contaminated soil or other hazardous materials that could be found but are not expected, the Chemical Waste Management Kettleman Hills Facility, approximately 100 miles south of the project area, would be used, depending on the type of contamination and volume of material. This is a commercial hazardous waste treatment, storage, and disposal facility regulated and permitted by EPA and the State of California. EPA regulates the handling, storage, and disposal of PCB waste, while the State regulates the handling and disposal of other hazardous wastes (EPA 2016).

Although the project area is predominantly agricultural in nature, the built environment in and surrounding the project area may have been previously affected by hazardous substances. Those sites were identified using the services of Environmental Data Resources (EDR), a company that provides database searches of sites that may have existing contamination or releases of pollutants that are listed on relevant agency databases. This section includes a discussion of known contamination in the project area, based on EDR's report of its database review.

Government agency records were reviewed for records of contamination in the project area. Because regulated facilities may impact other properties, it is also necessary to review governmental records for the surrounding area. EDR (2017) presents maps of potential historical contamination sites within 1 mile of the project area. The EDR report lists all databases searched and information found.

A review of applicable regulatory agency documents, lists of known or potential hazardous waste sites or landfills, and properties or facilities currently under investigation for potential environmental violations, was conducted to identify properties or facilities that may have the potential to adversely affect environmental conditions at the subject property. EDR used a 1-mile search radius around the entire Reach 4B/ESB Project area boundary (much larger than the Eastside Bypass Improvements Project area) to perform a computerized search of Federal, State, local, and Native American tribal databases for sites with environmental filings. These sites are shown as "listed sites" and are described in detail in EDR (2017). Five listed and mapped sites are located within 1 mile of the larger Reach 4B/ESB Project area. Each site may be listed in more than one database.

Unmapped sites are sites identified in the EDR report that are not mapped because of inadequate or erroneous geocode information. Such sites are designated as "orphan sites" by EDR. The EDR database report identified 90 orphan sites in the larger Reach 4B/ESB Project area. Because of the irresolvable geocode information and the length of the orphan list, a determination cannot be made regarding whether the orphan sites identified are within the 1-mile search radius, and the orphan list was therefore not reviewed.

In addition to the EDR report, separate database searches were conducted on the GeoTracker website maintained by SWRCB and the EnviroStor website maintained by the California Department of Toxic Substances Control (DTSC). Two additional sites were identified through these searches. The details regarding the sites identified through these database searches are summarized below.

There are two hazardous materials sites identified by Merced County near the project area (DTSC 2016). These sites are both associated with military activities. The Castle Radio Beacon Annex is located just south of Sandy Mush Road at the north side of the Merced NWR, and the Potter Auxiliary Field 5 site (not in the EDR report) is located approximately 2.5 miles east of the southeast end of the refuge, just north of West El Nido Road, as shown on **Figure 3.10-2**. Both sites are impaired for lead contamination. DTSC made "no further action" determinations for the Potter Auxiliary Field in 2005 and for the Castle Radio Beacon Annex site in 2016. There is no active cleanup or management at these sites.

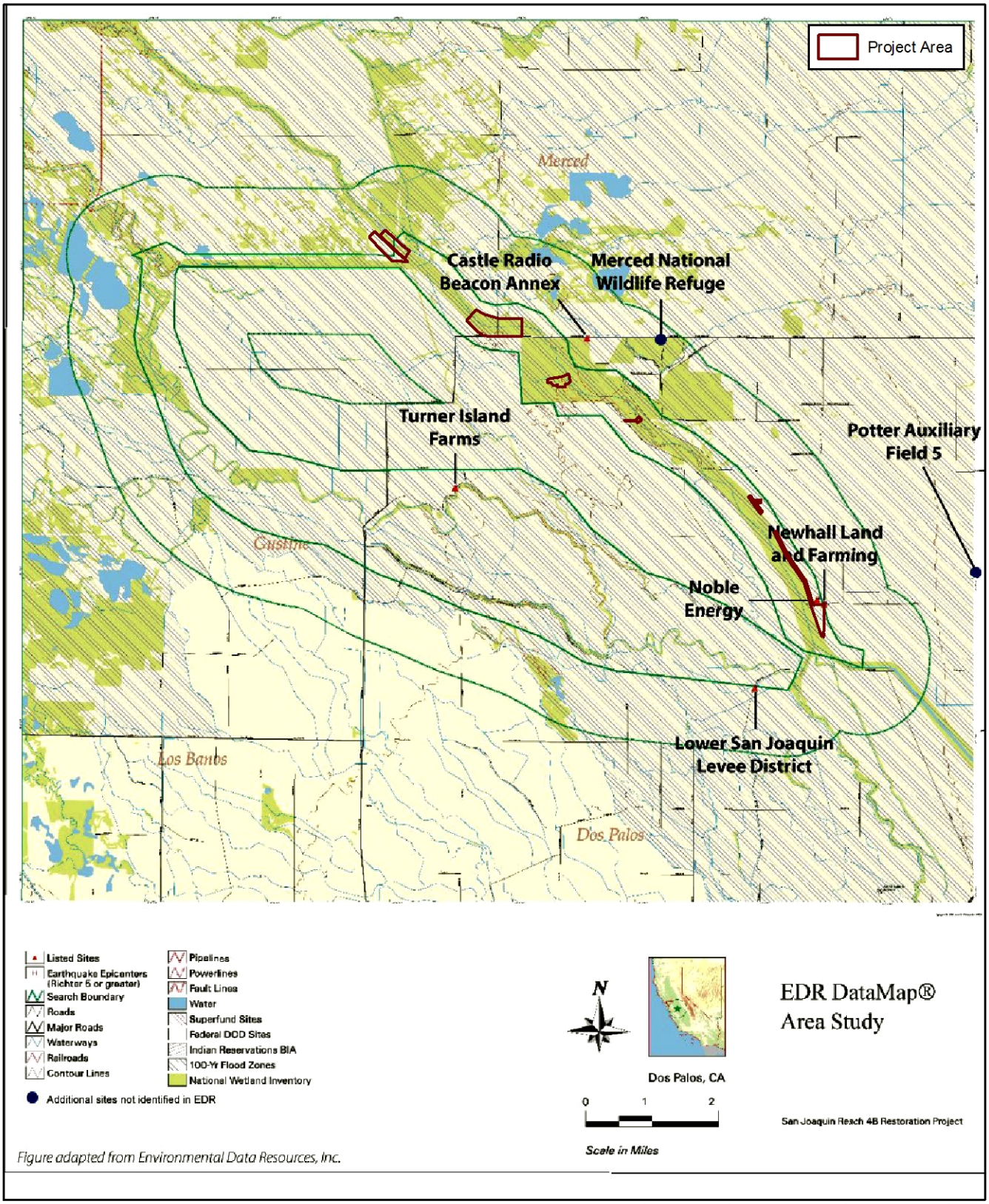
Five other sites were identified within 1 mile of the larger Reach 4B/ESB Project area in a search of environmental database records that identify potentially hazardous materials sites such as leaking underground storage tanks, injection wells, and fuel storage sites.

Two of the sites, Turner Island Farms on West Erreca Road and the Lower San Joaquin Levee District office on Indiana Avenue, are permitted to store small amounts of diesel fuel and hazardous materials. These are active operations that use diesel, gasoline, and engine oil and are not remediation sites (DTSC 2016).

A third site, Newhall Land and Farming located on El Nido Road east of the project area, is also a permitted fuel storage site. It appeared on the Leaking Underground Storage Tank (LUST) database for a gasoline leak that was reported and stopped in 1950. The cleanup case was closed in 2001 (DTSC 2016).

The LUST database also included a diesel spill at the Merced NWR. The leak was discovered during a tank closure and was stopped in 1995. The cleanup case was closed in 1998 (GeoTracker 2017).

Figure 3.10-2. Hazardous Materials Sites in the Project Area



Z:\Projects\1611277_Flood\1702\1611277_1702_G001_HazmatSites.mxd
03Aug2017 RS

Source: GEI Consultants, Inc. 2017

The final site identified in the database search is an underground control injection well that is owned by Noble Energy and located near the Newhall Land and Farming site on the east side of the Eastside Bypass. It is unknown if this is an active well or if it has been decommissioned (DTSC 2016).

In addition, areas currently or historically used for agricultural purposes are likely to have received pesticide, herbicide, and fertilizer applications.

Invasive Species Control

There are four high priority invasive vegetation species in the project area that are spread by water and that could require herbicide use if they are encountered (Reclamation 2012). These are:

- Red sesbania (*Sesbania punicea*)
- Salt cedar (*Tamarix* sp.)
- Giant reed (*Arundo donax*)
- Chinese tallow (*Sapium sebiferum*)

The species are easily transferred from one site to another during high flows and quickly colonize river bars and exposed soil. They can compromise and reduce salmonid habitat quality by stabilizing spawning gravel, choking river channels, or degrading habitat for insects that provide food for migrating fish. Due to these characteristics, controlling the existing infestations and preventing new ones is a high priority for SJRRP and could justify the use of herbicides in areas disturbed by project construction.

Herbicides would be used only on larger infestations of the target species. Sesbania would be sprayed with a glyphosate formulation approved for aquatic applications. Giant reeds would be treated with the same glyphosate mixture, but it would be applied directly to the stalks. Salt cedar would be treated using imazapyr or other chemical controls. Larger Chinese tallow would be cut down, and the stumps would be treated via spray with glyphosate while seedlings and saplings would be directly treated via injection with glyphosate.

Herbicide use is governed in the State by the California Department of Pesticide Regulation (CDPR). CDPR monitors the use of pesticides from farm fields to the grocery shelf to assure the safety of workers and the public. All instructions, restrictions, use limitations, and disposal/spill remediation methods described on each herbicide label must be followed. In addition, all rules, regulations, best practices, and restrictions as imposed by CDPR would be followed during herbicide application. On the Merced NWR, a USFWS pesticide use permit will be required.

Vector Control

Disease vectors found in the project vicinity include West Nile virus, Hantavirus, and Valley Fever. These diseases could expose construction workers and the public to health hazards.

West Nile virus – West Nile virus is an illness caused by a virus usually spread by infected mosquitos. Most commonly, mosquitoes become infected by feeding on infected birds; the virus is not contagious and cannot be transmitted through casual contact with an infected person or animal. According to the Mayo Clinic (2015b), most infected people will not have any symptoms, and 20 percent of people, who do get sick, will develop flu-like symptoms (e.g., fever, headache, fatigue, body aches, vomiting, diarrhea, and rash). In most people, the symptoms will go away on their own, but in severe cases (less than 1 percent of infected people), they could develop into a serious neurological infection, including

encephalitis or meningitis, that can linger for weeks or months and require hospitalization (Mayo Clinic 2015b).

The California Department of Public Health (CDPH) reported 2,765 cases in California from 2003 to 2008 (CDPH 2010). Local and State public health and vector control agencies, such as mosquito abatement districts, implement controls to prevent outbreaks of West Nile virus. In Merced County, the mosquito abatement district is the Merced County Mosquito Abatement District (MCMAD), although it does not operate on the refuge.

Hantavirus – Rodents can spread Hantavirus through bites, scratches, and their waste. Hantavirus infections can lead to Hantavirus Pulmonary Syndrome (HPS). Symptoms of HPS are fever, headaches, stomach problems, muscle aches, dizziness, and chills and can develop to shortness of breath and fluid filling the lungs. HPS can be fatal and requires immediate medical attention (Center for Disease Control 2017).

Valley Fever – Valley Fever (*coccidioidomycosis* or "cocci") is an illness caused by a fungus found in the soil of some areas of the southwestern United States, including many areas of the San Joaquin Valley. The illness can be contracted by breathing in dirt or dust contaminated with fungal spores; it is not contagious and cannot be transmitted from one person or animal to another (CDPH 2017). It infects the lungs and can cause flu-like symptoms (e.g., fever, cough, chest pain, chills, headache, fatigue, joint aches, and rash) within 1 to 3 weeks after exposure. In most people, the infection is mild and will go away on its own, but severe cases could develop into a chronic form of pneumonia (Mayo Clinic 2015a). According to the CDPH, about 60 percent of infected people will not get sick, and most people who do get sick and fully recover are protected from getting Valley Fever again. Construction activities, including grading and construction vehicle traffic, could generate fugitive dust and expose construction personnel and the public to potential health hazards associated with Valley Fever. Extended periods of high heat or unusually windy conditions could increase fugitive dust and the resulting potential for exposure to Valley Fever.

3.10.2 Regulatory Setting

Federal

Hazardous materials, substances, and waste are regulated under various Federal laws, including the following:

- Resource Conservation and Recovery Act (RCRA) (42 United States Code [USC] Section 6901 et seq.)
- Hazardous Material Transportation Act (49 USC Sections 1801–1819 and 49 CFR Parts 101, 106, 107, and 171–180)
- Clean Air Act (42 USC Section 7400 et seq.)
- Clean Water Act (33 USC Section 1251 et seq.)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (43 USC Section 9601 et seq.)
- Superfund Amendment Reauthorization Act Title 3

- 40 CFR, Parts 260 to 279, hazardous waste management
- Emergency Planning and Community Right to Know Act (40 CFR Parts 350 to 372)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 USC Section 136 et seq. and 40 CFR Parts 152 to 171)
- Federal Food, Drug, and Cosmetic Act (FFDCA)
- Food Quality Protection Act of 1996 (FQPA)
- Safe Drinking Water Act (42 USC Section 300(f) et seq.)
- Toxic Substances Control Act (15 USC Section 2601 et seq.)
- Occupational Safety and Health Act (29 USC Section 661 et seq.)

Under RCRA, EPA regulates the generation, transportation, and disposal of hazardous wastes. RCRA requires permits for the treatment, storage, and/or disposal of hazardous wastes and tracks the wastes from generation to disposal. EPA delegates some of this authority, such as permitting, to individual states.

The U.S. Department of Transportation regulates transportation of hazardous materials through the Hazardous Material Transportation Act. Transporting hazardous materials requires special handling, packaging, placarding, and manifesting of cargoes. Various laws, including the Superfund Amendment Reauthorization Act and Hazardous Material Transportation Act, govern day-to-day management of hazardous materials. These laws define the requirements for storage of hazardous materials, safe handling practices, and employee training.

State

The California Health and Safety Program is a Federally certified, State-operated occupational safety and health program. The Occupational Safety and Health Standards Board is required to adopt reasonable and enforceable standards that are at least as effective as Federal standards within 6 months of the effective date of any Federal regulations. The Occupational Safety and Health Standards Board is also responsible for reviewing applications for variances and responding to petitions regarding new or revised standards. All work conducted in the State must comply with agency rules and regulations or the conditions of specific variances. The California Health and Safety Program standards are Federally recognized and act in lieu of the adopted Federal standards.

The California Integrated Waste Management Board is charged with managing solid waste in the State. CCR Title 14, Chapter 3 addresses minimum standards for solid waste handling and disposal. The primary California law regulating activities involving solid waste is the California Integrated Waste Management Act (Assembly Bill 939), also known as the Recycling Act. This law, passed in 1989, established specific solid waste diversion goals for cities and counties based on the volume of waste generated in the 1990 baseline year. Each city and county was required to divert 25 percent of its solid waste from landfill disposal, through source reduction, recycling, and composting, by the end of 1995 and to divert 50 percent of its waste streams by the year 2000.

DTSC and the Regional Water Quality Control Boards (RWQCBs) are the State agencies primarily responsible for regulating hazardous materials in California. DTSC is responsible for managing hazardous substances and overseeing the investigation and remediation of contaminated sites. Per the Porter-Cologne Act (California Water Code Section 13000 et seq.), SWRCB and RWQCBs regulate water quality through oversight of water monitoring and contamination cleanup and abatement. RWQCBs are primarily responsible for protecting the quality of the waters of the State for present and future beneficial uses. The Central Valley RWQCB, which has jurisdiction in the proposed project area, has adopted two Basin Plans that contain the water quality standards for the Central Valley Region and the implementation programs and policies to achieve these standards.

According to the California Government Code (Section 65962.5), DTSC is required to compile and update lists of hazardous materials sites, including land designated as hazardous waste sites and hazardous waste disposals on public lands. Similarly, SWRCB is required to compile and update hazardous materials site lists, including underground storage tanks for which an unauthorized release report is filed and solid waste disposal facilities from which there is a migration of hazardous wastes.

SWRCB also adopted the anti-degradation policy (Resolution 68-16), which states that whenever the existing quality of water exceeds the quality necessary to maintain present and potential beneficial uses of the water, existing water quality must be maintained. This policy pertains to both surface waters and groundwater of the State.

The primary laws and regulations pertaining to hazardous materials in California include the following:

- California Hazardous Waste Control Law, California Health and Safety Code, Division 20, Chapter 6.5 – This state legislation is the basic hazardous waste statute in California and is administered by DTSC. Similar to but more stringent than RCRA, this law applies to a broader range of hazardous wastes and requires recycling and waste reduction programs.

- Carpenter-Presley-Tanner Hazardous Substances Account Act, California Health and Safety Code, Division 20, Chapter 6.8 – This legislation authorizes DTSC and RWQCB to require and oversee the investigation of sites where contamination of soil and water present a hazard to human health or the environment. This legislation also authorizes DTSC and RWQCB to recover costs for the remediation of the sites, if necessary.

- Unified Hazardous Waste and Hazardous Materials Management Regulatory Program – Under this program, local agencies were designated by CalEPA as Certified Unified Program Agencies (CUPAs). The CUPA with local jurisdiction over the area of analysis is the Merced County Public Health Department.

Local

The CUPA provides regulatory oversight of investigations and cleanups at sites and manages hazardous substances (including heavy metals, pesticides and herbicides).

The 2030 Merced County General Plan addresses hazardous materials and waste by setting a goal to "protect Merced County residents, visitors, and property through providing for the safe use, storage, transport, and disposal of hazardous materials and wastes" (County of Merced 2013).

MCMAD provides areawide extermination of mosquitoes, flies, and other insects to prevent mosquito-borne disease by spraying and providing public education (MCMAD 2017).

3.10.3 Environmental Effects

The evaluation of impacts to public health and hazardous materials primarily focuses on the extent to which the proposed project could create hazardous conditions during construction by disturbing existing hazardous materials sites, releasing construction-related hazardous material, or exposing the public to hazardous materials during the transport of contaminated soil or other materials from the project construction sites to offsite disposal facilities.

The impact assessment also considers the operation of private airstrips and/or small aircraft for aerial spraying on agricultural fields, impacts related to conflicts with emergency response actions, and potential impacts from wildland fires, herbicides, and disease vectors.

No Action Alternative

Under the no action alternative, there would be no construction activities in the project area and thus no activities involving hazardous materials or waste. There would be no impact.

Proposed Project

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?
(Less-than-Significant Impact)

The project would not cause any unusual risks associated with the transport and handling of hazardous materials. However, project construction could include the use of hazardous materials in varying amounts during construction and operation/maintenance activities, including fuels (gasoline and diesel), oils and lubricants, and cleaners (which could include solvents and corrosives in addition to soaps and detergents) commonly used in construction projects. Construction workers and others could be exposed to hazards and hazardous materials as a result of improper handling or use, transportation accidents, fires, explosions, or other accidental release. Operations and maintenance activities would be relatively minor and impacts would be negligible.

The use, storage, and transport of hazardous materials are regulated by Federal, State, and local agencies, and compliance with relevant laws is required during project construction and operation. Transportation of hazardous materials on area roadways is regulated by the CHP and Caltrans. Hazardous materials regulations, which are codified in CCR Titles 8, 22, and 26, and their enabling legislation set forth in the California Health and Safety Code (§ 25100 et seq.), were established at the State level to ensure compliance with Federal regulations to reduce the risk to human health and the environment from the routine use of hazardous substances. These regulations must be implemented, as appropriate, and are monitored by the State (e.g., Cal/OSHA in the workplace, DTSC for hazardous waste, and California Air Resources Board for lead) and/or local jurisdictions (i.e., Merced County Department of Environmental Health). All construction would be required to comply with CalEPA's Unified Program; regulated activities would be managed by Merced County Department of Environmental Health in accordance with their Unified Program (e.g., hazardous materials release response plans and inventories, and California Uniform Fire Code hazardous material management plans and inventories). Such compliance would reduce the potential for accidental release of hazardous materials during construction and improvement activities. As a result, compliance with Merced County's Unified Program would lessen the risk of exposure of construction workers and others to accidental release of hazardous materials.

Workplace regulations addressing the use, storage, and disposal of hazardous materials included in CCR Title 8 also would apply to project construction. Compliance with these regulations would be monitored by a local agency, such as Merced County Department of Environmental Health when they perform inspections for flammable and hazardous materials storage. Other mechanisms in place to enforce the Title 8 regulations include compliance audits and reporting to State and local agencies. Implementation of the workplace regulations would further reduce the potential for hazardous materials releases during project construction and improvement activities.

The project would implement and comply with Federal, State, and local hazardous materials regulations monitored by the State (e.g., Cal/OSHA, DTSC, CHP) and/or local jurisdictions (e.g., Merced County Department of Environmental Health); therefore, impacts related to creation of substantial hazards to the public through routine transport, use, disposal, and risk of upset during project construction activities would be less than significant.

Aerial spraying could be affected by the presence of construction equipment and workers on the site, reducing the effectiveness of the flights. Spraying could occur while the construction workers are on site, exposing them to herbicides, pesticides, and low-flying aircraft. Herbicides, including glyphosate and imazapyr, may also be used to control the four priority invasive plant species (red sesbania, salt cedar, giant reed, and Chinese tallow). Existing small sites would be removed manually using hand tools or other mechanical means to remove the stalks and root structure.

Land uses near the project area consist of agricultural uses, and recreational uses including environmental interpretation and education, hiking, hunting, and wildlife viewing/nature observation. Agricultural workers and recreational visitors could be exposed to herbicides directly during application and indirectly after application. In addition, spray application of herbicides may migrate from the original application area into nearby surface water bodies through wind or erosion. Surface water is used by major water suppliers and water users, irrigation districts and national wildlife refuges areas. Workers could be exposed to herbicides while mixing, loading, or applying herbicides, and when entering a treated site.

Because the project would implement measures to comply with Federal, State, and local hazardous materials regulations, construction-related impacts related to creation of substantial hazards to the public through routine transport, use, disposal, and risk of upset would be less than significant.

Although these impacts would be less than significant, DWR and Reclamation would implement the following mitigation measures during construction to further reduce these potential impacts from any hazardous spills, exposure of workers to nearby aerial spraying, and/or herbicide use.

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.

Implementation of Mitigation Measures HAZ-1a, -1b, and -1c would reduce any potential impacts from any hazardous spills, exposure of workers to nearby aerial spraying, and/or herbicide use because exposure risks would be minimized. The potential impacts would remain less than significant with implementation of these mitigation measures.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?
(Less-than-Significant Impact with Mitigation Incorporated)

Construction areas are not located within known hazardous materials sites, as shown in **Figure 3.10-2**, and a preliminary database search concluded that there were no known hazardous material sites in the immediate project area. However, there is potential to encounter pesticides, herbicides, fertilizers, and petroleum hydrocarbons in agricultural soils. Construction workers and others could potentially be exposed to previously unknown hazardous sites that are encountered during project construction. This construction-related impact would be potentially significant.

DWR and Reclamation would implement the following mitigation measure prior to construction to reduce these potential impacts.

> **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.

Implementation of Mitigation Measures HAZ-2 would reduce any potential impacts from any existing hazardous sites on the project site. The potential impacts would be less than significant with implementation of this mitigation measure.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?
(No Impact)

There are no schools within 0.25 mile of the project area. The nearest school, Merced County Juvenile Court School (at 2840 W Sandy Mush Road) is 13 miles east of the proposed project. Therefore, neither construction nor operation of the proposed project would have an impact on an existing or proposed school.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?
(No Impact)

Government Code Section 65962.5(a)(1) states that DTSC shall compile and update annually all hazardous waste facilities subject to corrective action. In accordance with this code, there are no active listed hazardous materials sites in the EnviroStor database within the project area or within a 3-mile radius of the project area. The proposed project would not be located on a hazardous materials site. Therefore, there would be no impact.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?
(No Impact)

The proposed project is not located within an area covered by an airport land-use plan or within 2 miles of a public-use airport. Therefore, construction of the project would have no impact related to aircraft safety hazards.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?
(No Impact)

The project site is not located within 2 miles of a public or private airport. Therefore, there would be no exposure of people residing or working in the project area to aircraft hazards. There would be no impact.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?
(No Impact)

The Merced County General Plan (Merced County 2012) identifies emergency response and evacuation plans, including major thoroughfares used for such purposes. The proposed project would not affect any major thoroughfares that may be used as an evacuation route, nor does the project site contain any essential facilities for emergency response. Please refer to Section 3.20, "Transportation and Transportation," for a discussion of emergency access and travel delays related to Dan McNamara Road closures during Restoration Flows in excess of 200 to 400 cfs at the Dan McNarmara Road.

h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?
(Less-than-Significant Impact with Mitigation Incorporated)

The project area is in an area designated by CAL FIRE as a Moderate Fire Severity Zone (CALFIRE 2007). Construction activities could potentially spark a wildland fire in the project or adjacent areas. This impact could be potentially significant.

In addition, if construction occurs near any tall trees or electrical lines, nearby vegetation may need to be removed or utilities may need to be relocated. Electricity can arc across an air gap from a high voltage line to a nearby tree, resulting in grounding of the circuit through the tree. Hazards arise not only from electric shock but also from the potential for starting fires. However, National Electrical Safety Code 2017 Edition (IEEE Standards Association 2017) guidelines would be followed regarding the allowed proximity of workers to energized lines and how a tree should be removed or trimmed, considering tree growth, movement of the tree and conductors in wind, voltage, and sagging of the conductor at high temperatures. The construction contractor would need to complete mandatory underground service alert surveys with local utilities during construction. Existing utilities would be avoided or relocated as needed.

The proposed project would be constructed at sites with no population center or housing structures; therefore, the project is not likely to expose people or structures to significant loss, injury, or death caused by wildland fires. However, due to the potential for a construction-related wildland fire, risk during construction of the proposed project would be potentially significant.

DWR and Reclamation will implement the following mitigation measure prior to and during construction to further reduce these potential impacts.

> **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.

Implementation of Mitigation Measure HAZ-3 would reduce the potential for wildfire as a fire prevention plan would be prepared and implemented prior to construction activities. Therefore, the impact would be less than significant with mitigation incorporated.

i) Expose people to a substantial hazard through increased risk of exposure to disease vectors?
(Less-than-Significant Impact with Mitigation Incorporated)

Construction activities in the San Joaquin Valley may increase the risk of exposure to disease vectors (i.e., West Nile virus, Hantavirus, and Valley Fever) for construction workers and the public. The project would include improvements to structures in and adjacent to the Eastside Bypass, which carries Restoration Flows and flood flows. Although these activities could have minor effects on localized sites of the Eastside Bypass, they are not expected to substantially alter existing drainage patterns or the rate or amount of surface runoff. However, any temporary or newly permanently wetted portions of the San Joaquin River can provide mosquito habitat, and can increase construction worker and public exposure to mosquitoes potentially infected with West Nile virus. Additionally, construction workers could be

exposed to rodents with Hantavirus during demolition of existing structures. Also, construction workers and the public could potentially be exposed to Valley Fever fungus spores during earth-moving activities, which could release spores in the soil into windblown dust in the air. This impact would be potentially significant.

DWR and Reclamation would implement the following mitigation measures during construction to reduce potential impacts from vector-borne diseases.

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.

Implementation of Mitigation Measure HAZ-4a and -4b would reduce the potential public risk from exposure to vector-borne diseases and valley fever by following BMPs to minimize exposure and public risk. Therefore, the impact would be less than significant with mitigation incorporated.

3.11 Hydrology and Water Quality

	Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XI.	**HYDROLOGY AND WATER QUALITY – Would the project:**					
a)	Violate any water quality standards or waste discharge requirements?	☐	☒	☐	☐	☐
b)	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐	☐
c)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial on- or off-site erosion or siltation?	☐	☒	☐	☐	☐
d)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding?	☐	☐	☐	☐	☒
e)	Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒	☐
f)	Otherwise substantially degrade water quality?	☐	☐	☒	☐	☐
g)	Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒	☐
h)	Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☐	☒
i)	Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☐	☒
j)	Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒	☐

3.11.1 Environmental Setting

The Eastside Bypass conveys flood flows from the San Joaquin, Fresno, and Chowchilla Rivers; Berenda and Ash Sloughs; and Deadman, Owens, and Bear Creeks. Flood flows in the Middle Eastside Bypass between the Sand Slough Control Structure to the Mariposa Bypass Control Structure split between the Mariposa Bypass and the Lower Eastside Bypass. Historical flood operations have shown that the first 2,000 to 3,000 cfs flow down the Lower Eastside Bypass. At up to 8,500 cfs, approximately one-quarter to one-half of the additional flows are routed to the Mariposa Bypass. Apart from some ponding in low-lying areas, the Eastside Bypass generally remains dry until required flood flows or Restoration Flows are conveyed. The flood season for the Lower San Joaquin Levee District (LSJLD) typically lasts from November 15 to June 15 of each water year, with rainfall contributing to higher flows during late fall/winter, and snowmelt contributing to higher flows in spring.

Water Quality

The project area is not 303(d) listed as impaired under the Clean Water Act. The Central Valley Regional Water Quality Control Board (Central Valley RWQCB) in coordination with the State Water Resources Control Board (SWRCB) has developed the Sacramento-San Joaquin River Basin Plan (RWQCB 2016) that defines Total Maximum Daily Loads (TMDLs) and water quality objectives for surface waters within the Central Valley. The salinity standard measured as electrical conductivity is 700 microSiemens per centimeter (µS/cm) from April 1 to August 31 and 1,000 µS/cm for the remainder of the year. The Central Valley RWQCB in coordination with SWRCB has developed a control program for salt and boron discharge in the lower San Joaquin River. Degraded water quality in various segments of the San Joaquin River has been a long-term problem due to low river flows and discharges from agricultural areas, wildlife refuges, and municipal waste water treatment plants (Reclamation 2010).

General physical water quality parameters taken in the Eastside Bypass at Merced NWR are listed in **Table 3.11-1**, and those taken at Eastside Bypass below Mariposa Bypass, farther downstream, are listed in **Table 3.11-2**. This portion of the Eastside Bypass has significantly higher electrical conductivity compared to the water sampled upstream at West Washington Road. High electrical conductivity is an indicator of high salinity.

Table 3.11-1. Physical Water Quality Parameters Sampled in the Eastside Bypass at Merced National Wildlife Refuge

Water Quality Parameter	Minimum	Maximum	Average	Water Quality Standard*
Temperature (ºFahrenheit)	38	102	65	--[1]
Electrical Conductivity (microSiemens/centimeter	167	634	369	--[1]

Note:
* State Water Resources Control Board 2015
Source: California Data Exchange Center 2016. Water quality data from continuous daily data generally taken from March 2013 through May 2016

Table 3.11-2. Physical Water Quality Parameters Sampled in the Eastside Bypass below Mariposa Bypass

Water Quality Parameter	Minimum	Maximum	Average	Water Quality Standard*
pH (standard units)	6.9	9.1	8.2	<6.5 & >8.5
Temperature (ºFahrenheit)	40	81	55	--[2]
Turbidity (Nephelometric Turbidity Units)	9	73	31	--[1]
Chlorophyl (micrograms/liter	2	152	7	
Dissolved Oxygen (milligrams/liter	5.8	11.5	8.7	7.0 mg/l
Electrical Conductivity (microSiemens/centimeter	195	1,156	850	--[2]

Notes:
[1] Increases shall not exceed 20%
[2] No objective in place for project area
* State Water Resources Control Board 2015
Source: California Data Exchange Center 2016. Water quality data from continuous daily data generally taken from March 2013 through April 2016

Beneficial Uses

The Eastside Bypass is not specifically identified in the Sacramento River Basin and San Joaquin River Basin Plan (RWQCB 2016) for beneficial uses. However, the beneficial uses of any specifically identified water body generally apply to its tributary streams. Beneficial uses for the San Joaquin River are included for the Eastside Bypass based upon application of the Central Valley RWQCB's "tributary rule" as defined in the Basin Plan (RWQCB 2016). The tributary rule consists of applying beneficial uses and water quality attributes to any water feature that currently feeds into a known water feature. In this case, the beneficial uses of the project area are represented by the San Joaquin River. In some cases, a beneficial use may not be applicable to the entire body of water and is determined by the Central Valley RWQCB. The beneficial uses designated for waters within the project area (i.e., San Joaquin River) are presented in **Table 3.11-3**, and may or may not apply to the Eastside Bypass. Beneficial use designations that likely would not apply to the Eastside Bypass are Municipal and Domestic Supply, Industrial Process Supply, Water Contact Recreation, Canoeing and Rafting, and Coldwater Spawning Habitat.

Groundwater

The project area is underlain by the Merced and Delta-Mendota subbasins of the San Joaquin Valley groundwater basin, as defined by DWR Bulletin 118 (**Figure 3.11-1**) (DWR 2003). DWR has prioritized the Delta-Mendota and Merced subbasins as "high priority" based on groundwater reliability concerns (both current and projected) and documented overdraft issues in the subbasins. In addition to groundwater overdraft assessment in the subbasin, DWR has categorized both subbasins to have a very high potential for subsidence (DWR 2014). **Figure 3.11-2** presents the location of select groundwater monitoring wells with the project area and surrounding area.

Shallow geology in the project area consists of heterogeneous layers of alluvial materials such as sands, silts, and clays. The shallow geology along with the elevation of the water in the surface water relative to the groundwater level governs whether water can flow (i.e., seep) out of the surface water feature,

through the stream bed/bank, into the groundwater (losing), or if water movement could be from the groundwater to the surface water feature (gaining).

Table 3.11-3. San Joaquin River Beneficial Uses

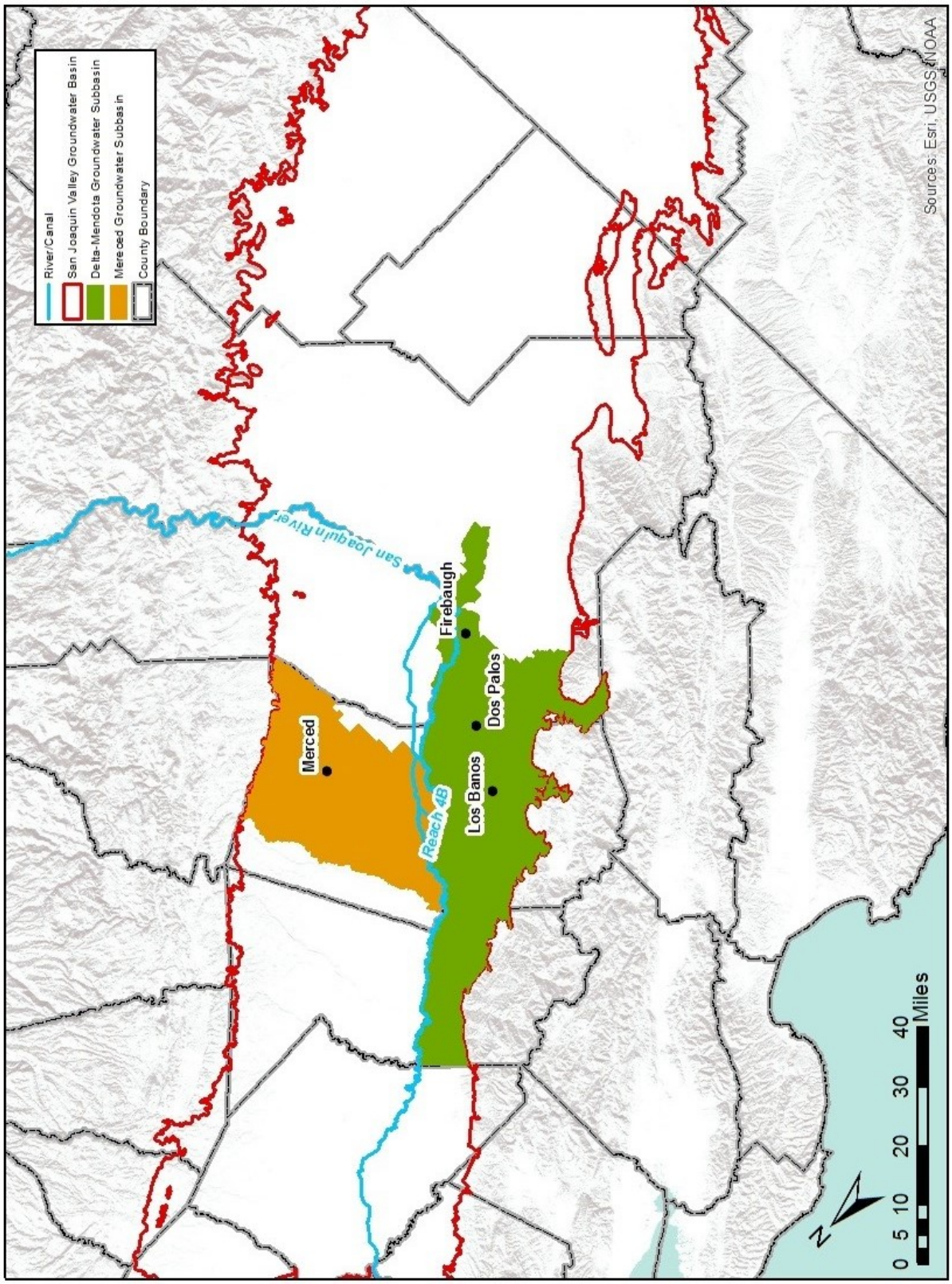
Beneficial Use Designation	San Joaquin River[5]
Municipal and Domestic Supply	✓P
Irrigation Watering	✓E
Stock Watering	✓E
Industrial Process Supply	✓E
Water Contact Recreation	✓E
Canoeing and Rafting[1]	✓E
Non-contact Water Recreation	✓E
Warm Freshwater Habitat[2]	✓E
Cold Freshwater Habitat[2]	
Warm[3] Water Migration Areas	✓E
Cold[4] Water Migration Areas	✓E
Warm Water Spawning Habitat[3]	✓E
Cold Water Spawning Habitat[4]	✓P
Wildlife Habitat	✓E

Notes:
1 Shown for streams and rivers only with the implication that certain flows are required for this beneficial use.
2 Resident does not include anadromous. Any segments with both COLD and WARM beneficial use designations will be considered COLD waterbodies for the application of water quality objectives.
3 Striped bass, sturgeon, and shad.
4 Salmon and steelhead.
5 Sack Dam to Mouth of Merced River
Key: ✓P POTENTIAL BENEFICIAL USE; ✓E EXISTING BENEFICIAL USE
Source: Regional Water Quality Control Board 2016

These changes in gaining and losing conditions can be seen in **Figures 3.11-3 through 3.11-5**. A gaining condition is seen when the water table line slopes toward a stream. A losing condition is noted when the lines slope away from a stream. Each of these figures shows that the water levels adjacent to the project area rise and drop, depending on the time of year. **Figure 3.11-2**, a transect approximately 1.5 mile downstream of the Sand Slough Control Structure, shows that the Eastside Bypass is typically a losing reach in this area, as groundwater levels are typically lower than the channel bed elevation; however, there is not a consistent pattern of gaining and/or losing conditions along the Eastside Bypass.

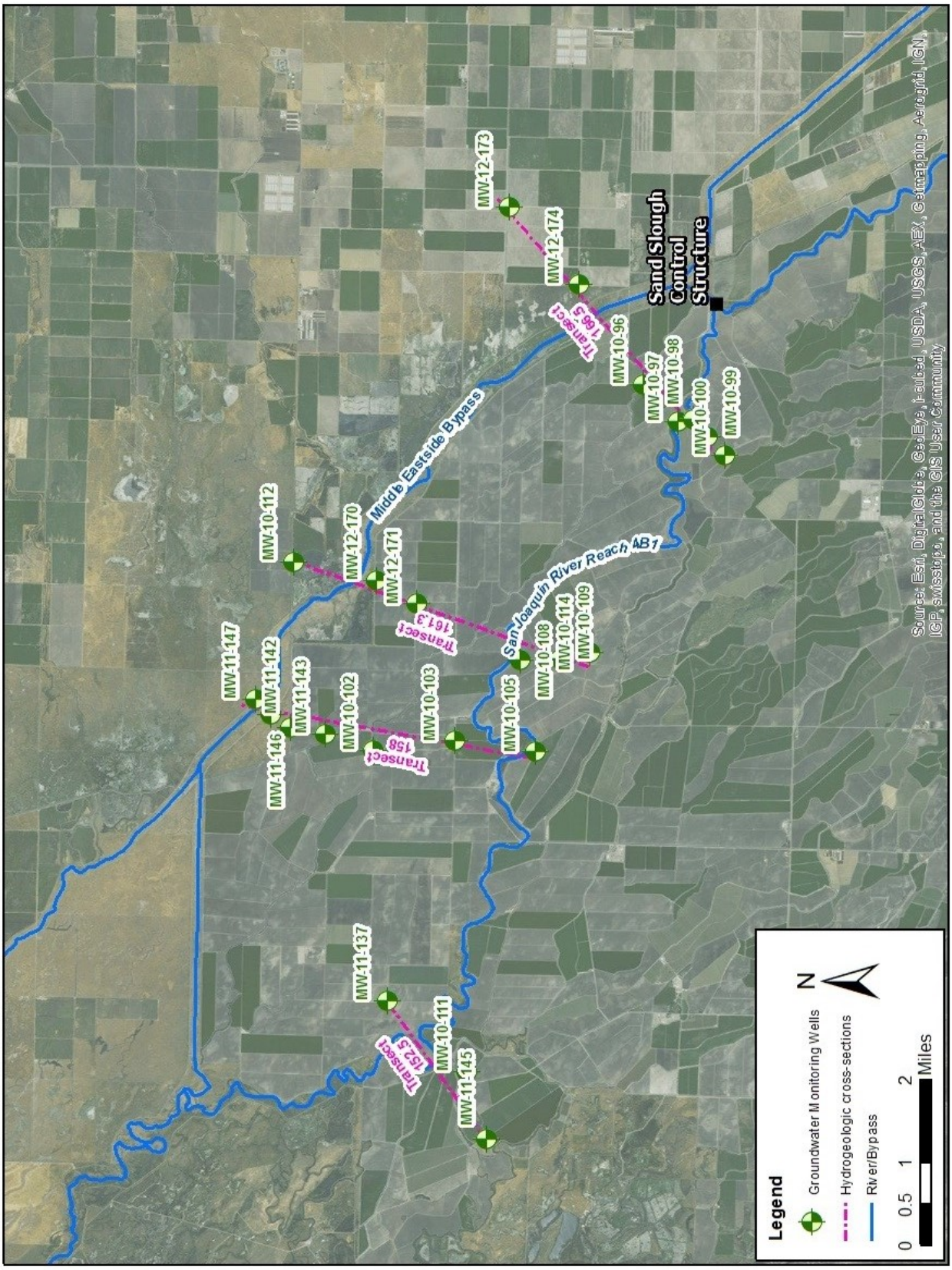
Groundwater levels in the project vicinity have been monitored since 2009. Data presented in **Figures 3.11-6 through 3.11-9** represent a short period of record (4 or less years). A longer duration data set for these areas does not exist. These data indicate that the Eastside Bypass has the potential to be a gaining or losing stream. The actual direction and rate of flow between groundwater and surface water depends on location along the bypass, groundwater levels, local geologic conditions, and the overall hydrologic conditions of the area. Additionally, groundwater levels vary with distance from the bypass and also based on time of year, likely due to agricultural activities. Groundwater levels have also shown a decline during this period, due to recent drought conditions.

Figure 3.11-1. Groundwater Resources in the Project Area and Surrounding Area



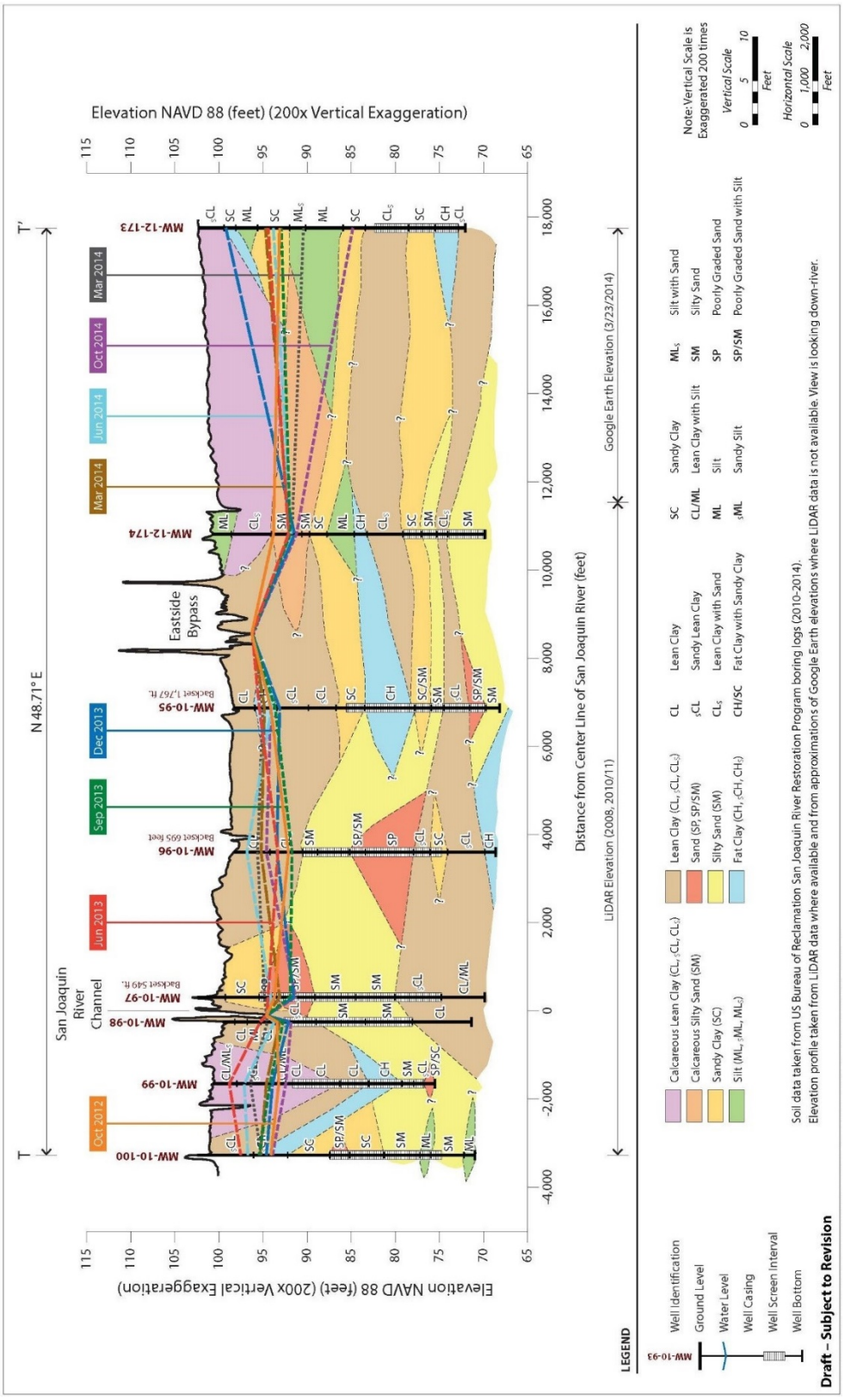
Source: CDM Smith 2017

Figure 3.11-2. Location of Select Groundwater Monitoring Wells within the Project Area



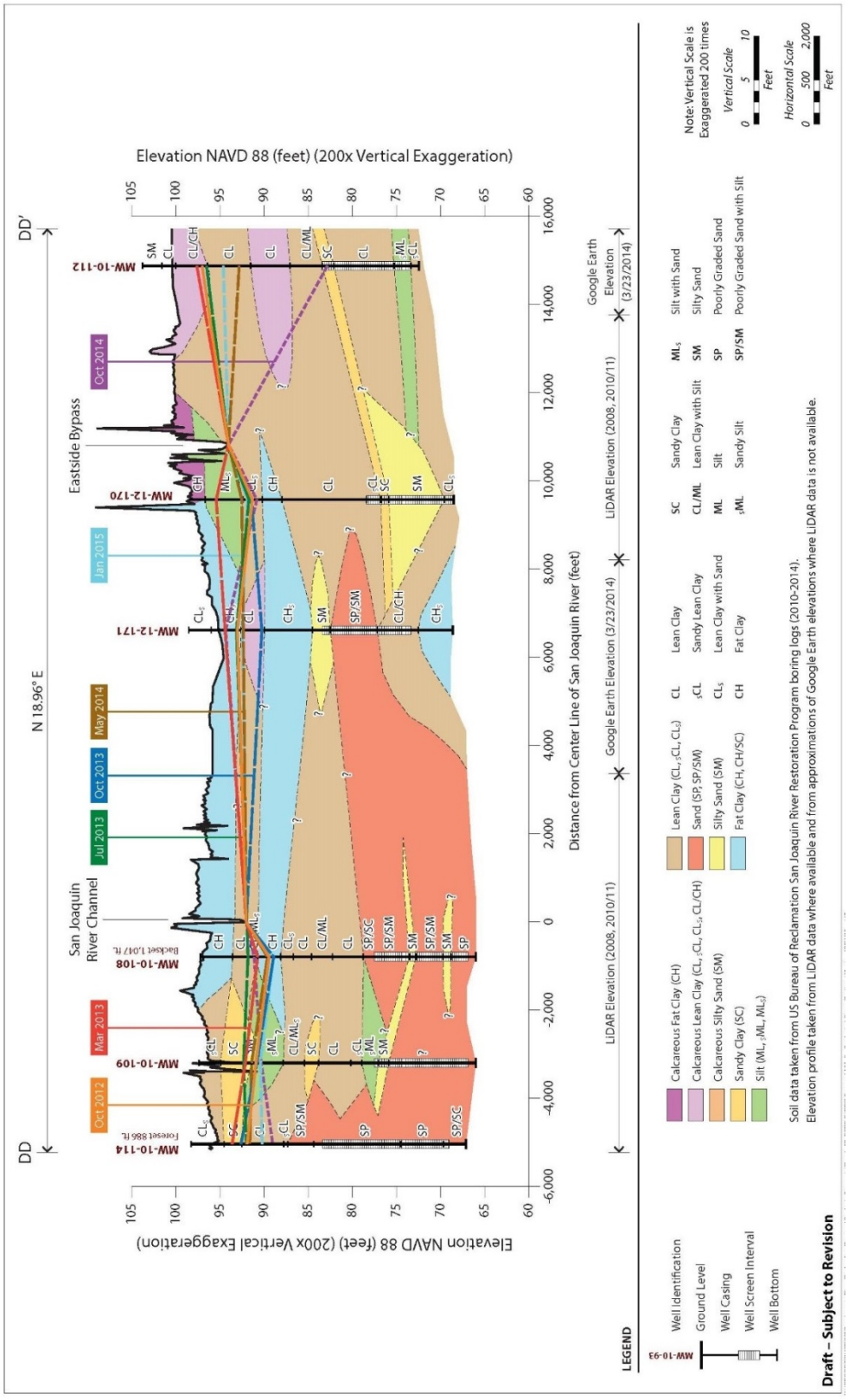
Source: CDM Smith 2017

Figure 3.11-3. Hydrogeologic Cross Section at Transect 166.5



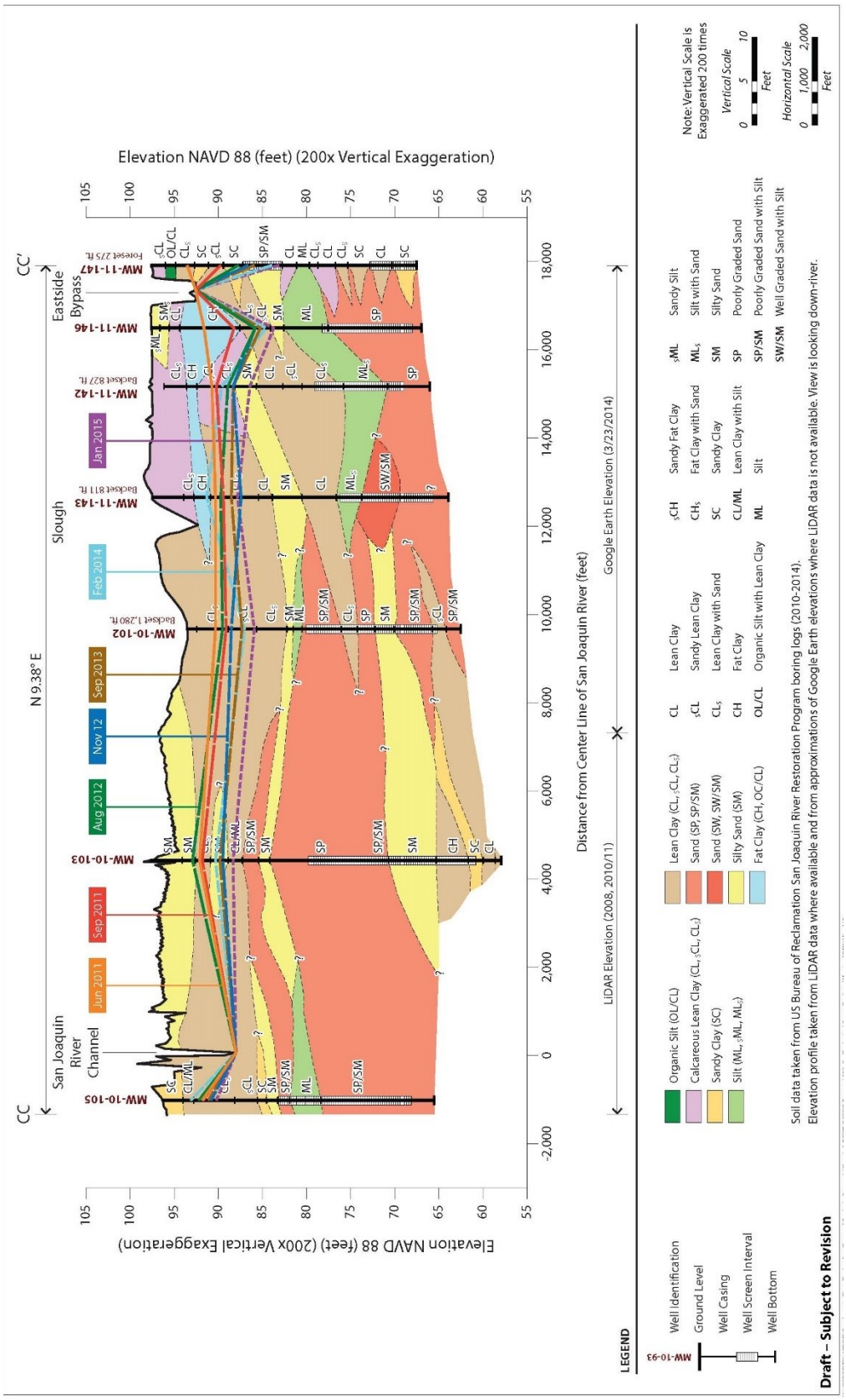
Source: CDM Smith 2017

Figure 3.11-4. Hydrogeologic Cross Section at Transect 161.3



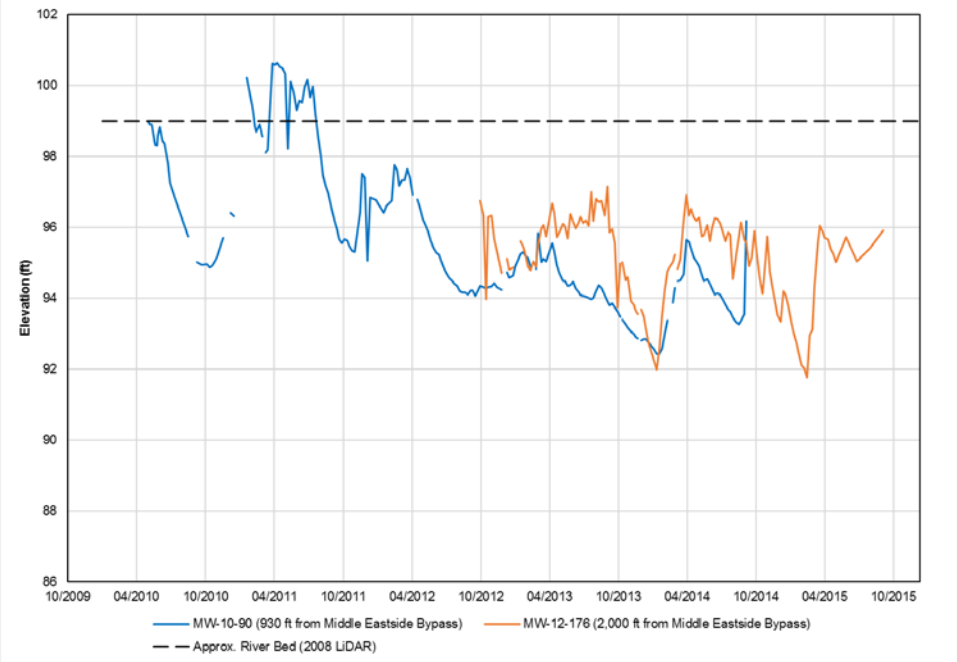
Source: CDM 2017

Figure 3.11-5. Hydrogeologic Cross Section at Transect 158.0



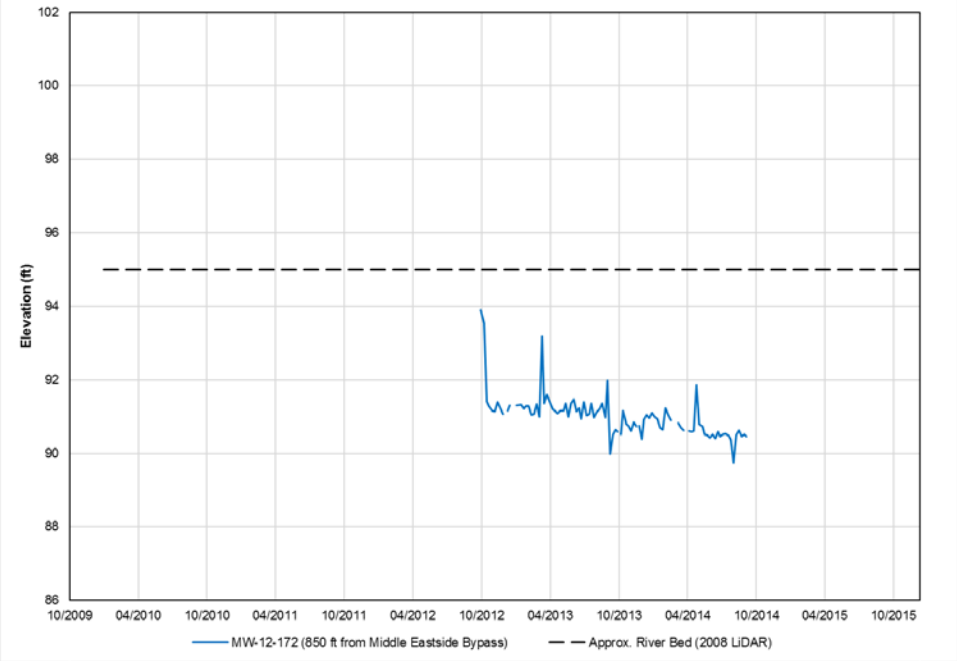
Source: CDM 2017

Figure 3.11-6. Groundwater Elevation and Ground Surface Elevation (Eastside Bypass, Right Bank)



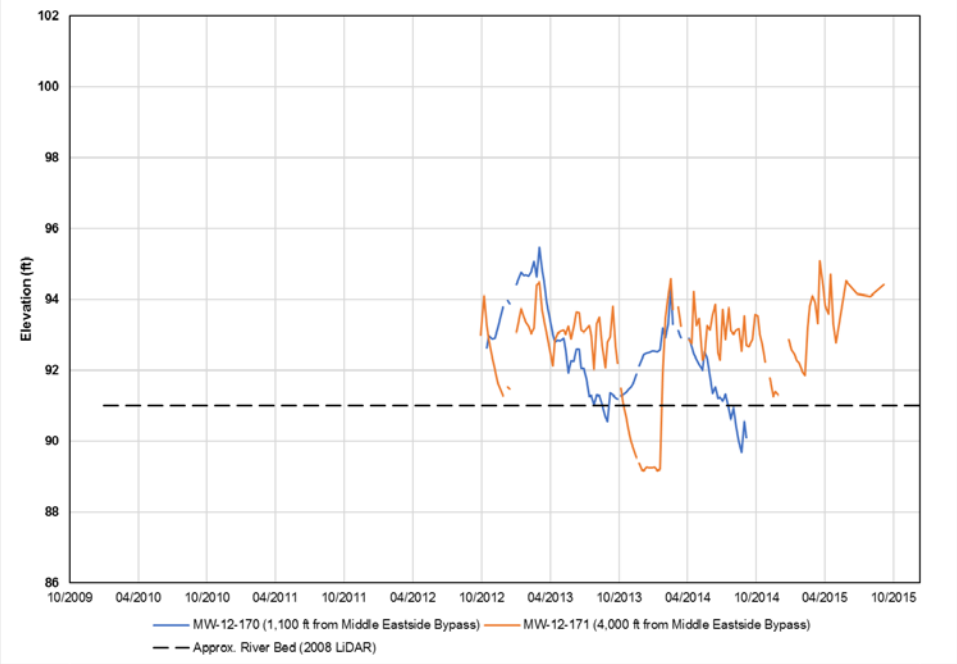
Source: CDM 2017

Figure 3.11-7. Groundwater Elevation and Ground Surface Elevation (Eastside Bypass, Left Bank)



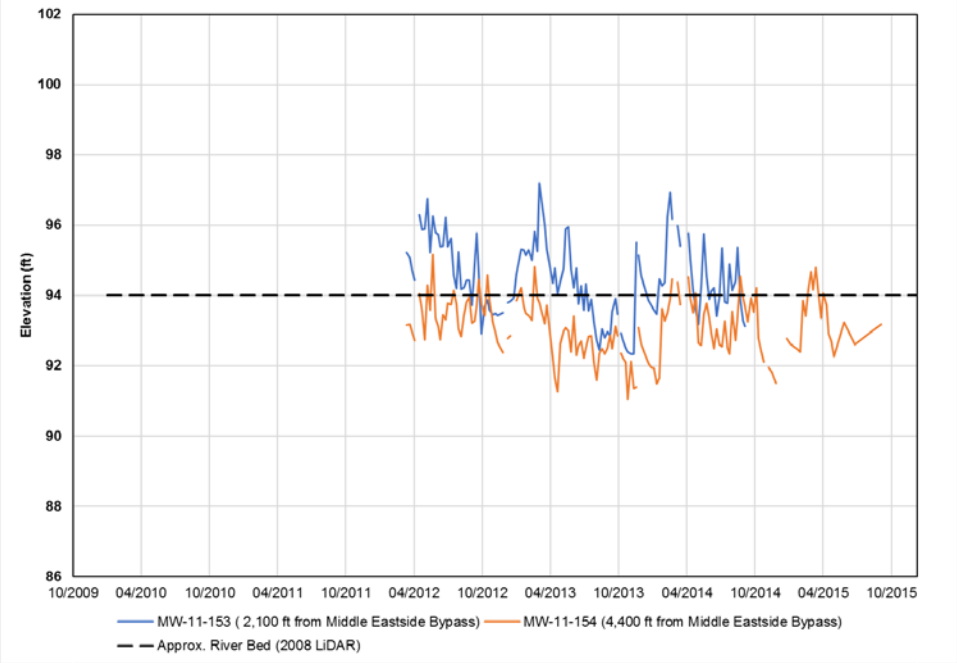
Source: CDM 2017

Figure 3.11-8. Groundwater Elevation and Ground Surface Elevation (Eastside Bypass, Left Bank)



Source: CDM 2017

Figure 3.11-9. Groundwater Elevation and Ground Surface Elevation (Eastside Bypass, Left Bank)



Source: CDM 2017

Regional and Local Groundwater Production

The Merced subbasin is estimated to be 21.1 million acre-feet (MAF) to a depth of 300 feet and 47,600,000 acre-feet (af) to the base of fresh groundwater (DWR 2004). The Delta-Mendota subbasin holds approximately 81.8 MAF to the base of fresh water, based on a study completed in 1995 (DWR 2006). There are no estimates on groundwater production in the project area, but not all the water purveyors in the project area hold surface water rights. Some users, particularly to the northwest of the project area, use groundwater as a water supply source.

Land Subsidence

During recent drought conditions, subsidence in and around the project area increased. Reclamation has been tracking recent subsidence in the area since 2011. **Figure 3.11-10** shows the subsidence rate ranges from approximately 0.45 feet/year at the upstream end of the Eastside Bypass to less than 0.15 feet/year in the downstream end of the bypass. Subsidence is changing the slopes of the San Joaquin River and bypasses. The steeper slope upstream of the project area creates more erosion, which increases sediment loads into the project area. At the same time, less subsidence at the downstream end of the project area has resulted in a more gradual slope. Flows slow down when they enter the project area, which increases sediment deposition. The result of ongoing subsidence within the project area is therefore expected to reduce freeboard (Reclamation 2016).

Groundwater Quality

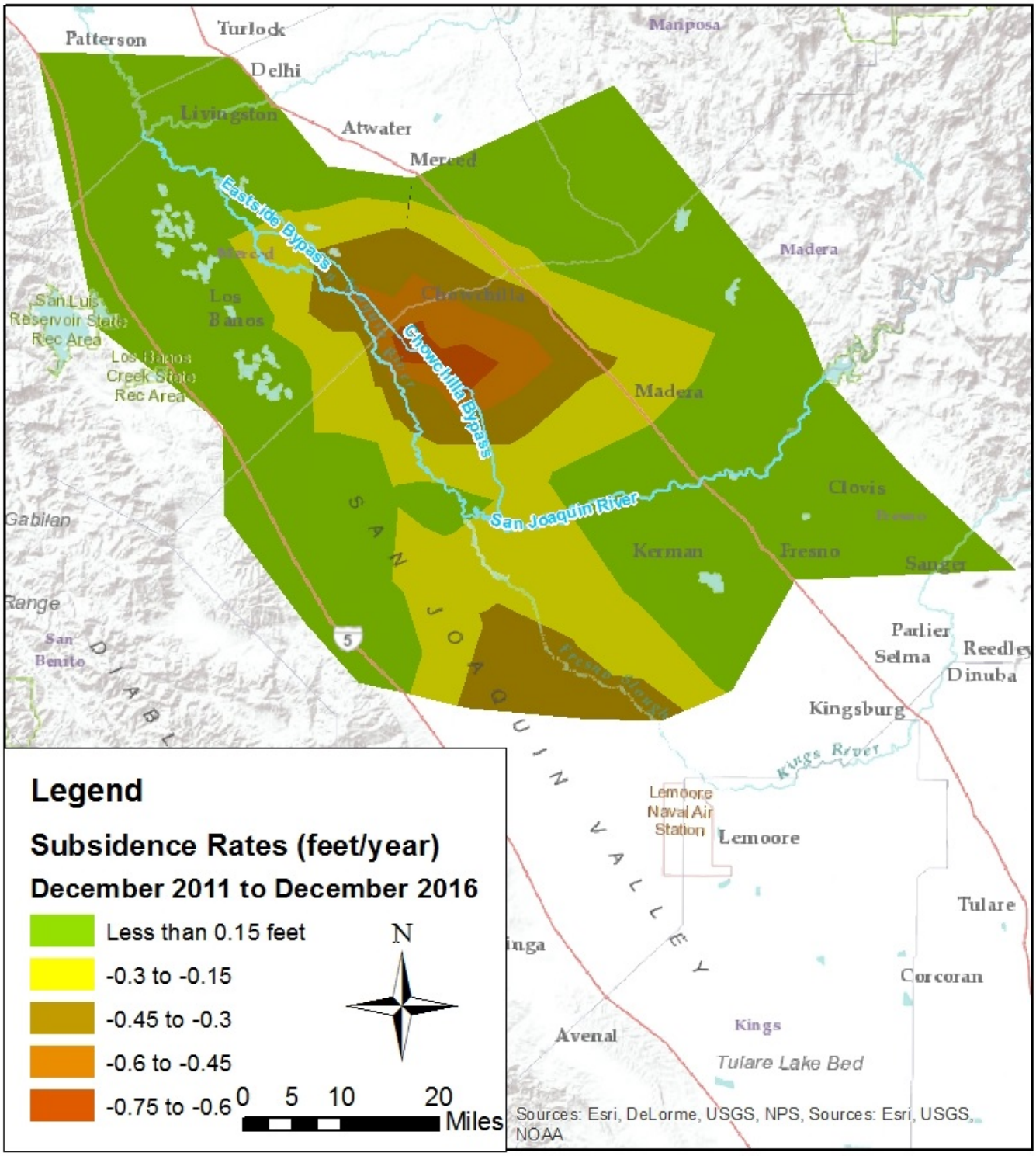
Reclamation conducted water quality monitoring in the project area to better understand the baseline quality of groundwater along the San Joaquin River (Reclamation 2012, 2013). **Table 3.11-4** shows the water quality results from the December 2012 and May 2013 sampling events within the project area and surrounding area. Groundwater development in the San Joaquin Valley in the last 80 years has changed groundwater quality. Irrigation of crops along the west side of the San Joaquin Valley has increased salts and trace metals in the localized shallow groundwater table. A few sites showed exceedances during the 2012/2013 monitoring events including aluminum, arsenic, electrical conductivity, molybdenum, selenium, and zinc. **Figure 3.11-11** shows the location of the monitoring wells.

Flood Management Facilities

Eastside Bypass and Control Structure

The Eastside Bypass extends from the confluence of the Fresno River and the Chowchilla Bypass to its confluence with the San Joaquin River. The Middle Eastside Bypass, with a design channel capacity of 16,500 cfs, receives flows from the San Joaquin River and Upper Eastside Bypass and extends from the Upper Eastside Bypass to the Eastside Bypass Control Structure near the head of the Mariposa Bypass. Based on a 4-foot freeboard criterion, the existing capacity of the Eastside Bypass is estimated at 12,000 cfs, which is substantially less than the design capacity of 16,500 cfs (DWR 2011). The gated Eastside Bypass Control Structure works in coordination with the Mariposa Bypass Control Structure to direct flows either to the Lower Eastside Bypass or to the Mariposa Bypass. LSJLD operates the Eastside Bypass such that the first 2,500 cfs of flows in the Middle Eastside Bypass continue into the Lower Eastside Bypass, then flows are split, with approximately 30 percent of flows to the Mariposa Bypass. If Bear, Owens, or Deadmans Creeks are flooding, LSJLD may close the gates at the Eastside Bypass Control Structure and route more flow to the Mariposa Bypass. Channel design capacity is based on 4 feet of freeboard along the bypasses, except along a portion of the left side of the Eastside Bypass, which has 3 feet of design freeboard (USACE 1993).

Figure 3.11-10. Measured Subsidence Rate between December 2011 and December 2016



Source: U.S. Bureau of Reclamation 2016

Table 3.11-4a. Water Quality Sampling Results

Compound	Alkalinity	Aluminum	Ammonia as N	Arsenic	Bicarbonate as $CaCO_3$	Boron	Cadmium	Calcium	Carbonate as $CaCO_3$	Chloride	Copper	Electrical Conductivity	Hardness	Lead	Magnesium	Mercury
units	mg/L	**µg/L**	mg/L	**µg/L**	mg/L	**µg/L**	**µg/L**	mg/L	mg/L	mg/L	**µg/L**	**µS/cm**	mg/L	**µg/L**	mg/L	ng/L
Water Quality Objective		87 [1]		10 [2]		700 [3]	0.21 [1]			106,000 [3]	10 [2]	150 [2,7]		1.9 [4]		770 [1]
Water Quality Sampling Results (December 2012 above, May 2013 below)																
Eastside Bypass – Right Bank (Groundwater Quality)																
MW-10-94	- 340	**-** **280**	- < 0.5	**-** **12.0**	- 340	69 73	< 0.10 < 0.5	59 77	< 2.0 < 2.0	270 -	3.0 0.78	- **2,506**	328 427	0.49 < 0.2	44 57	3.0 < 2.0
MW-12-174	250 260	**690** **550**	< 0.5 < 0.5	**11.0** 7.9	250 260	88 85	< 0.10 < 0.5	70 120	< 2.0 < 2.0	360 -	1.3 1.4	**1,969** **2,682**	319 534	< 0.2 < 0.2	35 57	< 2.0 < 2.0
MW-10-90	280 280	**3,600** **2,000**	< 0.5 < 0.5	**15.0** **14.0**	280 280	150 150	< 0.20 < 0.5	150 150	< 2.0 < 2.0	870 -	5.3 3.1	**4,375** **4,608**	716 704	0.64 0.40	83 80	24 35
Eastside Bypass – Left Bank (Groundwater Quality)																
MW-12-170	- 380	- **870**	- < 0.5	- 9.0	- 380	- 57	- < 0.5	- 62	- < 2.0	- -	- 1.6	**-** **2,021**	- 381	- 0.22	- 55	- 4.8
MW-12-172	290 310	**400** 86	< 0.5 < 0.5	9.7 9.2	290 310	56 56	< 0.10 < 0.5	54 52	< 2.0 < 2.0	230 -	0.99 0.83	**1,402** **1,330**	271 253	< 0.2 < 0.2	33 30	4.3 2.3

Notes:
[1] National Recommended Water Quality Criteria Aquatic Life Protection - Freshwater NRAWQC Continuous Concentration.
[2] Basin Plan.
[3] Agricultural goals.
[4] Regional Water Quality Control Board (RWQCB) Aquatic Life Protection – Freshwater California Toxics Rule and/or National Toxics Rule Continuous Concentration.
[5] Irrigation Suitability.
[6] Toxicity threshold based on reproductive effects on fish and other wildlife.
[7] Applies to Reaches 1 and 2.

Key:
- = Not Sampled
mg/L = milligrams per liter
Bold cells represent measurements exceeding the listed water quality standard.
Source: U.S. Bureau of Reclamation 2012, 2013

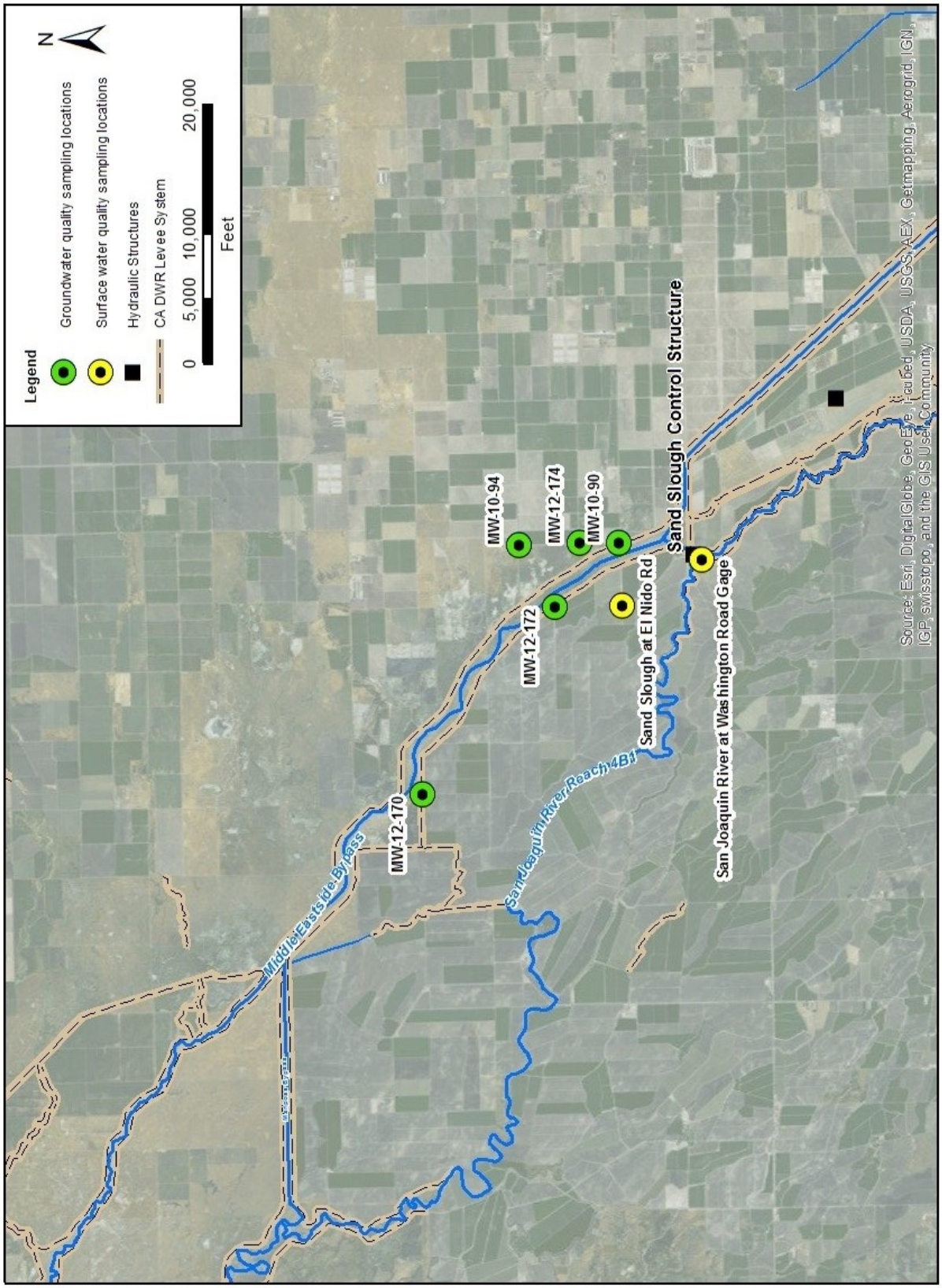
Table 3.11-4b. Water Quality Sampling Results

Compound	Molybdenum	Nickel	Nitrate As NO_3	Orthophosphate as PO_4	pH	Potassium	Selenium	Sodium	Soil Absorption Ratio	Sulfate	Total Dissolved Solids	Temperature	Total Kjeldahl Nitrogen	Turbidity	Zinc
units	**µg/L**	**µg/L**	**mg/L**	**mg/L**	**units**	**mg/L**	**µg/L**	**mg/L**	**-**	**mg/L**	**mg/L**	**°C**	**mg/L**	**NTU**	**µg/L**
Water Quality Objective	19 [4]	37 [4]	5000 [5]				2 [6]	69,000 [3,5]			450,000 [3,5]				84 [4]
Water Quality Sampling Results (December 2012 above, May 2013 below)															
Eastside Bypass – Right Bank (Groundwater Quality)															
MW-10-94	18	8.7	28	< 0.6	-	2.0	1.6	340	8.13	250	1,200	18.0	< 0.50	26.4	< 20
	16	6.4	-	-	7.6	1.9	2.5	410	-	-	1,500	18.4	< 0.50	8.1	< 20
MW-12-174	15	1.7	63	< 3.0	7.8	1.6	**2.1**	330	8.01	140	1,200	16.5	< 0.50	16.5	< 20
	9.0	3.3	-	-	7.7	1.5	**3.1**	380	-	-	1,500	17.9	< 0.50	11.4	< 20
MW-10-90	**56**	8.4	120	< 3.0	7.4	3.0	1.9	710	11.5	470	2,700	17.5	0.57	22.3	**360**
	51	7.5	-	-	7.6	3.0	1.8	650	-	-	2,800	17.7	< 0.50	52.9	**130**
Eastside Bypass – Left Bank (Groundwater Quality)															
MW-12-170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.3	2.1	-	-	7.4	0.94	< 0.4	270	-	-	1,100	19.0	< 0.50	16.1	< 20
MW-12-172	19	1.3	8	< 0.6	7.7	0.72	< 0.4	210	5.53	51	810	17.6	< 0.50	6.8	< 20
	22	< 0.5	-	-	7.4	0.65	< 0.4	190	-	-	760	18.4	< 0.50	1.5	34

Notes:
[1] National Recommended Water Quality Criteria Aquatic Life Protection - Freshwater NRAWQC Continuous Concentration.
[2] Basin Plan.
[3] Agricultural goals.
[4] Regional Water Quality Control Board (RWQCB) Aquatic Life Protection – Freshwater California Toxics Rule and/or National Toxics Rule Continuous Concentration.
[5] Irrigation Suitability.
[6] Toxicity threshold based on reproductive effects on fish and other wildlife.
[7] Applies to Reaches 1 and 2.

Key:
- = Not Sampled
mg/L = milligrams per liter
Bold cells represent measurements exceeding the listed water quality standard.
Source: U.S. Bureau of Reclamation 2012, 2013

Figure 3.11-11. Water Quality Sampling Locations



Source: CDM Smith 2017

Mariposa Bypass and Control Structure

The Mariposa Bypass Control Structure regulates the proportion of flood flows that continue down the Eastside Bypass or return to the San Joaquin River The *Lower San Joaquin River Flood Control Project Operation and Maintenance Manual* (O&M Manual) (Reclamation Board 1967) states that the operating rule for the Mariposa Bypass is to divert all flows to the San Joaquin River when flows in the Eastside Bypass above the Mariposa Bypass are less than 8,500 cfs; flows greater than 8,500 cfs remain in the Eastside Bypass, eventually discharging back into the San Joaquin River at the Bear Creek Confluence at the end of Reach 4B2 of the San Joaquin River. Historical operations deviate from this rule because of the elevation difference between the Eastside Bypass Control Structure and the Mariposa Bypass Control Structure. The Mariposa Bypass Control Structure is approximately 6 feet higher than the Eastside Bypass Control Structure. Flows enter the Mariposa Bypass and are conveyed to Reach 4B2 of the San Joaquin River starting at flows of about 2,500 cfs (reaching a stage of 84 feet mean sea level).

Levees

All levees that will be modified as part of the proposed project are classified as project levees and were constructed as part of the Lower San Joaquin River Flood Control Project or Lower San Joaquin River and Tributaries Project. According to the USACE National Levee Database, the project levees in the project area were inspected on April 7, 2011 and were given a rating of unacceptable (USACE 2013). LSJLD is responsible for operations and maintenance (O&M) of project levees within the project area. The O&M Manual provides guidance for project levees O&M. The O&M Manual calls for semiannual inspections by the LSJLD Superintendent and DWR. Periodic inspections throughout the year by each of these agencies are also described in the O&M Manual.

Restoration Flows and Flood Flows

As described in the SJRRP Record of Decision (ROD), Restoration Flows have a lower priority for downstream channel capacity than flood flows. If water releases from Friant Dam are required for flood control purposes, concurrent Restoration Flows are reduced by an amount equivalent to the required flood control release. If flood control releases from Friant Dam exceed the concurrent scheduled Restoration Flows, no additional Restoration Flow releases above those required for flood control are made for SJRRP purposes. Flood flows are routed in accordance with the O&M Manual to minimize loss of life and property.

Apart from some ponding in low-lying areas, the bypasses generally remain dry until flood flows or Restoration Flows are conveyed. The flood season for the LSJLD typically lasts from November 15 to June 15 of each water year, with rainfall contributing to higher flows during winter, and snowmelt contributing to higher flows in spring. Friant Dam flood releases occur on average once every 3-4 years. Restoration Flows up to a maximum of approximately 300 cfs in the Eastside Bypass could occur under existing conditions but drought and flood conditions have contributed to Restoration Flows not reaching that level in the Eastside Bypass yet. 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].)

3.11.2 Regulatory Setting

Federal

Federal Safe Drinking Water Act

The Federal Safe Drinking Water Act (SDWA) was enacted in 1974 to protect the quality of drinking water in the United States. This law focuses on all waters actually or potentially designated for drinking use, whether from above ground or underground sources. The SDWA authorized EPA to establish safe standards of purity for specified contaminants and required all owners or operators of public water systems to comply with primary (health-related) standards. State governments, which assume this power from EPA, also encourage attainment of secondary standards (nuisance-related). Contaminants of concern in a domestic water supply are those that either pose a health threat or in some way alter the aesthetic acceptability of the water. These types of contaminants are currently regulated by EPA through primary and secondary maximum contaminant levels (MCLs). As directed by the SDWA amendments of 1986, EPA has been expanding its list of primary MCLs. MCLs have been proposed or established for approximately 100 contaminants.

Federal Clean Water Act

The Federal Clean Water Act (CWA) established the basic structure for regulating discharges of pollutants into the waters of the United States. 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 the 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 waters of the United States unless a permit was obtained under its provisions (EPA 2012).

Section 303

Section 303(d) of the 1972 CWA requires states, territories, and authorized tribes to develop a list of water quality-impaired segments of waterways. The 303(d) list includes waterbodies that do not meet water quality standards for the specified beneficial uses of that waterway even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waterbodies on their 303(d) lists and implement a process, called TMDLs to meet water quality standards (EPA 2013).

The TMDL process is a tool for implementing water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions. TMDLs establish the maximum allowable loadings of a pollutant that can be assimilated by a waterbody while still meeting applicable water quality standards. TMDLs provide the basis for establishing water quality-based controls. These controls should provide the pollution reduction necessary for a waterbody to meet water quality standards. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The TMDL's allocation calculation for each waterbody must include a margin of safety to ensure that the waterbody can be used for the uses the state has designated. Additionally, the calculation also must account for seasonal variation in water quality (EPA 2013).

TMDLs are intended to address all significant stressors, which cause or threaten to cause waterbody beneficial use impairments, including point sources (e.g., sewage treatment plant discharges), nonpoint sources (e.g., runoff from fields, streets, range, or forest land), and naturally occurring sources (e.g., runoff from undisturbed lands). TMDLs are developed to provide an analytical basis for planning and implementing pollution controls, land management practices, and restoration projects needed to protect water quality. States are required to include approved TMDLs and associated implementation measures in state water quality management plans. Within California, TMDLs implementation is through regional Basin Plans.

The Federal Antidegradation Policy (40 CFR §131.12), established in 1968 and revised in 2005, is designed to protect existing uses and water quality and national water resources, as authorized by Section 303(c) of the CWA. Pursuant to the CFR, state antidegradation policies and implementation methods shall, at a minimum, protect and maintain: 1) existing in-stream water uses; 2) existing water quality where the quality of the waters exceeds levels necessary to support existing beneficial uses, unless the state finds that allowing lower water quality is necessary to accommodate economic and social development in the area; and 3) water quality in waters considered an outstanding national resource. State permitting actions must be consistent with the Federal Antidegradation Policy.

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. In California, the RWQCBs issue this certification.

Section 402

Section 402 of the 1972 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.

Nutrient Guidelines

EPA has established nutrient water quality guidelines for various waterbodies based on ambient water quality conditions within defined ecoregions. The guidelines are not enforceable laws or regulations; they are Federal guidelines for establishing state water quality criteria for nutrients.

Rivers and Harbors Act

Sections 9 and 10 of the Rivers and Harbors Act of 1899 regulate alteration of, and prohibit construction in, any navigable water of the United States without Congressional approval. However, the Eastside

Bypass is not a navigable water according to USACE. Therefore, the Rivers and Harbors Act is not relevant.

Executive Order 11988 (Flood Hazard Policy)

EO 11988 is a flood hazard policy for all Federal agencies that manage Federal lands, sponsor Federal projects, or provide Federal funds to state or local projects. It requires that all Federal agencies take necessary action to reduce the risk of flood loss; restore and preserve the natural and beneficial values served by floodplains; and minimize the impacts of floods on human safety, health, and welfare. Specifically, EO 11988 dictates that all Federal agencies avoid construction or management practices that would adversely affect floodplains unless that agency finds no practical alternative, and the proposed action has been designed or modified to minimize harm to or within the floodplain.

Section 408 Permission

Approval for any modifications, alterations, or occupation of public works projects is granted through the USACE Section 408 program. Recently, USACE made a determination that the project area is not part of an authorized Federal flood control project and is not regulated under Section 408. DWR will work through the Central Valley Flood Protection Board (CVFPB) Encroachment Permit process to confirm this determination.

USACE Levee Design Criteria

Regardless of whether the levees at the project site are part of a Federally authorized flood control project, the proposed levee improvements would meet USACE engineering criteria, including EM 111—1913, *Design and Construction of Levees;* Engineering Technical Letter (ETL) 1110-2-569, *Design Guidance for Levee Underseepage;* and ETL 1110-2-555, *Design Guidance on Levees*.

State

Regional Water Quality Control Plans

The California Water Code (CWC, Section 13240) requires the preparation and adoption of water quality control plans (Basin Plans), and the Federal CWA (Section 303) supports this requirement. According to Section 13050 of the CWC, Basin Plans consist of a designation or establishment for the waters within a specified area of beneficial uses to be protected, water quality objectives to protect those uses, and an implementation program needed for achieving the objectives. State law also requires that Basin Plans conform to the policies set forth in the Water Code, beginning with Section 13000, and any State policy for water quality control. The Basin Plans are regulatory references for meeting the State and Federal requirements for water quality control (40 CFR 131.20). One significant difference between the State and Federal programs is that California's Basin Plans also establish standards for groundwater in addition to surface water (RWQCB 2016).

The regional water quality control plan that governs waterbodies within the project area is the Central Valley Basin Plan. The Central Valley Region Basin Plan covers an area, including the entire Sacramento and San Joaquin River basins, involving an area bound by the crests of the Sierra Nevada on the east and the Coast Range and Klamath Mountains on the west. The area covered in this WQCP extends some 400 miles, from the California-Oregon border to the headwaters of the San Joaquin River.

Irrigated Lands Regulatory Program

Central Valley RWQCB's Irrigated Lands Regulatory Program was initiated in 2003 to prevent agricultural runoff from impairing surface waters. The program defined irrigated lands as lands where water is applied for producing crops, including row, field, and tree crops, as well as commercial nurseries, nursery stock production, managed wetlands, and rice production.

New waste discharge requirements are being developed under the Long-term Irrigated Lands Regulatory Program that address irrigated agricultural discharges throughout the Central Valley. The Central Valley RWQCB adopted Order No. R5-2012-0116 for the Eastern San Joaquin River Watershed and developed draft requirements for the Western San Joaquin River Watershed as part of the Long-term Irrigated Lands Regulatory Program. Per a letter issued by the Central Valley RWQCB (RWQCB 2016), growers in the project area who own and operate interceptor lines will be covered under the Irrigated Lands Regulatory Program for potential water quality effects from seepage water discharge.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act was enacted in 1969 and established the SWRCB. The Porter-Cologne Act defines water quality objectives as the limits or levels of water constituents that are established for reasonable protection of beneficial uses. Unlike the CWA, the Porter-Cologne Act applies to both surface and groundwater. The Porter-Cologne Act requires that each of nine semi-autonomous RWQCB establish water quality objectives while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. The project area is located within the Central Valley Region, which is the jurisdiction of the Central Valley RWQCB. Beneficial uses, together with the corresponding water quality objectives, are defined as standards, per Federal CWA regulations. Therefore, the regional plans provide the regulatory framework for meeting State and Federal requirements for water quality control. Changes in water quality are only allowed if the change is consistent with the most restrictive beneficial use designation identified by the State, does not unreasonably affect the present or anticipated beneficial uses, and does not result in water quality less than that prescribed in the water quality control plans (RWQCB 2016). Any person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the State, other than into a community sewer system, must file a report of waste discharge with the appropriate regional board.

NPDES Statewide General Construction Stormwater Permit

SWRCB issues the Statewide NPDES general permit for stormwater discharges associated with construction activities (General Construction Permit). This permit requires monitoring for sediment and non-visible pollutants under specified circumstances. Any project that disturbs an area greater than 1 acre requires a Notice of Intent (NOI) to discharge under the General Construction Permit. The General Construction Permit includes measures to eliminate or reduce pollutant discharges through a Stormwater Pollution Prevention Plan (SWPPP), which describes the implementation and maintenance of best management practices (BMPs) to control stormwater and other runoff during and after construction. The General Construction Permit contains receiving water limitations, which require stormwater discharges to not cause or contribute to a violation of any applicable water quality standard.

California Toxic Rule

EPA has established water quality criteria for certain toxic substances via the California Toxic Rule (CTR). The CTR establishes acute and chronic surface water quality standards for waterbodies, such as

inland surface waters and enclosed bays and estuaries, that are designated by the RWQCBs as having beneficial uses protective of aquatic life or human health.

State's Antidegradation Policy

In accordance with the Federal Antidegradation Policy, SWRCB adopted Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Waters in California (more commonly referred to as the State's Antidegradation Policy), which restricts the degradation of surface waters of the State and protects waterbodies where the existing water quality is higher than necessary for the protection of present and anticipated designated beneficial uses. The State Antidegradation Policy is implemented by the RWQCBs.

Waste Discharge Requirements for Dewatering and Other Low Threat Discharges to Surface Waters

The General Order for Dewatering and Other Low Threat Discharges to Surface Waters, RWQCB Order No. R5-2008-0081, is a general permit covering discharges of construction dewatering. Individuals, public agencies, private businesses, and other legal entities discharging relatively pollutant-free wastewaters that pose little or no threat to the quality of surface waters, for a duration of either 4 months or less in duration or have an average dry weather flow less than 0.25 million gallons per day, may obtain authorization under this General Order to discharge.

Central Valley Flood Protection Board Standards

California Code of Regulations (CCR) Title 23, Division 1, Article 8, Sections 111–137 are the primary State standards applicable to the proposed levee improvements. These CVFPB standards govern the design and construction of encroachments that affect all flood control works and floodways, and are used by CVFPB for the regulation of encroachments. The standards apply to any work within the limits of, or which can affect, any authorized flood control project or any adopted plan of flood control. These standards also provide the public with information needed to prepare and submit encroachment applications. Article 8 contains a list of the regulated streams in California and dates of the allowable periods when work in the streams may occur, and contains regulations related to the types of structures that may and may not be placed in floodways, along with associated permit requirements. In addition to levees, Article 8 also covers borrow and spoil materials, borrow excavation activities, and dams and related structures that are located within floodways or could affect flood control works.

Senate Bill 1324

SB 1324 was passed by the State in 1955 to amend Section 8621 of the CWC to "provide that the CVFPB, with the approval of the Department of Finance, may execute in connection with any flood management project a substitute plan which includes provision for the State to construct works of the project when in lieu of acquiring all or any of the lands, easements, or ROW in connection therewith, a saving to the State will result." The bill was also amended to state that in carrying out its provisions, CVFPB may adopt on behalf of the State any necessary revision of any flood management project authorized under Chapter 2, Part 6, Division 6, of the CWC, but that no money shall be expended to meet the requirements of the Federal Government for local cooperation in connection with such projects unless the Federal Government agrees to accept the substitute plan.

2012 Central Valley Flood Protection Plan and 2017 Update

The 2012 Central Valley Flood Protection Plan (CVFPP) and CVFPP 2017 Update apply to the project goals, objectives, design, implementation, and impact analysis, including guidance for improvements to rural-agricultural levees.

California Water Code and California Code of Regulations Title 23

These codes require permits for any project that may encroach upon, improve, alter or affect adopted plans of flood control (including Federal/State flood control systems, regulated streams, and designated floodways under CVFPB's jurisdiction). These codes apply to project design.

Water Code (Section 10750) or Assembly Bill 3030

Assembly Bill (AB) 3030 commonly referred to as the Groundwater Management Act, permits local agencies to develop groundwater management plans (GMP). Subsequent legislation has further amended the Water Code to make the adoption of a management program mandatory if an agency is to receive public funding for groundwater projects, creating an incentive for the development and implementation of plans.

Water Code (Section 10753.7) or Senate Bill 1938

Senate Bill (SB) 1938 requires local agencies, seeking State funds for groundwater construction or groundwater quality projects, to have the following: 1) a developed and implemented groundwater management plan that includes basin management objectives (BMOs) and addresses the monitoring and management of groundwater levels, groundwater quality degradation, inelastic land subsidence, and surface water/groundwater interaction; 2) a plan addressing cooperation and working relationships with other public entities; 3) a map showing the groundwater subbasin the project is in, neighboring local agencies, and the area subject to the groundwater management plan; 4) protocols for the monitoring of groundwater levels, groundwater quality, inelastic land subsidence, and groundwater/surface water interaction; and 5) groundwater management plans with the components listed above for local agencies outside the groundwater subbasins delineated by Bulletin 118 (DWR 2003).

Water Code (Sections 10920 to 10936 and 12924) or Senate Bill X7 6

SB X7 6 established a voluntary statewide groundwater monitoring program and requires that groundwater data collected be made readily available to the public. The bill requires DWR to 1) develop a Statewide groundwater level monitoring program to track seasonal and long-term trends in groundwater elevation; 2) conduct an investigation of the State's groundwater basins delineated by Bulletin 118 and report its findings to the Governor and Legislature no later than January 1, 2012 and thereafter in years ending in five or zero; and 3) work cooperatively with local monitoring entities to regularly and systematically monitor groundwater elevation to demonstrate seasonal and long-term trends. Assembly Bill 1152, Amendment to Water Code Sections 10927, 10932, and 10933, allows local Monitoring Entities to propose alternate monitoring techniques for basins meeting certain conditions and requires submittal of a monitoring plan to DWR for evaluation.

Fish and Game Code (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.

Sustainable Groundwater Management Act

SGMA requires establishment of groundwater sustainability agencies (GSAs) by June 30, 2017. GSAs are local entities tasked with the sustainable management of the groundwater basin(s) through the implementation of a groundwater sustainability plan. The following entities have been proposed to act as GSA for the Delta-Mendota and Merced subbasins, which have been designated as "high priority" by DWR:

- Delta-Mendota subbasin: Farmers Water District, Aliso Water District, Patterson Irrigation District, West Stanislaus Irrigation District, and San Joaquin River Exchange Contractors Water Authority (DWR 2016)
- Merced subbasin: Turner Island Water District (DWR 2016)

Regional and Local

Lower San Joaquin Levee District

The LSJLD was created in 1955 by a special act of the State Legislature to operate, maintain, and repair levees, bypasses, and other facilities built in connection with the Lower San Joaquin River Flood Control Project. The district encompasses approximately 468 square miles (300,000 acres) in Fresno, Madera, and Merced Counties.

Merced County Integrated Regional Water Management Plan

The Merced County Integrated Regional Water Management Plan (MIRWMP) addresses water supply, water quality, flood risk reduction, enhancement of aquatic and riparian habitat, and improvement of the County's recreational opportunities (MIRWMP 2013).

Merced County 2030 General Plan

The Merced County 2030 General Plan's Public Services and Facilities Element addresses storm drainage and flood control in Merced County and also identifies the policies that relate to Surface Water Quality:

- **Policy NR-3.2:** Require minimal disturbance of vegetation during construction to improve soil stability, reduce erosion, and improve stormwater quality.
- **Policy W-2.2:** Prepare updated development regulations, such as BMPs, that prevent adverse effects on water resources from construction and development activities.
- **Policy W-2.4:** Encourage agriculture and urban practices to comply with the requirements of the RWQCB for irrigated lands and confined animal facilities, which mandate agricultural practices that minimize erosion and the generation of contaminated runoff to ground or surface waters by providing assistance and incentives.

Pesticide Use Permits

In addition to Federal and State oversight, County Agricultural Commissioners in California also regulate the sale and use of pesticides and issue use permits for applications of pesticides that are

deemed as restricted materials by DPR. County Agricultural Commissioners collect pesticide use reports and investigate incidents and illnesses.

3.11.3 Environmental Effects

No Action Alternative

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

Restoration Flows are limited 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 are anticipated that would allow Restoration Flows up to approximately 580 cfs in the Eastside Bypass *without the proposed project*. Other proposed Reclamation realty actions to address adverse seepage and allow up to approximately 1,300 cfs in the Eastside Bypass, and future subsequent projects to increase Restoration Flows in the Eastside Bypass up to the approximately 2,500 cfs, would not occur without the proposed project levee improvements increasing safe channel conveyance capacity to 1,300 cfs.

The Restoration Goal of the Settlement, including conveying up to 4,500 cfs throughout the Restoration Area, would not occur under the no action alternative. Compared to existing conditions, the no action alternative provides additional flows in the Eastside Bypass. 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 in SJRRP 2011), with the caveat that Restoration Flows could not be released that exceed approximately 580 cfs in the Eastside Bypass.

Impacts to hydrology and flood management, groundwater, surface water supplies and facilities, and surface water quality from the increases in Restoration Flows from approximately 300 cfs under existing conditions to approximately 580 cfs under no action alternative conditions would be expected to be as described in the SJRRP Draft PEIS/R (SJRRP 2011). The program- and project-level impacts, including cumulative impacts, of flow-related actions related to the SJRRP were analyzed in detail in the SJRRP PEIS/R (Chapter 11.0, "Hydrology – Flood Management," Chapter 12.0, "Hydrology – Groundwater," Chapter 13.0 – "Hydrology – Surface Water Supplies and Facilities," Chapter 14.0, "Hydrology – Surface Water Quality," and Chapter 26.0, "Cumulative Impacts," in SJRRP 2012), which are all incorporated by reference. Hydrologic and water quality impacts relative to the Eastside Bypass would be mitigated to less-than-significant levels because Reclamation would carry out the following mitigation measures identified in the SJRRP PEIS/R as follows (full language of mitigation measures can be found in the chapters referenced above):

- Mitigation Measure FLD-1: Implement Design Standards to Minimize Risk of Loss, Injury, or Death Involving Flooding (program level);

- Mitigation Measure GRW-1a: Prepare and Implement a Stormwater Pollution Prevention Plan That Minimizes the Potential Contamination of Surface Waters, and Complies with Applicable Federal Regulations Concerning Construction Activities (program level);

- Mitigation Measure GRW-1b: Conduct Phase I Environmental Site Assessments (program level);

- Mitigation Measure SWS-1: Provide Alternate Temporary or Permanent River Access to Avoid Diversion Losses (program level);

- Mitigation Measure SWQ-1A: Prepare and Implement a Stormwater Pollution Prevention Plan that Minimizes the Potential Contamination of Surface Waters, and Complies with Applicable Federal Regulations Concerning Construction Activities (program level); and

- Mitigation Measure SWQ-1B: Conduct and Comply with Phase I Environmental Site Assessments in the Restoration Area (program level).

Hydrology and water quality impacts found to be potentially significant and unavoidable in SJRRP 2011) were as follows (full language of impact analysis can be found in SJRRP Draft EIS/R Chapter 12.0 (SJRRP 2011), "Hydrology – Groundwater," and Chapter 26.0, "Cumulative Impacts"):

- Impact GRW-4: Changes in Groundwater Levels in CVP/SWP Water Service Areas (project level),

- Impact GRW-5: Changes in Groundwater Quality in CVP/SWP Water Service Areas (project level), and

- Cumulative Impact: Changes in Groundwater Levels and Groundwater Quality in CVP/SWP Water Service Areas.

Proposed Project

a) Violate any water quality standards or waste discharge requirements? *(Less-than-Significant Impact with Mitigation Incorporated)*

The proposed project would involve numerous activities in or near a water conveyance facility, the Eastside Bypass: removing the Merced NWR weirs, improving the Dan McNamara Road low-flow crossing of the Eastside Bypass, providing fish passage at the Eastside Bypass Control Structure, and improving Eastside Bypass levees near Sand Slough. These construction-related project activities and any related runoff could negatively affect surface water quality in the Eastside Bypass. Construction-related ground-disturbing activities could temporarily cause soil erosion and increased sedimentation in the Eastside Bypass and continue downstream into the San Joaquin River. Construction equipment could discharge waste (petroleum products and/or other construction-related waste) that could inadvertently be introduced into the waterways through onsite or offsite spills. These potential impacts could occur immediately if discharged into water during the construction activity, or could be mobilized in the future during flood flows or Restoration Flows in the Eastside Bypass if discharged under dry conditions. This impact would be potentially significant.

DWR and/or Reclamation would implement Mitigation Measure SWQ-1 prior to and during construction activities to reduce this impact.

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.

Implementing Mitigation Measure SWQ-1 would reduce this impact to a less-than-significant level because DWR and/or Reclamation and the construction contractor(s) would be required to comply with BMPs that reduce the potential for construction-related erosion or contamination and meet strict RWQCB requirements.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?
(Less-than-Significant Impact)

Project construction activities may result in a temporary decrease in groundwater levels. Excavation and trenching activities during construction may encounter groundwater in the shallow aquifer. The excavated area would need to be dewatered during construction and the resulting water would be contained and treated in accordance with all applicable State and Federal regulations before being discharged. Dewatering during construction could cause temporary groundwater level declines in the shallow aquifer in the project vicinity during construction activities; however, construction dewatering would not affect the deeper-confined aquifer used by most production wells in the area. These potential impacts would only occur during construction, and any dewatering activities would cease after construction is complete.

The proposed project includes construction of a discontinuous levee cutoff wall that would extend to a depth of 35 feet below the surrounding ground surface. In areas where the cutoff wall is constructed, the wall could act to reduce the localized flow of water between the Eastside Bypass and the adjacent shallow aquifer. In any gaining areas affected by the cutoff wall, the cutoff wall could increase groundwater levels on the landside of the wall as water that would otherwise discharge into the Eastside Bypass could backup underground behind the cutoff wall. The relationship between the Eastside Bypass and the underlying groundwater aquifer is dynamic, and varies depending on the location along the reach, the type of water year, and the season. Because of this variation, and because the cutoff wall would be discontinuous along the reach, any effect on groundwater would be localized. Flow around the cutoff wall in other portions of the bypass would continue to allow regional recharge and discharge to and from the river and there would be no substantial interruption to existing regional subsurface flow patterns. As discussed above in Section 3.11.1, “Environmental Setting,” the Eastside Bypass is generally a losing stream in the project area; therefore, the flow increase in the Eastside Bypass could contribute to increased shallow groundwater levels along and adjacent to the bypass, as water infiltrates the bed and bank.

Any impacts resulting from infiltration or seepage would be avoided or substantially reduced by taking the appropriate actions Reclamation is already committed to in the SJRRP Physical Monitoring and Management Plan and/or the Seepage Management Plan included in the SJRRP Draft PEIS/R (SJRRP 2011) and already being implemented by Reclamation. More specifically, 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 with increases to approximately 1,300 cfs and eventually approximately 2,500 cfs with the proposed project and other Reclamation seepage management actions. These plans provide a means to reduce or

avoid risk of seepage impacts through a combination of monitoring and analyses to better understand and predict system response to Restoration activities, development of thresholds and response actions designed to reduce or avoid undesirable outcomes, and projects to prevent future impacts while allowing increased flows. In addition, increased recharge along losing reaches of the Eastside Bypass that have depleted groundwater levels would be beneficial. Overall, the impact to localized surface groundwater levels could be beneficial because of the added Restoration Flows into the Eastside Bypass above approximately 580 cfs with the proposed project.

Removing the two Merced NWR weirs and installing a new groundwater well would change the way the refuge uses its surface water and groundwater supplies in the project vicinity. The refuge relies on surface water supplies from the Merced Irrigation District and has several groundwater wells that can be used for water supply to apply to its wetland areas within and adjacent to the Eastside Bypass. Removing the weirs would preclude the Refuge from using surface supplies in the Eastside Bypass.

The new well would have a capacity of 1,500 gallons per minute (gpm) and would be screened at about 150 to 200 feet below ground surface, making withdrawals from the shallow aquifer. Simulated future groundwater conditions for different year types show that water levels in the shallow aquifer slightly decrease considering both Restoration Flows and the addition of the new Merced NWR supply well. Design parameters of the new replacement well were determined based on a review of well completion reports of 35 wells drilled within a 3-mile radius of the proposed well site. While the new well would likely cause a very small decline in groundwater levels in the shallow aquifer, the current groundwater levels are very close to the surface (approximately 4-11 feet below ground surface for the past 5 years). The neighboring landowner currently operates a drainage system to maintain water levels suitable for agricultural uses. This drainage system was installed to reduce groundwater levels for agricultural purposes, which indicates that groundwater levels are (at times) too shallow to maintain agricultural production. Given that the neighboring landowner already takes steps to actively reduce groundwater levels, a small decline in groundwater levels in the shallow aquifer introduced by the new replacement well would not likely adversely affect conditions in the shallow aquifer. Therefore, impacts to groundwater levels would be less than significant.

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. Two sites are under consideration, and an exploratory well would be drilled as a near-term action. The assessment would include a location that would limit the impacts of subsidence. For the reasons described above, impacts to the deep-water aquifer would not occur, and changes to groundwater levels in the shallow aquifer in the project area would be less than significant.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial on- or off-site erosion or siltation?

(Less-than-Significant Impact with Mitigation Incorporated)

The proposed project would remove the two Merced NWR weirs, replace a groundwater well, modify the Dan McNamara Road low-flow crossing to improve fish passage at the Eastside Bypass, provide fish passage at the Eastside Bypass Control Structure, and improve levees in the Eastside Bypass near Sand Slough. These construction-related project activities and runoff from them could negatively affect surface water quality in the Eastside Bypass. Construction-related ground-disturbing activities could

temporarily cause soil erosion and increased sedimentation in the Eastside Bypass and continue downstream into the San Joaquin River. This impact would be potentially significant.

DWR and/or Reclamation would implement Mitigation Measures SWQ-1 and SWQ-2 before and during project construction to reduce this impact.

> **Mitigation Measure SWQ-1: Develop and Implement a Stormwater Pollution Prevention Plan.**
>
> Please refer to Impact SWQ-1 above for the full text of this mitigation measure.
>
> **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.

Implementing Mitigation Measures SWQ-1 and SWQ-2 would reduce this impact to a less-than-significant level because BMPs would be used to reduce erosion during construction, and because DWR and/or Reclamation will implement a turbidity monitoring program to ensure that construction activities do not increase turbidity in the Eastside Bypass above standards identified in the Basin Plan and meet strict RWQCB requirements.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding?
(Beneficial Impact)

The proposed project includes weir removals and a new replacement well at the Merced NWR, fish passage improvements at the Dan McNamara Road crossing and Eastside Bypass Control Structure, and

Eastside Bypass levee improvements. These activities would have minor effects on Eastside Bypass bathymetry and operations, but are not expected to substantially alter existing local or regional drainage patterns or the rate or amount of surface runoff, since these changes would not reduce the ability of the Eastside Bypass to convey flood and Restoration Flows. Conversely, the ability of the Eastside Bypass to convey design flows and effectively act as a flood bypass facility would be improved by the proposed project, especially be improving key Eastside Bypass levee reaches with cutoff walls to current USACE standards. This impact would be a beneficial impact.

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?
(No Impact)

The proposed project would not alter the capacity of existing or planned stormwater drainage systems. In addition, the proposed project would not provide substantial additional sources of polluted runoff (please see the discussion under a) and Mitigation Measures SWQ-1 and SWQ-2). Therefore, the proposed project would have no impact.

f) Otherwise substantially degrade water quality?
(Less-than-Significant Impact)

Surface water quality impacts are described above in subsections a) and c). Groundwater quality impacts are described herein. Due to the varying degrees of surface-groundwater interaction in the project area, it is possible that groundwater levels surrounding the Eastside Bypass may increase following project implementation due to Restoration Flows. Surface water quality is generally better than groundwater quality in the project area, and increased groundwater levels due to increased seepage of surface water into the shallow groundwater system could improve groundwater quality in the project area. Surface waters percolating into groundwater could also bring unknown contaminants into the groundwater through seepage. It is expected that no substantial changes would occur that degrade surface water such that groundwater quality would be significantly affected; therefore, impacts to groundwater quality in the project area from the proposed project would be less than significant.

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?
(No Impact)

The proposed project is located within the 100-year floodplain, designated Zone A, an area of special flood hazards designated by the Federal Emergency Management Agency. The proposed project would not directly or indirectly cause construction of any housing whatsoever. Therefore, no impact would occur.

h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?
(Beneficial Impact)

The project would place, modify, and remove several structures within the 100-year flood hazard area of the Eastside Bypass.

The existing Merced NWR weir system includes two individual weirs (upstream and downstream along the Eastside Bypass). The existing structures are 6- to 6.5-feet tall and span the Eastside Bypass channel. These structures currently restrict flows, including flood flows. Removing these structures would reduce existing flood-flow restrictions in the Eastside Bypass and, as a result, would slightly reduce flood risk. The new groundwater well within the Merced NWR would be within the Eastside Bypass and may affect flood flows. However, the design of the well would result in negligible effects on flood elevations, specifically with respect to CVFPB's 0.1-foot water level increase criterion.

Under existing conditions, Dan McNamara Road creates an obstruction to flows in the Eastside Bypass. During Restoration Flows and flood events, flows exceeding 25 cfs cannot pass through the existing culverts due to underdesign and siltation, and flood flows overtop the road at flows exceeding 25 cfs. Once overtopping of Dan McNamara Road occurs, the roadbed contributes to increased bottom roughness and partially obstructs flood flows. Replacing the undersized and silted-in culverts at the Dan McNamara Road crossing with box culverts designed to pass flood and Restoration Flows would therefore reduce existing restrictions on flood flows and Restoration Flows. To keep grazing cattle from crossing the road or getting into the culverts, break away fencing (or some other exclusion cattle 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; however, these measures would not interfere with flood flows, which would readily pass through the fence and piping. If DWR elects to remove the culvert without replacement, there would be no new structures that would impede or redirect flood flows.

Fish passage upgrades at the Eastside Bypass Control Structure would install a new channel through the existing control structure to support fish passage. The proposed channel upgrades upstream and downstream of the structure could add roughness to the Eastside Bypass; however, a one-dimensional model was developed to inform design features and ensure that the rock ramp meets criteria for passing flood and Restoration Flows. For the segment downstream of the proposed fish ramp, the water surface elevation at 8,000 cfs would be the same for both the existing condition and the condition after project construction. Over the length of the ramp, water surface changes would range from a 0.02-foot decrease to a 0.06-foot increase when compared to existing conditions. 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 after project construction.

Operating conditions at the modified Eastside Bypass Control Structure would influence how the flow is split between the Eastside Bypass and the Mariposa Bypass. Following project construction, nearly 800 cfs of additional flows would be diverted through the Eastside Bypass Control Structure during flood flows when compared to the existing condition. 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. Based on historical operations, this would likely only be needed during extraordinary flood conditions.

Levee improvements along the Eastside Bypass near Sand Slough would include the installation of a cutoff wall. A cutoff wall would strengthen levees and reduce potential for levee failure without interfering with flood flows. The Eastside Bypass levee improvements are designed to effectively pass additional Restoration Flows up to 2,500 cfs in the Eastside Bypass without significantly increasing flood risk. The improved levee reaches designed to meet current USACE standards could also improve flood conveyance in the Eastside Bypass. Strengthening the Eastside Bypass levees with cutoff walls and reducing the risk of levee failure at this location would potentially increase the risk of levee

overtopping or failure in downstream reaches. Changes in water level frequencies within the system would indicate a redirecting of flood flows due to the upstream channel capacity or floodplain modifications. However, SJRRP modeling of estimated annual damages (EAD) showed little to no change in water level frequencies downstream. Additionally, downstream from the overall SJRRP Restoration Area, the changes in water level frequencies and EAD are smaller than within the Restoration Area and separated by distance from the potential effects of redirected flows (this impact was addressed in the SJRRP Draft PEIS/R (SJRRP 2011) under Impact FLD-1 on pages 11-31 to 11-34 and was determined to be less than significant). Furthermore, impacts from redirected flows would not occur as channels downstream are capable of safely conveying the increased Restoration Flows from approximately 300/580 cfs up to approximately 2,500 cfs, which is the limit of Restoration Flows that can be safely conveyed in the Eastside Bypass with the proposed project. Ultimately, additional levee improvements would be needed under future projects to safely convey additional Restoration Flows up to 4,000 cfs.

Project construction will abide by levee design criteria developed by USACE in *Design and Construction of Levees Engineering and Design Manual* (Manual No. 1110-2-1913), *Engineering Manual: Slope Stability* (Manual No. 1110-2-1902), and *Design Guidance for Levee Underseepage* (Engineering Technical Letter No. 1110-2-569) and all project designs would have a minimum Factor of Safety Level of 1.4, as required by the SJRRP.

Additionally, under the SJRRP, Reclamation would implement three integrated measures that would collectively avoid a potentially significant increase in the risk of flood damage or levee failure during Restoration Flows due to underseepage, through-seepage, erosion, or landside slope stability issues within the Restoration Area, including the Eastside Bypass and downstream. All project elements would be subject to these same provisions, which include: (1) establishing a Channel Capacity Advisory Group and determining and updating estimates of then-existing channel capacities as needed; (2) maintaining Restoration flows below estimates of then-existing channel capacities; and (3) closely monitoring erosion and performing maintenance and/or reducing Restoration Flows as necessary to avoid erosion-related impacts. These provisions are addressed in greater detail in the SJRRP Draft PEIS/R under a section called, “Minimize Flood Risk from Interim and Restoration Flows,” on pages 2-22 to 2-28, which are incorporated by reference (SJRRP 2012).

Consequently, the overall impacts from structures placed in the flood hazard area, as well as their effects on impeding or redirecting flood flows would not cause any significant impacts and would be beneficial.

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam? *(Beneficial Impact)*

The project area is outside of any dam failure inundation zones (Merced County 2016).

The proposed project would improve Eastside Bypass levees and provide beneficial effects related to flooding as described in subsection h) immediately above. Therefore, this impact would be beneficial.

j) Inundation by seiche, tsunami, or mudflow? *(No Impact)*

Since the project site is many miles inland from the coast and San Francisco Bay, the project site is not exposed to flooding risks from tsunamis. Additionally, the project site and surrounding areas are flat,

which eliminates the potential for mudflows on the project site. The project site does not contain large bodies of standing water that could be subject to a seiche. There would be no impact.

3.12 Land Use and Planning

Environmental Issue		Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Benifiicial Impact
XII.	**LAND USE AND PLANNING – Would the project:**					
k)	Physically divide an established community?	☐	☐	☐	☒	☐
l)	Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒	☐

3.12.1 Environmental Setting

Land Uses and Zoning

Land uses along the Eastside Bypass consist of agriculture and open space. Apart from some ponding in low-lying areas, the bypass generally remains dry until it is required to convey flood flows or Restoration Flows. The flood season typically lasts from November 15 to June 15 of each water year, with rainfall contributing to higher flows during the early part of the flood season, and snowmelt contributing to flows during the latter part of the flood season. In the Grasslands Wildlife Management Area, 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. The project area consists of annual and perennial grasslands, croplands, and managed wetlands. Croplands include irrigated hayfields, irrigated grain crops, and pasture.

The project area encompasses a portion of the Merced NWR and the Grasslands Wildlife Management Area. Established in 1951, the Merced NWR encompasses 10,258 acres of wetlands, native grasslands, vernal pools, and riparian areas. The Merced NWR hosts the largest wintering populations of lesser Sandhill cranes and Ross' geese along the Pacific Flyway, along with other visiting waterfowl, water birds, and shorebirds. Public access is provided from Sandy Mush Road, and there are wildlife viewing opportunities including three trails, an auto tour route, and wildlife observation platforms. Public waterfowl hunting opportunities are also available. In addition to managed natural habitats, the Merced NWR contains cultivated corn and winter wheat crops, as well as irrigated pasture for wildlife. It also incorporates a livestock grazing program in partnership with local ranchers and farmers. The Grasslands Wildlife Management Area contains 70,000 acres of private wetlands and 53,000 acres of State and Federal lands, all of which are held under conservation easements. General public access in the management area is not permitted, but there are private waterfowl hunting clubs.

DWR employs a land classification system that includes four general categories of land uses: Agriculture, Native Classes, Urban, and Not Surveyed. The most recent DWR land use survey for Merced County was conducted in 2002 (DWR 2002). Based on the results of that survey, there are two

DWR land use classifications in the project area—Agriculture and Native Classes—which are described below.

- **Agriculture**—This category consists of both agricultural and semi-agricultural classes. In mapping land uses, DWR groups agricultural land uses into a variety of subcategories and types. The subcategories consist of grain and hay crops (e.g., barley and oats); rice; field crops (e.g., cotton, corn, and beans); pasture (e.g., alfalfa); truck (e.g., onions and garlic), nursery, and berry crops; deciduous fruits and nuts (e.g., almonds and pistachios); citrus and subtropical (e.g., oranges); vineyards (e.g., table, wine, and raisin grapes); and idle areas (e.g., fallow fields). The "Agriculture" category, as defined by DWR, also includes semi-agricultural classes (e.g., dairies and livestock feed lots).

- **Native Classes**—This category consists of areas of native vegetation, surface water, and barren and wasteland areas. Vegetation includes forest land (e.g., oak woodland) and other types of native vegetation (e.g., grassland), riparian vegetation, surface water, and barren and wasteland areas (e.g., mine tailings).

The project area is designated by the *2030 Merced County General Plan* as Rural Agricultural and is zoned for agricultural use (Merced County 2013). Most of the Merced County land area within the San Joaquin Valley is designated as Rural Agricultural. The nearest urban centers are in Merced (approximately 10 miles to the northeast) and Los Banos (approximately 11 miles to the southwest).

3.12.2 Regulatory Setting

Federal

There are no Federal laws, regulations, plans, or ordinances related to land use and planning that apply to the proposed project elements outside of the Merced NWR. Within the Merced NWR, numerous Federal laws, regulations, and policies related to land use and planning apply:

Laws

- National Wildlife Refuge System Administration Act of 1966
- National Wildlife Refuge System Improvement Act of 1997

Regulations

- National Wildlife Refuge System regulations:
  - Administrative Provisions (50 C.F.R. 25)
  - Public Entry and Use (50 C.F.R. 26)
  - Land Use Management (50 C.F.R. 29)

Policies

- National Wildlife Refuge System Compatibility policy (603 FW 2)

- National Wildlife Refuge System Appropriate Refuge Uses policy (603 FW 1)

- National Wildlife Refuge System Mission, Goals, and Purposes policy (601 FW 1)

- National Wildlife Refuge System Biological Integrity, Diversity, and Environmental Health policy (601 FW 3)
- National Wildlife Refuge System Rights of Way & Road Closings policy (340 FW 3)
- Final Policy on the National Wildlife Refuge System and Compensatory Mitigation Under the Section 10/404 Program

State

Public Trust Doctrine

The common law Public Trust Doctrine protects sovereign lands, such as tide and submerged lands and the beds of navigable waterways, for the benefit, use, and enjoyment of the public. These lands are held in trust by the State of California for the statewide public and for uses that further the purposes of the trust. The foundational principle of the Public Trust Doctrine is that trust lands belong to the public and are to be used to promote publicly beneficial uses that connect the public to navigable waterways. However, the Eastside Bypass is not considered to be a navigable water (USACE 2017).

State Planning and Zoning Laws

California Government Code (CGC) Section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. A general plan is a comprehensive, long-term strategy document that sets forth the expected location and general type of physical development expected in the city or county developing the document. The plan also may consider land outside its boundaries that, in the city's or county's judgment, may affect land use activities within its borders. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city's or county's vision for the area. The general plan is a long-range document that typically addresses development over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow flexibility in the approach taken to achieve the plan's goals.

The State Zoning Law (CGC Section 65800 et seq.) establishes that zoning ordinances, which are laws that define allowable land uses in a specific district, are required to be consistent with the general plan and any applicable specific plans. When amendments to the general plan are made, corresponding changes in the zoning ordinance may be required within a reasonable time to ensure that the land uses designated in the general plan also would be allowable by the zoning ordinance (CGC 65860[c]).

Local

Merced County General Plan

The *2030 Merced County General Plan* (General Plan) provides an inventory of land supply within the County, and projects the amount and location of land and density, and intensity of development that will be required to accommodate future populations and economic growth through 2030 (Merced County 2013). General Plan policies related to the proposed project are largely focused on maintaining and enhancing agriculture and open space throughout most of the County while directing urbanization to cities and existing rural population centers.

The project area is designated for rural agricultural (A) land uses. The General Plan states that this land use designation provides for cultivated agricultural practices which rely on good soil quality, adequate water availability, and minimal slopes (Merced County 2013).

Merced County Zoning Code

The Merced County Zoning Code regulates the location of land uses and the development standards to which new development must be built. The purpose of establishing zoning designations is to ensure that neighboring uses are compatible with each other and to regulate and protect the uses occupying the land. Each zoning designation contains specific regulations controlling the uses of the land; the density of population and structures; uses, location, and dimensions of structures; open space and setback requirements; and access considerations.

General descriptions of agricultural zoning in Merced County are provided in Zoning Code Chapter18.02.010 as follows:

- The General Agricultural (A-1) Zone is intended for intensive farming that is dependent upon higher-quality soils, water availability, and relatively flat topography, and agricultural commercial and/or industrial uses dependent on proximity to urban areas or location in sparsely populated low traffic areas. Parcels smaller than 40 acres down to a minimum of 20 acres can be considered where agricultural productivity of the property will not be reduced.

- The General Agricultural (A-1-40) Zone allows for a wide variety of farming operations including agricultural commercial/industrial uses that are dependent on medium- to higher-quality soils and water availability on parcels of 40 acres or larger away from urban areas.

- The Exclusive Agricultural (A-2) Zone is intended to allow for considerably expanded agricultural enterprises, mainly due to the requirement of larger size land parcels which are more economically suitable to support farming activities occurring in the area. The 160-acre minimum parcel size of this zone allows for farming and ranching operations and a variety of open space functions that are typically less dependent on soil quality and water for irrigation and are often connected more with foothill and wetlands locations, grazing and pasture land, and wildlife habitat and recreational areas.

The Merced County Zoning Code Chapter 18.02.020 indicates that the following representative land uses (among others) are generally allowed within areas that are zoned agricultural, although some uses require a conditional use permit: agricultural processing plants, crop/orchard/vineyard production, animal confinement facilities, fertilizer plants, ranch/farm offices, museums, churches, parks and recreational facilities, wildlife management areas, energy generation facilities, mining and aggregate storage yards, oil/gas wells, wineries and breweries, limited rural residential housing primarily associated with agricultural uses (but also includes bed and breakfast inns), nurseries, produce stands, animal hospitals, cemeteries, kennels, airports, and transportation equipment yards.

3.12.3 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) Physically divide an established community? *(No Impact)*

The project area is located in an unincorporated, rural agricultural area of Merced County that includes vast areas of open space. Housing in the project vicinity is very limited. There are no houses in the area where the project elements would be constructed; only a few, widely scattered rural residences are present to the east of the project area. Therefore, the proposed project would not physically divide an established community and there would be no impact.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect? *(No Impact)*

An evaluation of the proposed project's consistency with land use and zoning classification is presented below. However, it should be noted that any inconsistency of the proposed project with land use and zoning code designations is an issue related to land use regulation rather than a physical environmental consequence of the project. Where the project could conflict with a land use plan or policy that was adopted specifically for the purposes of preventing or reducing an adverse environmental effect, such potential conflicts are evaluated as stand-alone environmental impacts within each topic area of this IS/EA. For example, the potential for project-related noise to exceed Merced County General Plan standards is evaluated in Section 3.14, "Noise," the potential for project-related facilities to conflict with agricultural land uses and Williamson Act contracts is evaluated in Section 3.2, "Agriculture and Forestry Resources," potential conflicts with recreational policies established at the Merced NWR are evaluated in Section 3.18, "Recreation," and potential conflicts with an adopted natural communities conservation plan or habitat conservation plan are evaluated in Section 3.5, "Biological Resources: Vegetation and Wildlife." Impacts related to cultural resources (including Native American tribal concerns) are presented in Sections 3.6, "Cultural Resources," and 3.21, "Indian Trust Assets."

Project implementation would not alter the existing land uses in the project area. All of the project elements would be consistent with the existing agricultural and open space land uses and zoning. From a planning perspective, the proposed project would be consistent with policies in the *2030 Merced County General Plan* related to land use, open space, and natural resources. Therefore, the proposed project would not entail activities that would conflict with an applicable land use plan, policy, or regulation, and there would be no impact.

3.13 Mineral Resources

Environmental Issue		Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XIII.	**MINERAL RESOURCES – Would the project:**					
a)	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒	☐
b)	Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒	☐

3.13.1 Environmental Setting

The Surface Mining and Reclamation Act of 1975 (SMARA) requires the State Geologist to classify land based on the known or inferred mineral resource potential of that land. The primary goal of mineral land classification is to help ensure that the land's mineral resource potential is recognized and considered in the land-use planning process.

In compliance with SMARA, the California Geological Survey (CGS) has established the mineral resource zone (MRZ) classification system shown in **Table 3.13-1** to denote both the location and significance of key extractive resources.

Table 3.13-1. California Geological Survey Mineral Land Classification System

Classification	Description
MRZ-1	Areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources.
MRZ-2a	Areas underlain by mineral deposits where geologic data indicate that significant measured or indicated resources are present.
MRZ-2b	Areas underlain by mineral deposits where geologic information indicates that significant inferred resources are present.
MRZ-3a	Areas containing known mineral occurrences of undetermined mineral resource significance.
MRZ-3b	Areas containing inferred mineral occurrences of undetermined mineral resource significance.
MRZ-4	Areas of no known mineral occurrences but where geologic information does not rule out either the presence or absence of significant mineral resources.

Notes: MRZ = Mineral Resource Zone
Source: Clinkenbeard 1999

Historic mineral production in Merced County has included gold, silver, platinum, mercury, copper, common clay, construction aggregate, and gypsum. However, for more than 50 years the primary mineral commodity produced in Merced County has been construction aggregate. Approximately 38 square miles of Merced County (divided by CGS into 10 resource areas), have been classified MRZ-2a

or MRZ-2b for concrete aggregate. The 10 resource areas contain an estimated 1.18 billion tons of concrete aggregate resources, with approximately 574 million tons in western Merced County and approximately 605 million tons in eastern Merced County. (Due to the cost of transporting aggregate, two distinct market regions exist in Merced County: one in the west and one in the east.) (Clinkenbeard 1999:VI.)

Most of the San Joaquin Valley within Merced County, including the project area, is classified as MRZ-1—areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources. Clinkenbeard (1999: Plate 3) notes that the MRZ-1 classification is generally applied to areas of the Dos Palos Alluvium, Modesto Formation, Valley Springs Formation, Kreyehagen Shale, and Moreno Shale. As discussed in Section 3.8, "Geology and Soils" and Section 3.15, "Paleontological Resources," the project area is underlain by the Modesto Formation.

Based on a review of the Natural Resources Element of the *2030 Merced County General Plan* (Merced County 2013) and the *2030 Merced County General Plan Update Draft Program Environmental Impact Report* (Merced County 2012), the County-designated mineral resources are the same as those identified by CGS in the mineral land classification report prepared by Clinkenbeard (1999).

A review of California Division of Oil, Gas, and Geothermal Resources (DOGGR) data indicates that Noble Energy Corporation's plugged oil well no. 04720088 is located immediately adjacent to, but outside of, the southernmost portion of the project area where levee improvements are proposed. There are no other oil or gas wells either within or adjacent to the project area. (DOGGR 2017.)

3.13.2 Regulatory Setting

Federal

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

State

California Surface Mining and Reclamation Act

SMARA (PRC Section 2710 et seq.) addresses surface mining of minerals and requires the prevention of adverse environmental effects caused by mining, the reclamation of mined lands for alternative uses, and the elimination of hazards to public health and safety from the effects of mining activities. SMARA is implemented through ordinances for permitting developed by local government "lead agencies" that provide the regulatory framework under which local mining and reclamation activities are conducted. The State Mining and Geology Board reviews the local ordinances to ensure that they meet the procedures established by SMARA. The general process consists of obtaining a permit to mine material, implementing a reclamation plan to return the land to a useable condition, and providing financial assurances to ensure the feasibility of the reclamation plan. The process of reclamation includes maintaining water and air quality and minimizing flooding, erosion, and damage to wildlife and aquatic habitats caused by surface mining. SMARA applies to an individual or entity that would disturb more than 1 acre or remove more than 1,000 cubic yards of material through surface mining activities. However, the provisions of PRC Section 2714(b) indicate that DWR is not required to obtain a SMARA permit or secure approval of a reclamation plan to conduct soil excavation from borrow pits for flood control projects, provided that soil borrow is obtained from lands owned or leased, or upon which

easements or ROW have been obtained, by DWR. Thus, PRC Section 2714(b) would not apply to the levee improvements under the proposed project.

Local

Merced County General Plan

The *2030 Merced County General Plan* Natural Resources Element (Merced County 2013) identifies the following policy related to minerals that is applicable to the proposed project.

- **Policy NR-3.4: New Development Compatibility.** Ensure that new development is compatible with existing and potential surface mining areas and operations as identified on the Mineral Resource Zone Maps prepared by the State Division of Mines and Geology and other mineral resource areas identified by the County. [...]

3.13.3 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) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state? *(No Impact)*

The project area is classified as MRZ-1—areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources (Clinkenbeard 1999: Plate 3). Furthermore, DOGGR (2017) well data indicate there are no oil or gas wells within the project area. Thus, there would be no impact.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan? *(No Impact)*

Individual counties retain the authority to designate locally important mineral resources within their general plans. However, based on a review of the Natural Resources Element of the *2030 Merced County General Plan* (Merced County 2013) and the *2030 Merced County General Plan Update Draft Program Environmental Impact Report* (Merced County 2012), the County designated mineral resources are the same as those identified by CGS in the mineral land classification report prepared by Clinkenbeard (1999). Thus, there is little likelihood for the presence of significant mineral resources in the project area, and there would be no impact.

3.14 Noise

	Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XIV.	**NOISE – Would the project:**					
a)	Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?	☐	☒	☐	☐	☐
b)	Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐	☐
c)	A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐	☐
d)	A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐	☐
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒	☐
f)	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒	☐

3.14.1 Environmental Setting

Noise

Noise generally can be defined as unwanted sound. Sound, traveling in the form of waves from a source, is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level (referred to as sound level) is the most common descriptor used to characterize the loudness of an ambient sound level. It is measured in decibels (dB), with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain.

When assessing potential noise impacts, sound is measured in a manner corresponding to the human ear's greater sensitivity to mid-range frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted dB (dBA). Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. **Table 3.14-1** summarizes some representative noise sources and their corresponding A-weighted noise levels.

Table 3.14-1. Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noise urban area, daytime		
Gas lawnmower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quite suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Notes:
dBA = A-weighted decibel scale
mph = miles per hour
Source: California Department of Transportation 2013a

A key concept in evaluating potential noise impacts is the perceived effect of incremental increase in existing noise levels. **Table 3.14-2** presents the effect of increasing noise levels. For example, the table shows that an increase of 3 dBA is barely perceptible, an increase of 5 dBA is noticeable, and a 10 dBA increase would be perceived by someone to be a doubling of noise.

Table 3.14-2. Decibel Changes, Loudness, and Energy Loss

Sound Level Change (dBA)	Relative Loudness/Impact	Acoustical Energy Gain (%)
0	Reference	0
+3	Barely Perceptible Change	50
+5	Readily Perceptible Change	67
+10	Twice as Loud	90
+20	Four Times as Loud	99
+30	Eight times as Loud	99.9

Source: Federal Highway Administration 2011

Vibration

To assess the potential for structural damage associated with vibration, the vibratory ground motion in the vicinity of the affected structure is measured in terms of peak particle velocity (PPV) in the vertical and horizontal directions, typically in units of inches per second (in/sec). The PPV is defined as the maximum instantaneous peak of the vibration signal. Caltrans estimates that frequent generation of

vibration at levels exceeding 0.3 in/sec can damage older residential structures and cause annoyance to humans (Caltrans 2013b).

Existing Noise and Vibration Sources

The existing noise and vibration environment near the project area is influenced by various transportation and non-transportation sources. Vehicular traffic would be the predominant source of transportation-related noise, and agricultural-related activities would be primarily responsible for non-transportation noises.

Transportation Sources

Because the project site is more than 5 miles from the nearest State highway, mainline railroad, or airport, transportation is not a substantial source of noise in the project vicinity. However, construction-related haul trucks using West El Nido Road to access the levee and staging area would be traveling approximately 700 feet south of nearby residences.

Non-transportation Sources

This section describes noise levels from non-transportation sources within the project area. Noise sources, such as parks, school playgrounds, industrial facilities, and quarries, are not located near the project site and would not contribute to the existing noise environment.

The predominant land use near the project site is related to agricultural activities. Activities associated with land preparation, and harvesting and transporting crops, would contribute to the existing noise and vibration environment near the project area. Typical heavy off-road equipment used for agricultural activities include tractors, harvesters, bailers, tillers, and seeders. Overflights from crop spraying also would occur over agricultural land uses.

Noise-sensitive Receptors

Generally, any place where quiet is an essential element of a land use's intended purpose would qualify as a noise-sensitive receptor, such as concert pavilions and historic monuments with significant outdoor use. Places where people normally sleep, like residences, hotels, and hospitals, qualify as noise-sensitive receptors. Several residences are clustered together approximately 4,100 feet to the east of the levee improvements area and the 31-acre staging area. Construction-related haul trucks using West El Nido Road to access the levee and staging area would be traveling approximately 700 feet south of these residences. These are the only noise-sensitive receptors near the proposed project construction activities.

3.14.2 Regulatory Setting

Federal

There are no Federal laws, regulations, plans, or ordinances related to noise or vibration that apply to the proposed project.

State

There are no State laws, regulations, plans, or ordinances related to noise or vibration that apply to the proposed project.

Local

Merced County Code

Noise

The Merced County Code (Section 10.60.030) sets sound level limitations for the County. The noise control ordinance states that noise levels, when measured at or within the property line of the receiver, should not result in any of the following:

- Exceed the background noise level by at least 10 dBA during daytime hours (7 a.m. to 10 p.m.) and by at least 5 dBA during nighttime hours (10 p.m. to 7 a.m.)
- Exceed 65 dBA L_{dn} (day-night average noise level) on residential property or 70 dBA L_{dn} on nonresidential property
- Exceed 75 dBA L_{max} (maximum noise level) on residential property or 80 dBA L_{max} on nonresidential property

The County's ordinance exempts construction activities, "provided that all construction in or adjacent to urban areas shall be limited to the daytime hours between 7 a.m. and 6 p.m., and all construction equipment shall be properly muffled and maintained" (Section 10.60.030(B)(5)). Operation of construction equipment outside of these daytime hours or at any time on a weekend day or legal holiday is prohibited. (Merced County 2017a.)

Vibration

Section 18.41.090 of the Merced County Code states that no use shall create any disturbing ground vibration based on typical human reaction beyond the boundaries of the site (Merced County 2017b).

3.14.3 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

Construction noise was predicted using equations and guiding principles from the FHWA Roadway Construction Noise Model (RCNM), Version 1.1. The types of construction equipment that could be used during the construction of the project, the percentage of time that the equipment would operate at full power (usage factor) during an hour, and each piece's maximum noise level are presented in **Table 3.14-3**. Construction equipment is anticipated to operate primarily during weekdays and during daylight hours to the extent feasible.

In addition to noise, construction activities have the potential to produce vibration that may be annoying or disturbing to humans and may cause damage to structures. Highest levels of vibration from construction projects are caused by soil compacting, jack hammering, and demolition. **Table 3.14-4** presents the PPV in inches per second for typical construction equipment as published by the FTA (2006).

Table 3.14-3. Construction Equipment Types and Noise Levels

Equipment Type	Estimated Usage Factor	L_{max} at 50 Feet
All Other Equipment Greater than 5 hp	50%	85
Auger Drill Rig	20%	84
Backhoe	40%	78
Compactor (ground)	20%	83
Compressor (air)	40%	78
Concrete Mixer Truck	40%	79
Concrete Pump Truck	20%	81
Crane	16%	81
Dozer	40%	82
Dump Truck	40%	76
Excavator	40%	81
Flat Bed Truck	40%	74
Front End Loader	40%	79
Generator	50%	81
Grader	40%	85
Impact Pile Driver	20%	101
Paver	50%	77
Pickup Truck	40%	75
Pumps	50%	81
Tractor	40%	84
Vibratory Pile Driver	20%	101

Notes:
hp = horsepower
L_{max} = maximum noise level measured during a monitoring period
Source: Federal Highway Administration 2006

Table 3.14-4. Construction Equipment Types and Vibration Levels

Equipment Type	PPV at 25 feet (in/sec)
Pile Driver (impact)	0.644
Pile Driver (sonic)	0.17
Large Bulldozer	0.089
Loaded Trucks	0.076
Caisson Drilling	0.089

Source: Federal Highway Administration 2006

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards? *(Less-than-Significant Impact with Mitigation Incorporated)*

The project would include removing Merced NWR weirs and rehabilitating a refuge groundwater well, modifying the Dan McNamara Road low-flow crossing, providing fish passage at the Eastside Bypass Control Structure, and improving levees in the Eastside Bypass near Sand Slough to improve channel capacity for Restoration Flows. Residences closest to project construction sites are approximately 4,100 feet east of the levee improvements area and the 31-acre staging area, and haul trucks would be traveling approximately 700 feet south of these residents. The Merced County noise ordinance exempts weekday construction activities between 7 a.m. and 6 p.m. from its sound level limitations. Additionally, all construction equipment would be properly muffled and maintained, Weekday construction activities would be consistent with the Merced County noise ordinance, and the impact would be less than significant.

Construction work times may be extended into the evening or weekend during key points of the construction phase, as needed. Several residences are clustered together approximately 4,100 feet 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 have some noise attenuation from these residences. However, construction-related haul trucks using West El Nido Road to access the levee and staging area would be traveling approximately 700 feet south of these residences. If construction extends into the evening or weekend on a regular basis during the construction season, noise impacts could be potentially significant.

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

> **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.

Implementing Mitigation Measure NOI-1 would reduce construction-related noise to a less-than-significant impact.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels? *(Less-than-Significant Impact)*

Construction equipment associated with the project, such as dozers and plate compactors, would generate vibrations that could result in groundborne noise or vibration that may affect nearby structures and sensitive receptors. *Merced County Code* (Section 18.41.090) states that no use shall create any disturbing ground vibration based on typical human reaction beyond the boundaries of the site.

Vibration levels during construction are estimated to be less than 0.3 in/sec at 140 feet or more from the vibration source. There are no anticipated receptors within 140 feet of the construction activities; therefore, PPV for construction activities would not exceed the significance threshold of 0.3 in/sec for sensitive receptors. No long-term project operations would occur that could generate vibrations or groundborne noise or otherwise expose persons to such impacts. Therefore, this impact would be less than significant.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
(Less-than-Significant Impact)

Construction impacts on ambient noise levels would be temporary and short term and would not result in permanent increases in ambient noise levels. Operation of the control gates or pumps for the groundwater well(s) would not generate substantial noise. Ambient noise levels in the project vicinity are not anticipated to substantially change with project operations and maintenance. The impact would be less than significant.

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?
(Less-than-Significant Impact)

As noted previously, noise from construction activities during weekday daytime hours (between 7 a.m. and 6 p.m.) is exempt from the County noise control ordinance. However, construction-related noise may result in a substantial temporary or periodic increase in ambient noise levels. These noise levels would be located in areas that have some existing sources of noise, such as traffic, agricultural equipment, and overhead aircraft, although existing ambient noise levels are generally low. Project-related noise levels would vary, depending on the construction activity and specific pieces of equipment in use at any given time.

Daytime unmitigated construction noise is anticipated to be 89 to 91 dBA at 50 feet from the construction source. The existing ambient noise levels are estimated to be approximately 40 dBA during the day. Noise levels at a sensitive receptor would exceed the significance criterion of 10 dBA if the receptor is within 4,100 feet of the construction area. There are no anticipated receptors within 4,100 feet of the construction area; therefore, noise from construction activities would not exceed the significance threshold. The impact would be less than significant.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?
(No Impact)

The project site is not located within 2 miles of a public or private airport. Therefore, there would be no exposure of people residing or working in the project area to excessive noise levels from aircraft activities. There would be no impact.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?
(No Impact)

The project site is not located within 2 miles of a public or private airport. Therefore, there would be no exposure of people residing or working in the project area to excessive noise levels from aircraft activities. There would be no impact.

3.15 Paleontological Resources

Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XV. PALEONTOLOGICAL RESOURCES – Would the project:					
a) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐	☐

3.15.1 Environmental Setting

Regional Geographic Setting

The project area is located within the Great Valley geomorphic province, which is an elongated, northwest trending, nearly flat lowland that is located between the Coastal Ranges and the Sierra Nevada Mountains. The project area is in the San Joaquin Valley, which is a structural trough situated in the southwestern portion of the Great Valley. The Tertiary- to Quaternary-age sediments within the San Joaquin Valley record the transition from shallow marine environments to terrestrial environments, which is associated with the rise of the Coastal Ranges and Sierra Nevada and subsequent closure of the valley from the ocean.

Geological and Paleontological Context

A review of the geologic map of the San Francisco-San Jose Quadrangle (Wagner et al. 1991) shows that the project area is mapped as Late Pleistocene Modesto Formation. Holocene-age artificial fill is also present in locations where previous construction has occurred, such as the Eastside Bypass levees.

Artificial Fill

Artificial fill consists of surface materials that have been previously excavated from another location, dumped into haul trucks, transported to the new location, and then compacted by heavy equipment. Scientifically important fossils are not known in these units since any fossils that may have been present in the source material would have been destroyed during the excavation and subsequent compaction process. The Eastside Bypass levee is composed of artificial fill, as is the Dan McNamara Road crossing. These deposits are not paleontologically sensitive.

Modesto Formation

The Late Pleistocene Modesto Formation (Qm) has a type section in Stanislaus County within the Ceres (2012) 7.5-minute Quadrangle and is exposed along the Tuolumne River in eastern Modesto and east of Modesto and Turlock, almost to the San Joaquin River (Davis and Hall 1959). The Modesto Formation was deposited during the last major series of depositional events during the Pleistocene within the San Joaquin Valley. The Modesto Formation consists of a series of alluvial fans along the San Joaquin River that are comprised of arkosic sand, silt, and clay (Marchand and Allwardt 1977). The Modesto Formation is substantially more oxidized and weathered than younger Holocene-age deposits (Marchand and Allwardt 1977). It ranges in thickness from approximately 30 to 100 feet near its type section (Davis

and Hall 1959; Marchand and Allward 1977). The Modesto Formation is subdivided into two informally designated members: the lower (older) and upper (younger) (Marchand and Allwardt 1977). The Modesto Formation is mapped at the surface throughout the project area.

Fossils are well documented in scientific literature from the Modesto Formation. A literature search indicated there are no records of fossil localities within the project area (Jefferson 1991). However, seven vertebrate fossil localities have been recorded within Merced County in the Modesto Formation and other geologically correlative units. Recorded taxa include dog, horse, camel, deer, bison, pronghorn antelope, ground sloth, mammoth, and mastodon (Jefferson 1991). Pleistocene-age animals and plants have been collected from older alluvial deposits similar to the Modesto Formation throughout California's Central Valley and include mammoth, mastodon, camel, horse, bison, giant ground sloth, peccary, cheetah, lion, saber-toothed cat, capybara, dire wolf, and numerous taxa of smaller mammals (Jahns 1954; Jefferson 1991). Because of the large number of vertebrate fossils recovered from the Modesto Formation, it is considered to be of high paleontological sensitivity.

Paleontological Resources Assessment Criteria

A stratigraphic inventory and paleontological resource inventory was completed to develop a baseline paleontological resource inventory of the project site and surrounding area by rock unit and to assess the potential paleontological productivity of each rock unit. Research methods included a review of published and unpublished literature. These tasks complied with Society of Vertebrate Paleontology (SVP) (1995) guidelines.

Published geological and paleontological literature and maps were reviewed to document the number and locations of previously recorded fossil sites from rock units exposed in and near the project site and the surrounding region, as well as the types of fossil remains each rock unit has produced. The literature review was supplemented by an archival search by the University of California Museum of Paleontology (UCMP) in Berkeley, California, on November 8, 2016.

The potential paleontological importance of the project site can be assessed by identifying the paleontological importance of exposed rock units in and surrounding the project area. Because the aerial distribution of a rock unit can be easily delineated on a topographic map, this method is conducive to delineating parts of the project site that are of higher and lower sensitivity for paleontological resources.

A paleontologically important rock unit is one that (1) has a high potential paleontological productivity rating, and (2) is known to have produced unique, scientifically important fossils. The potential paleontological productivity rating of a rock unit refers to the abundance/densities of fossil specimens and/or previously recorded fossil sites in exposures of the unit in the project area and in other locations in California.

An individual vertebrate fossil specimen may be considered unique or significant if it is identifiable and well preserved, and it meets one of the following criteria:

- a type specimen (i.e., the individual from which a species or subspecies has been described);
- a member of a rare species;
- a species that is part of a diverse assemblage (i.e., a site where more than one fossil has been discovered) wherein other species are also identifiable, and important information regarding life history of individuals can be drawn;

- a skeletal element different from, or a specimen more complete than, those now available for its species; or

- a complete specimen (i.e., all or substantially all of the entire skeleton is present).

The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions (such as for a research project). Identifiable vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare. Marine invertebrates are generally common; the fossil record is well developed and well documented, and they would generally not be considered a unique paleontological resource.

In its standard guidelines for assessing and mitigating adverse impacts on paleontological resources, the SVP (SVP 1995) established three categories of sensitivity for paleontological resources: high, low, and undetermined. Areas where fossils have been previously found are considered to have a high sensitivity and a high potential to produce fossils. Areas that are not sedimentary in origin and that have not been known to produce fossils in the past typically are considered to have low sensitivity. Areas that have not had any previous paleontological resource surveys or fossil finds are considered to be of undetermined sensitivity until surveys and mapping are performed to determine their sensitivity. After reconnaissance surveys, observation of exposed cuts, and possibly subsurface testing, a qualified paleontologist can determine whether the area should be categorized as having high or low sensitivity.

Paleontological Record Search Results

The results of a UCMP record search on November 8, 2016 indicated there were no recorded fossil localities within a 10-mile radius of the project area (Finger 2016; Appendix B). Online database searches were also negative for fossils recorded within the project area; however, there are seven recorded vertebrate fossil localities within Merced County (Jefferson 1991; PaleoBiology Database 2017; UCMP 2017). Five localities were recorded in the Modesto Formation and other geologically correlative units in nearby Fresno and Stanislaus counties (**Table 3.15-1**). Recorded taxa include mammoth (*Mammuthus,* cf. *Mammuthus columbi*), camel (Camelidae, *Camelops*), bison (*Bison,* cf. *Bison latifrons*), horse (*Equus*), ground sloth (cf. *Megalonyx jeffersonii*), and unidentified mammal (UCMP 2017).

3.15.2 Regulatory Setting

Federal

American Antiquities Act of 1906

The American Antiquities Act of 1906 prohibits the collecting of any “object of antiquity” (including fossils) from Federal lands unless a permit is obtained for the purposes of scientific study.

Table 3.15-1. Paleontological Records and Literature Search Results

Institutional Locality Number	Taxon	Common Name	Location	Source
V99830	*Mammuthus*	mammoth	Fresno County	UCMP 2017
V99829	Camelidae Mammalia	camel mammal	Fresno County	UCMP 2017
V99464	*Bison* *Camelops* sp.	bison camel	Stanislaus County	UCMP 2017
V72186	cf. *Bison latifrons*	bison	Stanislaus County	UCMP 2017
V72007	cf. *Mammuthus columbi* cf. *Megalonyx jeffersonii* *Equus*	mammoth ground sloth horse	Stanislaus County	UCMP 2017
Unknown	*Equus* sp. *Camelops* sp. cf. *Odocoileus* sp.	horse camel deer	Merced County	Jefferson 1991
UCMP 2049	*Mammuthus* sp.	mammoth	Merced County	Jefferson 1991
UCMP V69172	*Mammut americanum*	mastodon	Merced County	Jefferson 1991
UCMP V68006	*Paramylodon harlani* *Equus* sp. *Camelops* sp. *Bison* sp.	ground sloth horse camel bison	Merced County	Jefferson 1991
Unknown	*Mammuthus* sp. *Camelops* sp.	mammoth camel	Merced County	Jefferson 1991
Unknown	Canidae *Mammuthus* sp. *Equus* sp. Antilocapridae *Bison* sp.	dog mammoth horse pronghorn bison	Merced County	Jefferson 1991
UCMP V37020	*Bison* sp.	bison	Merced County	Jefferson 1991
Unknown	*Mammuthus* *Mammut* Camelidae Equidae *Bison* *Megatherium* Tayassuidae *Acinonyx* *Panthera* *Smilodon* *Hydrochoerus* *Canis dirus* Rodentia	mammoth mastodon camel horse bison giant ground sloth peccary cheetah lion saber-toothed cat capybara dire wolf rodent	California	Jahns 1954, Jefferson 1991, Cooper and Eisentraut 2002

Notes: UCMP = University of California Museum of Paleontology
Source: Data compiled by Paleo Solutions, Inc. in 2016

Federal Land Policy and Management Act of 1976

In general, the Federal Land Policy and Management Act prohibits the collection of paleontological resources from Federal land without a permit. However, the Act allows casual collecting without a permit on Federal land controlled or administered by BLM, Reclamation, or the U.S. Forest Service where such collection is consistent with the laws governing the management of those Federal lands. The Act also requires that specimens receive proper curation, and sets forth criminal and civil penalties for illegal collection.

State

California Public Resources Code Section 5097

PRC Section 5097 defines the excavation, destruction, or removal of paleontological "sites" or "features" from public lands without the express permission of the jurisdictional agency as a misdemeanor. As used in Section 5097, "State lands" refer to lands owned by, or under the jurisdiction of, the State or any State agency. "Public lands" are defined as lands owned by, or under the jurisdiction of, the State, or any city, county, district, authority, or public corporation, or any agency thereof.

Local

Merced County General Plan

The *2030 Merced County General Plan* (County of Merced 2013) states that archeological, historical, architectural, paleontological, and Native American cultural resources and values must be considered in all phases of planning and subsequent development projects, including design, permitting, construction, and long-term maintenance.

3.15.3 Environmental Effects

No Action Alternative

Under the no action alternative, no construction-related or ground-breaking activities would occur. There would be no impact.

Proposed Project

a) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?
(Less-than-Significant Impact with Mitigation Incorporated)

To be considered a unique paleontological resource, a fossil must be more than 11,700 years old. Holocene deposits contain only the remains of extant, modern taxa (if any resources are present), which are not considered "unique" paleontological resources. Furthermore, because of the nature of artificial fill material (which is of Holocene age), it generally does not contain intact fossil remains. Therefore, earthmoving activities for any of the project elements that would occur in Holocene-age deposits, including artificial fill, would have no impact on unique paleontological resources.

All project elements would be constructed in the Pleistocene-age Modesto Formation, which is considered to be paleontologically sensitive. Therefore, project-related earthmoving activities could result in inadvertent damage to or destruction of unique paleontological resources, and this impact would be potentially significant.

DWR and/or Reclamation would implement Mitigation Measure PAL-1 before and during project construction to reduce this potential impact on paleontological resources.

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.

This impact would be less than significant after mitigation because construction workers would be alerted to the possibility of encountering paleontological resources and, in the event that resources were discovered, work would stop immediately and fossil specimens would be recovered and recorded, and would undergo appropriate curation.

3.16 Population and Housing

Environmental Issue		Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XVI.	**POPULATION AND HOUSING – Would the project:**					
a)	Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒	☐
b)	Displace substantial numbers of existing homes, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒	☐
c)	Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒	☐

3.16.1 Environmental Setting

Demographic Data

California Department of Finance (DOF) population forecasts from 2016 through 2030 and the percent change are shown in **Table 3.16-1**. The unincorporated areas of Merced County (including the project area) are primarily agricultural, and since the *2030 Merced County General Plan* (Merced County 2013) indicates that agricultural land uses will continue through the foreseeable future, growth is primarily projected to occur in the incorporated cities and specific, defined unincorporated community areas. Thus, the projected rate of population change is considerably greater for the Cities of Merced and Los Banos, as compared to Merced County as a whole (**Table 3.16-1**).

Table 3.16-1. Estimated Population Growth in the Project Region, 2016–2030

Demographic Area	2016 Population	Projected 2030 Population	Projected Population Change	Projected Percent Change
Merced County	271,547	326,574	+ 55,027	+ 17
City of Los Banos	39,354	90,400	+ 51,046	+ 57
City of Merced	83,955	155,000	+ 71,045	+ 46

Sources: California Department of Finance 2017a and 2017b, City of Merced 2012, City of Los Banos 2009

Housing Data

Table 3.16-2 presents housing data for Merced County and the Cities of Merced and Los Banos. According to the U.S. Census Bureau, in 2014 Merced County had 83,903 housing units, of which approximately 91.2 percent were occupied. Renters occupied 36,206 units, while owners occupied 40,310 units (U.S. Census Bureau 2015).

Table 3.16-2. Housing Estimates for the Project Region, 2014

	Merced County		City of Merced		City of Los Banos	
	Estimate	Percent	Estimate	Percent	Estimate	Percent
Occupied Housing Units	76,516	91.2%	24,950	91.2%	10,303	91.7%
Owner-Occupied	40,310	52.7%	10,533	42.2%	5,450	52.9%
Renter-Occupied	36,206	47.3%	14,417	57.8%	4,853	47.1%
Vacant Housing Units	7,387	8.8%	2,399	8.8%	927	8.3%
Median Monthly Rent	$870	-	$830	-	$1,087	-

Source: U.S. Census Bureau 2015

In addition to permanent residential housing units, there are eight hotels in Los Banos and 16 hotels in Merced.

3.16.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to population, housing, and employment apply to the proposed project.

State

No State plans, policies, regulations, or laws related to population and housing apply to the proposed project.

Local

No regional or local plans, policies, regulations, or ordinances related to population and housing apply to the proposed project.

3.16.3 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) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?
(No Impact)

As discussed in Chapter 2, "Description of the Proposed Project and No Action Alternative," peak construction periods would require up to 50 total workers. As indicated in **Table 3.16-1** (see Section 3.19, "Socioeconomics"), there were approximately 3,494 construction workers in Merced County in 2014 (MIG Inc. 2016). These existing residents who are employed in the construction industry would likely be sufficient to meet the demand for construction workers that would be generated by the

proposed project. Furthermore, the California Employment Development Department (EDD) estimates that between 2014 and 2024, the various construction trades will experience a greater than 73 percent increase in employment opportunities (EDD 2016). If some non-local construction workers were employed for the project, the temporary and short-term nature of the work supports the conclusion that these workers would not typically change residences when assigned to a new construction site. Therefore, it is likely that an adequate number of construction workers for project construction could be found within the local area.

In addition to the permanent residential housing units shown in **Table 3.16-1**, there are eight hotels in Los Banos and 16 hotels in Merced available to support the needs for short-term temporary construction worker housing. Because workers serving the project could be expected to come from nearby communities and cities in Merced County, neither substantial population growth nor an increase in housing demand in the region is anticipated as a result of these jobs. Therefore, temporary and short-term impacts from direct increases in population and housing demand from construction of the project elements would not occur. There would be no impact.

The proposed project would not entail the construction of new housing or commercial development, would not create long-term permanent new jobs from project operation, or directly induce substantial population growth. The project would benefit areas identified for future growth anticipated in the vicinity of urban areas downstream. However, local land use decisions are within the jurisdiction of the individual cities and the County, which have adopted general plans consistent with State law. The project would not allow additional growth to occur other than what has already been planned, nor would it change the locations where this growth is planned to occur. Consequently, project implementation would not affect current and/or projected population growth patterns as already evaluated and planned for in any city or county general plan (**Table 3.16-2**), and therefore would not indirectly induce substantial population growth. The project would reduce flood risks by improving the Eastside Bypass levee to meet engineering standards associated with the National Flood Insurance Program; it would not alter protection for the 100-year event nor does it transfer any such risk to other areas. The project would not directly or indirectly support development in the base floodplain. Thus, permanent and long-term impacts from increases in population and housing demand from project operations would be less than significant.

b), c) Displace substantial numbers of existing homes or people, necessitating the construction of replacement housing elsewhere? *(No Impact)*

The project area is located in a rural agricultural area of Merced County. Implementing the proposed project would not displace any homes or people, and would not require the construction of replacement housing. Thus, there would be no impact.

3.17 Public Services

Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Imipact
XVII. PUBLIC SERVICES – Would the project:					
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:					
Fire protection?	☐	☐	☒	☐	☐
Police protection?	☐	☐	☒	☐	☐
Schools?	☐	☐	☐	☒	☐
Parks?	☐	☐	☐	☒	☐
Other public facilities?	☐	☐	☐	☒	☐

3.17.1 Environmental Setting

Fire Protection

Fire protection services in the project area are provided by the Merced County Fire Department. The Merced County Fire Department provides emergency services to unincorporated areas of the County through a network of fire stations, personnel, and equipment. Fire suppression personnel are provided through a contract with the California Department of Forestry and Fire Protection, and support personnel are Merced County employees. Fire stations are staffed 24 hours a day by a full-time fire captain or fire apparatus engineer and augmented by over 300 paid or volunteer on-call firefighters. The on-call firefighters are organized into engine companies according to the station's response area. The closest fire station to the majority of the project site is Fire Station #61 located at 961 South Gurr Road (at the State Route 140 intersection). El Nido Fire Station #83 located at 10537 Highway 59 in El Nido is closest to the proposed levee improvements. From both of these locations, emergency services can be quickly provided to the project area with no increase in distance or time with Dan McNamara Road open or closed by flooding at the Eastside Bypass.

In addition to fire protection, the Merced County Fire Department provides first response emergency medical services, control and mitigation of hazardous material spills, and mutual aid fire/rescue/Emergency Medical Services (EMS) services to cooperating agencies. The department participates in statewide fire and rescue mutual aid systems and other non-fire emergencies such as floods, earthquakes, and other disasters (Merced County 2016).

Law Enforcement

Law enforcement services in the project area are provided by the Merced County Sheriff's Department. The Merced County Sheriff's Department coverage area includes all unincorporated areas of the County. The department maintains stations and smaller Community Law Enforcement Office stations in locations spread throughout the County. The Merced County Sheriff's Department maintained as of 2013, a ratio of approximately one officer per 1,000 residents in unincorporated areas of the County, with an average response time of less than 10 minutes on emergency calls, increasing to approximately 30 minutes for non-emergency calls. The California Highway Patrol handles all traffic enforcement and automobile accident investigations for the unincorporated parts of the County (Merced County 2013).

Emergency Response

The Merced County Office of Emergency Services is operated under the direction of the Merced County Fire Department. The coverage area encompasses all of Merced County and involves the support of Federal, State, and local law enforcement agencies; fire departments; hospitals; ambulance services; and the Merced County Health Department.

Schools

The areas surrounding the project area are served by multiple school districts within Merced County; however, there are no schools near the project site. The nearest school, Merced County Juvenile Court School (at 2840 W Sandy Mush Road), which is administered by the Merced County Office of Education, is 13 miles east of the project area.

3.17.2 Regulatory Setting

Federal

There are no Federal regulations pertaining to public services in the project area.

State

California Fire Code

In accordance with CCR, Title 8 Section 3221 Fire Prevention and Section 6773 Fire Protection and Fire Equipment, the California Division of Occupational Safety and Health has established minimum standards for fire suppression and emergency medical services.

California Uniform Fire Code

The Uniform Fire Code contains regulations relating to construction, maintenance, and use of buildings. Topics addressed in the code include fire department access, fire hydrants, automatic sprinkler systems, fire alarm systems, fire and explosion hazards, safety, hazardous materials storage and use, provisions intended to protect and assist fire responders, industrial processes, and many other fire-safety requirements for new and existing buildings.

Local

There are no local regulations pertaining to public services in the project area.

3.17.3 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) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

Fire and police protection?
(Less-than-Significant Impact)

Construction activities required for project implementation could increase short-term demands on emergency services, including fire protection and law enforcement to respond to potential construction accidents. However, this increase would not be expected to require new or altered emergency services facilities in the project area given that fire protection, law enforcement, and other emergency services currently are provided at acceptable levels in the project area. In addition, construction activities in the project area would comply with industry safety regulations required by the California Labor Code (Title 8, California Code of Regulations), which would help to reduce the likelihood of construction accidents. This impact would be less than significant.

Schools?
(No Impact)

The proposed project would not provide any new housing or employment opportunities. Therefore, the proposed project would not generate new students or increase the demand on the local school systems. Additionally, the nearest school, Merced County Juvenile Court School (at 2840 W Sandy Mush Road) is 13 miles east of the project. Therefore, construction and operations and maintenance of the proposed project would have no impact on an existing or proposed school.

Parks?
(No Impact)

The proposed project would not provide any new housing or employment opportunities that would generate new residents who would require new or expanded park facilities. Thus, there would be no impact.

Other public facilities?
(No Impact)

No other public facilities would be affected by construction or operation of the proposed project. Therefore, there would be no impact.

3.18 Recreation

Environmental Issue		Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XVIII.	**RECREATION – Would the project:**					
a)	Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐	☐
b)	Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒	☐
c)	Substantially restrict or reduce the availability, access, or quality of existing recreational opportunities in the project site or vicinity?	☐	☒	☐	☐	☐
d)	Conflict with any goals or policies related to recreation in an applicable HCP or NCCP?	☐	☐	☐	☒	☐

3.18.1 Environmental Setting

The Eastside Bypass provides minimal developed recreation facilities. The bypass is dry except during winter flood flows and recent Restoration Flows, thus there are no existing water-based recreation activities such as swimming, fishing, or boating. Existing recreation opportunities in the project area consist of private waterfowl hunting clubs in the Grasslands Wildlife Management Area, public waterfowl hunting within the Merced NWR from designated blinds, and wildlife viewing opportunities within the Merced NWR (via three hiking trails and an auto tour route). Lands in the project area are primarily managed for agricultural use or are included in the Merced NWR and the Grasslands Wildlife Management Area. USFWS administers and manages the San Luis NWR Refuge Complex, which is composed of the San Luis NWR, San Joaquin River NWR, Merced NWR, and Grasslands Wildlife Management Area. Recreation opportunities in the project area within the Merced NWR and Grasslands Wildlife Management Area are described below.

Merced National Wildlife Refuge

The Merced NWR is composed of approximately 10,258 acres of wetlands, native grasslands, vernal pools, and riparian habitat. The refuge is located east of the San Joaquin River along the Eastside Bypass. Public access consists of a single entrance along Sandy Mush Road. The refuge's primary function is to provide migratory and wintering bird habitat and to host various threatened and endangered species. The refuge provides wildlife viewing opportunities for various bird and terrestrial species. There are several nature viewpoints, most of which are accessible by automobile, along with nature photography stations and waterfowl observation decks. The refuge also offers an auto tour on the east side of the Eastside Bypass near the refuge entrance. The tour consists of a kiosk and various interpretive panels along the route, providing visitors with educational information about the refuge and the wildlife. The refuge also includes three designated nature trails—the Meadowlark Trail

(approximately 1.5 miles), and the Kestrel and Bittern Marsh Trails (approximately 0.5 mile each)—all of which are adjacent to the auto tour route on the east side of the Eastside Bypass. (USFWS 2016b.)

CDFW and USFWS allow licensed hunting for geese, ducks, coots, and moorhens within designated areas of the refuge. There are six hunting blinds within the Mariposa Creek Hunting Unit on the south side of Sandy Mush Road west of the Eastside Bypass, and nine blinds within the West Marsh Hunting Unit on the south side of Sandy Mush Road east of the Eastside Bypass (USFWS 2016c). Waterfowl hunting is also allowed in the Lone Tree Unit on the east side of the Eastside Bypass throughout most of the area where levee improvements are proposed (USFWS 2016d). Hunting dates are determined by CDFW and may change each year depending on population status; however, the waterfowl hunting season generally runs from the third weekend in October until the last weekend in January for adults, followed by a junior hunt the first weekend in February. Waterfowl hunting in all three of the above areas within the Merced NWR is only allowed on Wednesdays and Saturdays.

Grasslands Wildlife Management Area

A portion of the project area is located within the Grasslands Wildlife Management Area, which supports the largest remaining block of wetlands in the Central Valley. The management area contains 70,000 acres of private wetlands and 53,000 acres of State and Federal lands, all of which are held under conservation easements. General public access in the management area is not permitted. However, recreation opportunities are present in the form of private waterfowl hunting clubs.

3.18.2 Regulatory Setting

Federal

Federal Wildlife Refuges

Management goals and objectives for the Federal wildlife refuges in the San Luis NWR Complex include providing compatible education/interpretation and wildlife-based recreational programs, which may include wildlife/nature observation, photography, fishing, and hunting (USFWS 2016a). This goal is addressed within the context of priority wildlife habitat goals and objectives described in the *Draft San Luis and Merced NWR Comprehensive Conservation Plan* (USFWS 2017b).

Federal Water Project Recreation Act

The Federal Water Project Recreation Act requires Federal agencies with authority to approve water projects to include recreation development as a condition of approving permits. Recreation development must be considered along with any navigation, flood control, reclamation, hydroelectric, or multipurpose water resources project. The act indicates that consideration should be given to opportunities for outdoor recreation and fish and wildlife enhancement whenever any such project can reasonably serve either or both purposes consistently.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act of 1946 requires Federal agencies to provide for protection and supply of wildlife and wildlife resources, including the provision of public shooting and fishing recreation resources. The premise of the act is that wildlife resources should receive equal consideration as other features of water resource projects. Federal agencies are charged with the responsibility to prevent loss or damage to wildlife resources during the development and management of water resources projects.

State

Public Trust Doctrine

The common law Public Trust Doctrine protects sovereign lands, such as tide and submerged lands and the beds of navigable waterways, for the benefit, use, and enjoyment of the public. These lands are held in trust by the State of California for the statewide public and for uses that further the purposes of the trust. The foundational principle of the Public Trust Doctrine is that trust lands belong to the public and are to be used to promote publicly beneficial uses that connect the public to navigable waterways.

Local

Merced County General Plan

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

- **Policy RCR-1.1:** Encourage the continuation and expansion of existing public recreation land uses, including, but not limited to, public beaches, parks, recreation areas, wild areas, and trails.
- **Policy RCR-1.7:** Require buffering between non-recreational land uses and sensitive public recreation lands through site design and other techniques when the non-recreational land use may significantly impact recreational lands.
- **Policy RCR-1.7:** Consider agriculture as a compatible land use and appropriate buffer for public and private recreation areas.
- **Policy RCR-1.11:** Encourage the use of regional parks and open space areas as a mechanism to preserve the County's natural scenic beauty and protect land for public purposes.
- **Policy RCR-1.12:** Support recreation services to promote the full use of recreation facilities within their design capacity and improve connections and access to a wide range of recreation opportunities in order to improve the quality of life for residents and visitors.

3.18.3 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) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?
(Less-than-Significant Impact)

The proposed project does not involve the construction of any new housing that would generate new residents who would increase the use of existing recreational facilities. As discussed in item c) below, project construction could displace existing recreational facility users to other locations during the last 2 weeks of hunting season. However, because construction would only overlap with up to 4 days of the

hunting season, the proposed project would not be likely to increase the use of other recreational facilities such that substantial physical deterioration of any facilities would occur or be accelerated. This impact would be less than significant.

b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?
(No Impact)

The proposed project does not include or require the construction of new recreational facilities; thus, there would be no impact.

c) Substantially restrict or reduce the availability, access, or quality of existing recreational opportunities in the project site or vicinity?
(Less-than-Significant Impact with Mitigation Incorporated)

The proposed project includes improvements to fish passage at the Eastside Bypass Control Structure, which would generally improve the health of the aquatic ecosystem within the project area, potentially leading to an improvement in the quality of recreational fishing in the surrounding area. In addition, the removal of the Merced NWR weirs and installing culverts underneath the Dan McNamara Road crossing to remove fish passage barriers would facilitate better access in the river system for fish. With the ongoing release of Restoration Flows under the SJRRP, the proposed project would increase fish passage in the bypass system and the San Joaquin River. Therefore, a beneficial impact on permanent recreational angling would occur.

The proposed project includes the removal of the Merced NWR weirs, which were originally constructed to facilitate water diversions to support seasonal wetlands and ponds for migratory birds. While removing the weirs would facilitate better fish passage through the Eastside Bypass, it would also require an alternative water source to ensure that sufficient water is available in the Merced NWR to maintain aquatic habitats for migratory birds. Therefore, an existing well that is no longer operational in the Merced NWR would be replaced with a deep well, which would provide the water required to meet the irrigation needs of the Merced NWR. The well would maintain the seasonal ponds for migratory birds. The proposed project would have no long-term, permanent impacts on private or public waterfowl hunting, or the wildlife viewing opportunities afforded by the three nature trails or the auto tour route in the Merced NWR. Thus, the proposed project would have a less-than-significant impact on permanent wildlife-based recreation opportunities.

There are no officially designated recreational opportunities in proximity to the area where the proposed levee improvements would occur. Therefore, the proposed levee improvements would have a less-than-significant impact on permanent wildlife-based recreation opportunities.

Construction of the culverts underneath Dan McNamara Road would occur immediately adjacent to, but north of, West Sandy Mush Road, which provides public entry into the Merced NWR. Although construction associated with the road culverts would be visible to recreationists using West Sandy Mush Road for access to the refuge, the construction would be short-term in nature (approximately 8 months) and would not substantially detract from any wildlife viewing activities.

Removing the lower Merced NWR weir and drilling the new well would occur approximately 0.75 mile south of West Sandy Mush Road and would be barely visible in the background. West Sandy Mush

Road would be used for transport of construction materials, equipment, and personnel; however, closure of West Sandy Mush Road would not be required. Removing the upper Merced NWR weir would occur approximately 1,800 feet west of the southwestern corner of the refuge's auto tour route. However, views of construction activities associated with the upper Merced NWR weir from the auto tour route would be blocked by the height of the intervening Eastside Bypass levee, and access to this weir for construction crews and equipment would occur only on the west side of the Eastside Bypass. Construction associated with the upper Merced NWR weir would also be located approximately 1 mile southwest of the nearest trail (the Meadowlark Trail), and approximately 1.5 miles southwest of the other two trails (Kestrel and Bittern Marsh). At these distances, project-related construction would not be visible and there would be little to no effect from noise, dust, or traffic on the quality of the recreational experience for hikers on any of the three trails. Furthermore, recreational use of the Merced NWR during June through September, the primary construction period, is extremely limited as the area has high temperatures, limited shade, and few waterfowl or wildlife observation opportunities.

Information about the location of privately-owned waterfowl hunting blinds in the Grasslands Wildlife Management Area is not available. Based on a review of aerial photography, a waterfowl hunting blind may be located approximately 1,200 feet northwest of the proposed Dan McNamara Road fish passage improvements. Other privately owned hunting blinds may be in proximity to the construction work that would occur on the Eastside Bypass Control Structure. There are 15 public use hunting blinds in the Merced NWR: six blinds in the Mariposa Creek Hunting Unit on the south side of Sandy Mush Road west of the Eastside Bypass, and nine blinds in the West Marsh Hunting Unit on the south side of Sandy Mush Road east of the Eastside Bypass (USFWS 2016c). Waterfowl hunting is also allowed in the Lone Tree Unit on the east side of the Eastside Bypass throughout most of the area where levee improvements are proposed (USFWS 2016d).

Hunting dates are determined by CDFW and may change each year depending on population status; however, the waterfowl hunting season generally runs from the third weekend in October until the last weekend in January for adults, followed by a junior hunt the first weekend in February. Waterfowl hunting in all three of the above areas within the Merced NWR is only allowed on Wednesdays and Saturdays. As stated in Chapter 2, "Description of the Proposed Project and No Action Alternative," project-related construction would occur between April 1 and November 15, and therefore would not occur during most of the waterfowl hunting season or during the bulk of the period when migratory waterfowl would be present at the refuge (i.e., late fall and winter). However, construction would be necessary during the first 2 weeks of waterfowl hunting season, which could adversely affect public recreational hunting in the Merced NWR and privately owned hunting clubs in the project vicinity. Therefore, the proposed project would have a short-term temporary significant impact.

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

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.

Implementation of Mitigation Measure REC-1 would reduce the significant impact on waterfowl hunting to a less-than-significant level because project construction will only overlap hunting season by 2 weeks and impacts to hunting minimized to two weekdays during the waterfowl hunting season.

d) Conflict with any goals or policies related to recreation in an applicable HCP or NCCP?
(No Impact)

Goals and policies for the Merced NWR are part of the *Draft San Luis and Merced NWR Comprehensive Conservation Plan* (USFWS 2017b). The goals relate primarily to wildlife habitat management, but also include the provision of public recreation based on wildlife viewing. The conservation plan's recreational goal discusses provision of nature trails, auto tour routes, and wildlife viewing platforms in all the units that comprise the San Joaquin River NWR. These facilities have already been constructed in the Merced NWR. The proposed weir removals to improve fish passage and well drilling to ensure sufficient water to maintain wildlife habitat in the Merced NWR would be consistent with goals and policies of the conservation plan. Modifications to the existing Eastside Bypass levee are intended to improve flood protection and would occur primarily within the footprint of the existing levee. The proposed levee improvements, Dan McNamara Road crossing fish passage improvements, and Eastside Bypass Control Structure fish passage improvements would not conflict with any goals or policies contained in the conservation plan. Thus, the proposed project would result in no impact.

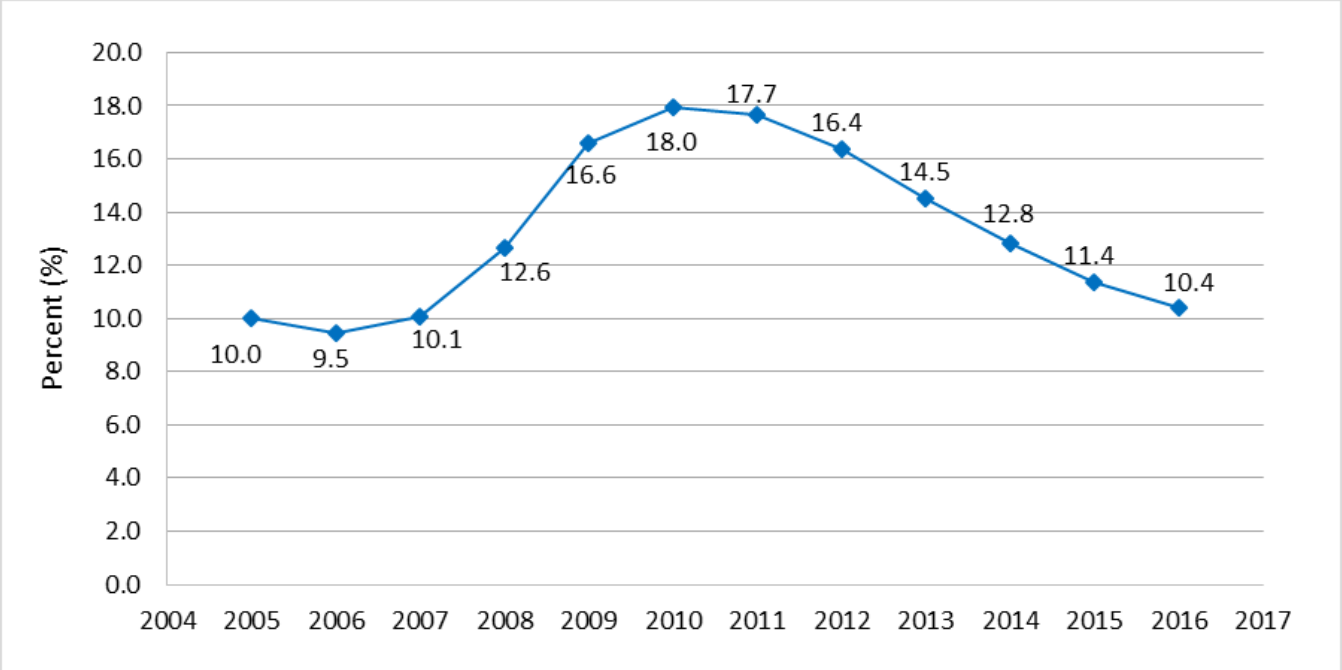
3.19 Socioeconomics

Environmental Issue		Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XIX.	**SOCIOECONOMICS – Would the project:**					
a)	Cause changes to employment, income, or output of the regional economy?	☐	☐	☐	☐	☒

3.19.1 Environmental Setting

Figure 3.19-1 shows the unemployment rate trends for Merced County as a whole between 2005 and 2016. Merced County unemployment rate increased from 2006 through 2010 and decreased from 2011 through 2016.

Figure 3.19-1. Unemployment Rate Profile for Merced County (2005-2016)



Source: California Economic Development Department 2017

3.19.2 Regulatory Setting

There are no Federal, State, or local regulations applicable to the analysis of socioeconomic impacts.

3.19.3 Environmental Effects

a) Cause changes to employment, income, or output of the regional economy? *(Beneficial Impact)*

Project construction would occur during less than a 1-year period and would cost approximately $20.5 million. Direct labor would be 252 jobs, generating an estimated 22 indirect and 26 induced jobs, for a total effect of 300 jobs. However, a portion of these jobs may come from workers outside of Merced County, and these jobs would potentially only last for a portion of the year, and would potentially not be full-time jobs. **Table 3.19-1** summarizes total direct, indirect, and induced economic impacts resulting from project construction. Construction would temporarily increase employment, labor income, and revenue in Merced County. This would be a beneficial impact on the Merced County regional economy.

Table 3.19-1. Direct, Indirect, Induced, and Total Regional Economic Effects of Project Construction

Impact Type	Employment (# jobs)	Labor Income (Million $)	Revenue (Million $)
Direct Effect	252	$6.9	$20.5
Indirect Effect[1]	22	$0.8	$2.5
Induced Effect[1]	26	$1.0	$3.4
Total Effect	300	$8.7	$26.3

Note:
[1] MIG Inc., 2016

3.20 Transportation and Traffic

	Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XX.	**TRANSPORTATION ANDTRAFFIC – Would the project:**					
a)	Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐	☐
b)	Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒	☐
c)	Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒	☐
d)	Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐	☐
e)	Result in inadequate emergency access?	☐	☐	☒	☐	☐
f)	Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒	☐

3.20.1 Environmental Setting

Regional access to the project area is provided from the north and south via State Route (SR) 99 (six lanes, identified on the Merced County General Plan's Circulation Diagram as a freeway [Merced County 2013]), SR 59 (a two-lane principal arterial), SR 165 (a two-lane principal arterial), and Interstate 5 (I-5) (a four-lane freeway), and to the east and west via SR 140 (a two-lane principal arterial) and SR 152 (a four-lane principal arterial).

Local access to the project site includes the following undivided, two-lane roadways:

- Nickel Road (Major Collector)
- Sand Slough Road (Major Collector)

- Sandy Mush Road (Major Collector)
- South Gurr Road (Major Collector)
- Turner Island Road (Major Collector)
- West Washington Road (Minor Collector)
- Dan McNamara Road
- Lone Tree Road
- South Burt Crane Road
- West Chamberlain Road
- West El Nido Road

There are no pedestrian or bicycle facilities in the project area. Public buses travel along SR 152 and SR 59, with stops in Dos Palos and El Nido.

Table 3.20-1 presents traffic volume data for State highways near the project site, and **Table 3.20-2** presents traffic volumes for local roadways.

Table 3.20-1. Highway Segment Operations – 2015 Conditions

Highway	Location	Roadway Classification	Area	Number of Lanes	AADT[1]
SR 59	North of Sandy Mush Road	Principal Arterial	Rural	2	6,900
SR 140	East of Buhach Road	Principal Arterial	Rural	2	6,400
SR 152	West of SR 59	Principal Arterial	Rural	4	15,800
SR 165	North of SR 152	Principal Arterial	Rural	2	16,000

Notes:
AADT – Annual Average Daily Traffic; SR – State Route
Source: Caltrans 2015

Table 3.20-2. Local Roadway Operations –2006 Conditions

Roadway	Location	Roadway Classification	Area	ADT[1]
South Gurr Road	South of SR 140	Minor Collector	Rural	1,293
Turner Island Road	South of Sand Slough Road	Major Collector	Rural	1,292

Notes:
ADT –Average Daily Traffic; SR – State Route
Source: Merced County 2012a

The project includes the replacement of Dan McNamara Road's existing culverted low-flow crossing of the Eastside Bypass with larger concrete box culverts. The current culvert has a maximum capacity of approximately 25 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 (see **Figure 2-7**).

Restoration Flows up to a maximum of approximately 300 cfs in the Eastside Bypass occur under existing conditions, but Restoration Flows since January 2014 have been interrupted extensively because

of either drought or flood conditions, so Dan McNamara Road has experienced reduced flooding from Restoration Flows.

During high flood flows, Merced County closes Dan McNamara Road between Sandy Mush Road and Green House Road and posts the closure on its website. There are permanent "flooding" signs on Dan McNamara Road on either side of the Eastside Bypass. When the road is closed for flood flows, an existing approximately 1.5-mile detour is used. When the road is closed for Restoration Flows, however, traffic is required to detour on public roads, a distance of up to approximately 24 miles. **Figure 3.20-1** illustrates the approximately 1.5-mile detour used during flood flows, as well as the likeliest potential detour used when Restoration Flows are high enough to close Dan McNamara Road, estimated to be approximately 25 cfs, without the project.

Emergency services in the area are provided primarily from Fire Station #61 located at 961 Gurr Road (at the SR 140 intersection). From this location, emergency services can be provided on Dan McNamara Road and adjacent areas on either side of the Eastside Bypass with no increase in distance or time with Dan McNamara Road closures at the Eastside Bypass. Emergency vehicle drivers (as well as other drivers) are familiar or would quickly gain familiarity with the frequent road closures and alternative routes. Furthermore, emergency access to the south (Sandy Mush Road) end of Dan McNamara Road is not substantially affected because alternate routes of similar distance and travel time are available from all of the nearby communities (Merced, El Nido, Dos Palos Y, Los Banos) in which emergency trips originate (i.e., locations with fire stations, sheriff stations, or emergency medical facilities). Closure of Dan McNamara Road at the Eastside Bypass does not substantially affect access or travel times for emergency vehicles traveling to the north (Green House Road) end of Dan McNamara Road because emergency vehicles generally originate in Merced or Atwater to serve this area; the distance and the low speed possible on Dan McNamara Road due to the road surface make emergency trips originating in El Nido, Dos Palos Y, or Los Banos highly unlikely even during periods when the road is open. Because of these expected points of origin and routes, the impact related to emergency access is substantially less for emergency vehicle drivers aware of the seasonal closures posted on Merced County's website and knowledgeable of alternative routes as shown on **Figure 3.20-1**.

3.20.2 Regulatory Setting

There are no Federal, State, or local regulations applicable to the analysis of transportation impacts.

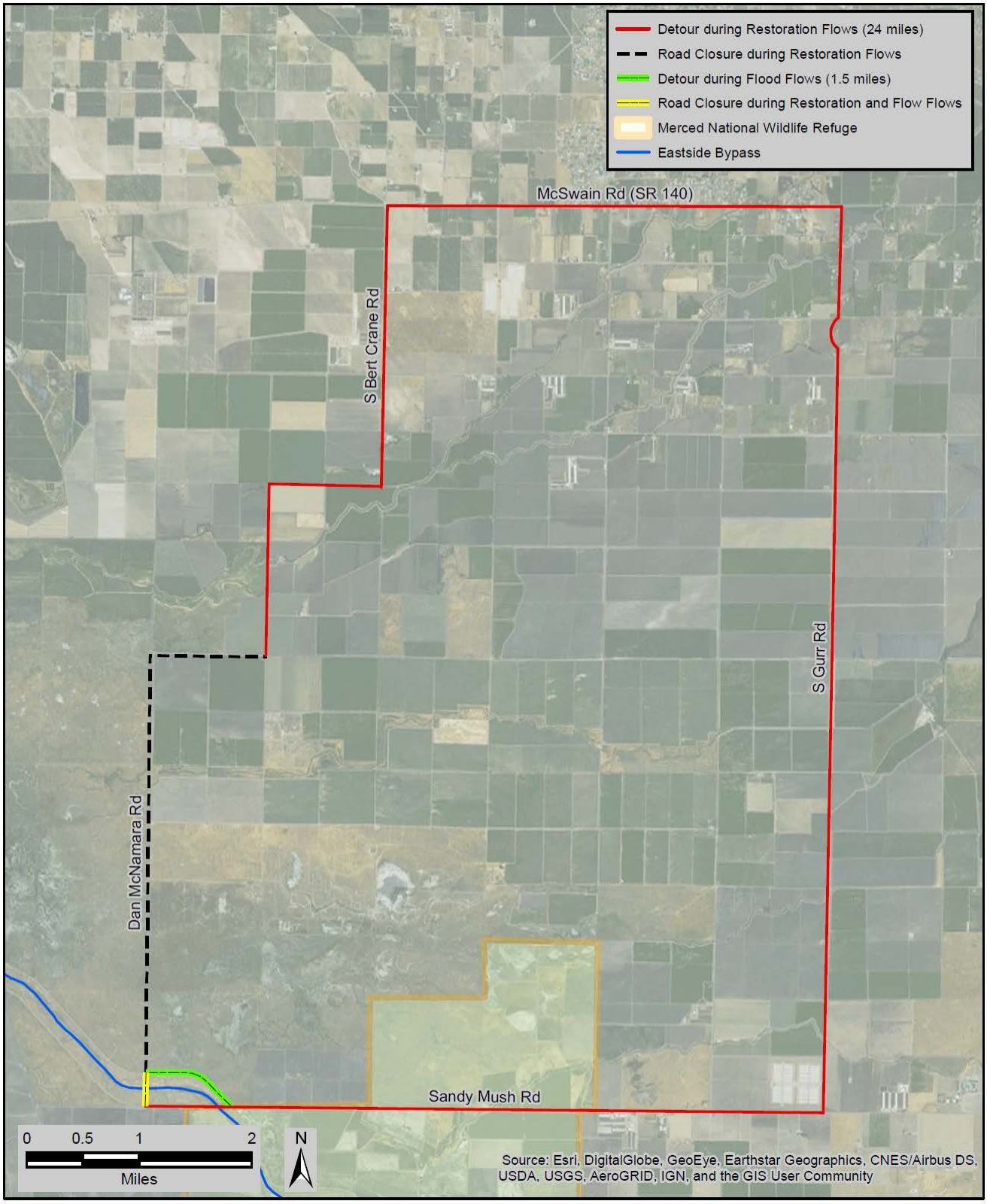
3.20.3 Environmental Effects

No Action Alternative

Under the no action alternative, no construction-related activities would occur and no existing facilities would be modified. However, Restoration Flows up to a maximum of approximately 300 cfs in the Eastside Bypass occur under existing conditions, and would increase to a maximum of approximately 580 cfs in the Eastside Bypass under the no action alternative when seepage concerns are alleviated by Reclamation, anticipated to occur in 2018.

Merced County would close the road more frequently and post the closures on its website, detours would be available (see **Figure 3.20-1**), and local travelers familiar with the frequent road closures would likely drive mostly about 5-15 additional miles, but on a much better road system (South Gurr and Sandy Mush Roads vs. the rough Dan McNamara Road) depending on where they are coming from and where they are going.

Figure 3.20-1. Dan McNamara Road Crossing Detours during Flood and Restoration Flows



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

Few if any travelers would drive the maximum 27-mile, 40-minute detour from the Eastside Bypass on Dan McNamara Road to the other side of Eastside Bypass on Dan McNamara Road (see **Figure 3.20-1**). Very few residences (less than 15) are located along the 9 miles of Dan McNamara Road from the Eastside Bypass to SR 140 (McSwain Road). The longest detour for the majority of travelers going east on SR 140 would detour an additional 18 miles and 22 minutes down South Gurr Road and Sandy Mush Road. Travelers going west on SR140, however, would detour down South Gurr Road and Sandy Mush Road as well, but without any additional distance and in less time. The majority of residents are located along SR 140 toward South Gurr Road and would drive about 3 miles farther, 2 minutes faster, and over a substantially better paved road system to reach Sandy Mush Road and Dan McNamara Road intersection if taking the South Gurr Road and Sandy Mush Road alternative, as compared to taking Dan McNamara Road from the North.

The predominance of businesses and residents affected are located along SR 140 between Bert Crane Road and South Gurr Road, and most would not have any longer travel distance or travel time because the South Gurr Road and Sandy Mush Road alternative route is a substantially better 2-lane paved road with 55 mph speed limits compared to the rough paved and gravel Bert Crane Road and Dan McNamara Road route crossing the Eastside Bypass. Given that Dan McNamara Road already is subject to infrequent flood closures and closures at Restoration Flows up to 300 cfs in the Eastside Bypass under existing conditions, the increase in Restoration Flows in the Eastside Bypass up to 580 cfs would not likely cause additional closures. Furthermore, given Merced County's posting of closures on its website, and the availability of an alternative route that adds no-to-little additional time or distance for a majority of residents in the area, this impact is less than significant.

Proposed Project

Available literature, including documents published by Federal, State, and County agencies that document traffic conditions, were reviewed for this analysis. California Department of Transportation (Caltrans) and Merced County evaluate traffic performance based on a level of service (LOS) standard. LOS standards are typically used to evaluate long-term (operational) traffic effects resulting from residential, employment-generating, industrial, and institutional development projects. The proposed project is not a land use development project. Long-term operation of the proposed project would require a similar level of maintenance and monitoring as under current conditions and the no action alternative. Because the project would result in only marginal operational changes, LOS standards were not used in this analysis. Instead, this analysis focuses on construction-related traffic effects on existing roadways.

Based on the information in, "Description of the Proposed Project and No Action Alternative," this analysis conservatively assumes a maximum of 53 workers on the proposed improvements at any one time. The analysis also assumes up to 10 heavy trucks would be operating on roadways in the vicinity of the project site on a daily basis.

To assess the effect of truck trips generated by construction of these project components, a heavy-vehicle factor known as a passenger car equivalent (PCE) value was applied to the project-generated truck traffic. This heavy-vehicle factor was used to account for the additional space occupied, reduced speed, and reduced maneuverability associated with having these vehicles, rather than standard automobiles, on the roadway. A PCE value of 2.0 was applied to the construction equipment truck trip generation estimates as recommended by the *Highway Capacity Manual 2000* (Transportation Research Board 2000).

This analysis used the recommended screening criterion from the Institute of Transportation Engineers (ITE) (1988) for assessing the effects of construction projects that create temporary traffic increases. To account for the large percentage of heavy trucks associated with typical construction projects, ITE recommends a threshold level of 50 or more new peak-direction trips during the peak-hour. Therefore, the project would cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system, and result in a significant effect related to traffic, if they would result in 50 or more new truck trips (100 PCE) during the a.m. or p.m. peak hours. This is considered an "industry standard" and is the most current guidance.

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?
(Less-than-Significant Impact)

The project would involve a maximum of approximately 53 workers and 10 trucks accessing the project site daily, resulting in 126 construction-related trips (106 worker trips and 20 truck trips). Assuming that half of the worker trips would occur during the morning peak hour, and half during the evening peak hour, the 10 trucks operating at the project site would not exceed the ITE screening criterion of 50 trucks (100 PCE) during an hour for construction traffic impacts. This temporary impact would be less than significant.

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?
(No Impact)

No congestion management program has been established for Merced County (Merced County 2012b). There would be no impact.

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?
(No Impact)

The project site is not located within 2 miles of a public or private airport, and the project does not include any activities or changes in land use that would affect air traffic patterns. There would be no impact.

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
(Less-than-Significant Impact)

Project construction would result in temporary traffic (temporary daily commute traffic for 53 construction workers, plus trips by 10 trucks operating daily) on local and regional roadways. With the exception of a replacement crossing of the low-flow channel on Dan McNamara Road, the project would not change any existing roadways, and the adjustments to Dan McNamara Road would not create new

curves, intersections, or changes to visibility. Furthermore, roadways in the project vicinity already carry truck traffic associated with agricultural operations. The temporary construction-related impacts related to increases in roadway hazards would be less than significant.

e) Result in inadequate emergency access? *(Less-than-Significant Impact)*

The project includes the replacement of Dan McNamara Road's existing culverted low-flow crossing of the Eastside Bypass with larger concrete box culverts. The road will need to be closed during construction activities, expected to take approximately 6 months. During this time, emergency vehicles would likely have access to use the shorter 1.5-mile detour typically used when the road is closed during flood flows. Even if they did not, emergency services in the area would be provided primarily from Fire Station #61 located at 961 Gurr Road (at the SR 140 intersection). From this location, emergency services can be provided on Dan McNamara Road and adjacent areas on either side of the Eastside Bypass with no increase in distance or time with Dan McNamara Road closures at the Eastside Bypass. Consequently, there would be no impact to emergency access on Dan McNamara Road at the Eastside Bypass crossing during temporary construction activities. Construction of other project elements would not close any roads, but there would be slightly higher truck traffic from haul trucks. This temporary construction-related impact to emergency access would be less than significant.

The proposed project 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 traffic and transportation from changes in flow conditions resulting from proposed project operations. Further information is provided in Section 4.1, "Cumulative Impacts."

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 current inundation at flows above the existing culvert capacity of about 25 cfs. This would have no impact during flood flows and an approximate 25 cfs increase in Restoration Flows overtopping the road (i.e., the current culvert capacity). Given that significantly larger Restoration Flows already cross the road (up to approximately 300 cfs) and much larger Restoration Flows up to 580 cfs in the near future when Reclamation expects to obtain seepage agreements would occur, this increase in road closures would be small and primarily occur at low flows during drought years when Restoration Flows are reduced. As described above, even with additional road closures with this option, the available alternative emergency routes would result in minimal, if any, delays to emergency vehicles. Therefore, the culvert removal without replacement option would have a less-than-significant impact on emergency access, both during project construction and operations.

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities? *(No Impact)*

There are no public transit, bicycle, or pedestrian facilities in the project vicinity. There would be no impact related to conflict with policies or plans, and no decrease in the performance or safety of these facilities caused by implementing the proposed project.

3.21 Indian Trust Assets

Indian Trust Assets (ITAs) are defined as legal interests in property held in trust by the United States government for Indian tribes or individuals or property protected under United States law for Indian tribes or individuals. An Indian trust has three components: 1) the trustee, 2) the beneficiary, and 3) the trust asset. ITAs can include land, minerals, Federally reserved hunting and fishing rights, Federally reserved water rights, and in-stream flows associated with a reservation or Rancheria. Beneficiaries of the Indian trust relationship are Federally recognized Indian tribes with trust land. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the United States. The characterization and application of the United States trust relationship have been defined by case law that supports Congressional acts, executive orders, and historic treaty provisions.

Existing ITA conditions are determined by their existence and proximity to the project area, within Merced County. There are no ITAs within Merced County. The ITAs in closest proximity to the study area are northeast and slightly southeast of Merced County in Madera and Tuolumne Counties. There would be no direct, indirect, or cumulative impacts to ITAs from the proposed project.

3.22 Utilities and Service Systems

	Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XXI.	**UTILITIES AND SERVICE SYSTEMS – Would the project:**					
a)	Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒	☐
b)	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒	☐
c)	Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒	☐
d)	Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐	☐
e)	Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒	☐
f)	Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐	☐
g)	Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒	☐
h)	Affect power and energy facilities?	☐	☒	☐	☐	☐

3.22.1 Environmental Setting

Solid Waste Management

Within Merced County, there are two active solid waste disposal-landfill facilities owned by Merced County and operated by the Merced County Association of Governments Regional Waste Management Authority. The Merced County Department of Public Works Solid Waste Division is under contract to operate the Highway 59 Landfill, which serves the eastern end of the County, and the Billy Wright Landfill, which serves the western end of the County. Both the Highway 59 Landfill and Billy Wright Landfill are defined as Class III landfills and accept mixed municipal, green materials, wood waste, tires, and other hazardous materials (Merced County 2013a).

The Highway 59 Landfill is permitted to accept a maximum of 1,500 tons per day of solid waste. The site has a permitted maximum capacity of approximately 30 million cubic yards and when last reported in 2005 had a remaining capacity of 28 million cubic yards and a projected closure date in 2030. The Billy Wright Landfill is permitted to accept a maximum of 1,500 tons per day of solid waste. The site has a permitted capacity of approximately 14 million cubic yards and when last reported in 2010 had a remaining capacity of 11 million cubic yards and a projected closure date in 2054 (California Department of Resources Recycling and Recovery 2016).

Water Supply

Merced Irrigation District

The Merced Irrigation District's (MID) service area is situated to the east of the Eastside Bypass, north of the Chowchilla River, and south of the Merced River. Water from Lake McClure along Merced River is the primary MID water source. Within the project area, MID provides water to the Merced NWR.

Turner Island Water District

The Turner Island Water District (TIWD) provides agricultural irrigation services to four customers during the summer irrigation season. The TIWD owns and operates various infrastructure, including 47 lift pumps, 13 wells, and 16 miles of canals.

Lone Tree Mutual Water Company

The Lone Tree Mutual Water Company (LTMWC) manages San Joaquin River water rights and supplies for many agricultural landowners primarily east of the Eastside Bypass to the north and west of El Nido, but also between the Eastside Bypass and the San Joaquin River in the vicinity of the Sand Slough inlet. LTMWC owns and maintains infrastructure including pipes underneath the San Joaquin River to the north of Sand Slough.

Merced National Wildlife Refuge

The Merced NWR receives water from MID, which delivers water into the Eastside Bypass. The Merced NWR diverts this water from the Eastside Bypass using two weirs and primarily uses the downstream weir for diversions because the crest elevation is higher and it creates a pool for use by a temporary, trailer-mounted pump. Diversions vary based on water year type and volume of water available but the approximate schedule is below:

- Flood up: September 1 to October 15 – flooding to create waterfowl habitat
- Draw down: March 1 to May 15 – draining of the refuge area
- Irrigation: April 1 to July 1 – managing water to produce forage for waterfowl.

Power Distribution and Generation Facilities

Power supplies within the project area are primarily provided by Pacific Gas & Electric Company (PG&E) from the regional power grid for residential, commercial, industrial, and agricultural uses. Power supplies delivered within the MID service area are provided by MID, although PG&E is responsible for maintaining the MID delivery system (Merced County 2013a).

The California Independent Service Operator (ISO) manages the flow and distribution of electricity through high-voltage, long-distance power lines to 80 percent of California's total power grid. California ISO delivers high voltage electricity to PG&E substations near the project area where it is distributed by

PG&E on lower voltage primary and secondary power lines (PG&E 2016). PG&E records indicate that high voltage (≤750 kilovolts) electrical transmission lines do not occur in the project area.

In addition to power from the Statewide grid, an important part of the Statewide grid's reliability is locally produced base power load. There are 11 power plants in the region providing base power load; however, none of these facilities are within the project area and would be affected by the proposed project.

Other Utilities

Natural gas services are provided to the developed areas surrounding the project vicinity by PG&E gas transmission pipelines (Merced County 2013a). Smaller rural settlements in the project vicinity are primarily served by imported propane stored on site. No natural gas lines have been documented within the project area.

In addition to natural gas and local propane distribution systems, there is the potential for unmapped pipelines serving individual or community septic systems in the project area (Merced County 2013a). However, due to the extent and nature of these septic systems and the lack of residences within the project area, it is highly unlikely that any septic pipelines fall within the project area. Also, agricultural water purveyors may maintain pipelines for irrigation water delivery in the project vicinity. The project is located in a rural-agricultural portion of Merced County and there are no documented stormwater management facilities that would be affected by the proposed project.

3.22.2 Regulatory Setting

Federal

Power and energy production and distribution are regulated by the Federal Government. The Federal Energy Regulatory Commission regulates both Federal and non-Federal power projects.

Central Valley Project Improvement Act

The Central Valley Project Improvement Act (CVPIA) was enacted in 1992 to protect, restore, and enhance habitat in Central Valley river basins, address impacts of the CVP on biological resources, improve CVP operational flexibility, support water transfers and water conservation, support protection of the Delta, and manage Central Valley Project (CVP) competing uses and demands. The following sections affect the proposed project area:

- **Section 3406(b)(2)** authorized and directed the Secretary of the Interior (Secretary), among other actions, to dedicate and manage 800 thousand acre-feet (TAF) of CVP yield annually for the primary purpose of implementing the fish, wildlife, and habitat restoration purposes and measures authorized in the CVPIA; assist the State of California in its efforts to protect the Delta; and help meet obligations legally imposed on the CVP under Federal or State law following the date of enactment of the CVPIA.

- **Section 3406(d)(1)** required that the Secretary immediately provide specific quantities of water to the refuges, referred to as "Level 2" supplies. The CVPIA requires delivery of Level 2 water in all year types, except critically dry water year conditions when Level 2 water can be reduced by 25 percent.

- **Section 3406(d)(2)** of the CVPIA refers to "Level 4" refuge water supplies, which are the quantities required for optimum habitat management of the existing refuge lands. Level 4 water supplies amount to about 163 TAF above Level 2 water supplies. The availability of Level 4 refuge water supplies is influenced by the availability of water for transfer from willing sellers.

- **Section 3406(c)(1)** mandated development of a comprehensive plan that is reasonably prudent and feasible to be presented to Congress to address fish, wildlife, and habitat concerns on the San Joaquin River. However, Public Law 111-11 declared that "the Settlement satisfies and discharges all of the obligations of the Secretary contained in Section 3406(c)(1)."

San Joaquin River Agreement

The San Joaquin River Agreement (SJRA), adopted in 2000, is a water supply program to provide increased instream flows in the San Joaquin River. The water available under the SJRA provides protective measures for fall-run Chinook salmon in the San Joaquin River under the Vernalis Adaptive Management Plan (VAMP). Though VAMP was discontinued, the NMFS 2009 Biological Opinion (BO) for Long-term Operations of the CVP/SWP included continuation of VAMP-like flows in the Reasonable and Prudent Alternatives.

State

California Integrated Waste Management Act

To minimize the amount of solid waste that must be disposed of by transformation and land disposal, the California Legislature passed the California Integrated Waste Management Act (CIWMA) of 1989 (AB 939), effective January 1990. According to the CIWMA, all cities and counties were required to divert 25 percent of all solid waste from landfill facilities by January 1, 1995 and 50 percent by January 1, 2000. Each city is required to develop solid waste plans demonstrating integration of the CIWMA plan with the county plan. The plans must promote (in order of priority) source reduction, recycling and composting, and environmentally safe transformation and land disposal.

California Public Utilities Commission

The California Public Utilities Commission (CPUC) regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies. The California ISO is an impartial operator of the Statewide wholesale power grid with responsibility for system reliability through scheduling available transmission capacity.

California Public Resources Code

Under the California Public Resources Code, agencies of the State government that regulate activities of private individuals, corporations, and public agencies found to affect the quality of the environment shall regulate such activities, with major consideration given to preventing environmental damage, while providing a satisfying living environment for every Californian.

California Water Rights

Water rights in California are managed by the State Water Resources Control Board (SWRCB). A water right is a legally protected right, granted by law, to take possession of water and put it to beneficial use. SWRCB is responsible for allocating surface water rights and permitting diversion and use of water, including the water rights of users within the project area, as applicable.

Local

As described under "Solid Waste Management" above, each solid waste management provider with jurisdiction in the project area implements solid waste plans and recycling programs consistent with the requirements of AB 939.

The Merced County General Plan outlines policies guiding the placement of new and interaction with existing electrical services for projects proposed within Merced County (Merced County 2013b).

The project area is within the Merced Integrated Regional Water Management (IRWM) Region and the boundaries of the IRWM were developed by local agencies and approved by DWR; the area includes Merced County east of the San Joaquin River and is almost entirely within the Merced Groundwater Basin. Portions of the Merced River watershed contiguous with the Merced Groundwater Basin are also a part of the region. The City of Merced, County of Merced, and MID are currently in the process of preparing an Integrated Regional Water Management Plan.

3.22.3 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) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?
(No Impact)

The project area is not served by any municipal wastewater collection systems. Project implementation would not produce any new wastewater or result in the need to expand existing private wastewater facilities. On-site portable restrooms would be available for the construction workforce during project construction. Therefore, there would be no impact.

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?
(No Impact)

See item a). There would be no impact.

c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?
(No Impact)

Implementation of the proposed project would not create additional impervious surface or stormwater runoff in excess of current conditions and would not require the construction of new or expansion of existing stormwater drainage facilities. There would be no impact.

d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?
(Less-than-Significant Impact)

The proposed fish passage modifications at the Eastside Bypass Control Structure would be near an existing siphon that conveys water in the Eastside Canal from the north side to the south side of the Mariposa and Eastside Bypasses. Construction of the proposed fish passage system is designed to avoid interference with the underground siphon; the design does not include improvements that overlie the siphon. Therefore, the proposed project would not affect the existing siphon or its operation.

The proposed project would also involve the removal of the existing Merced NWR weirs to facilitate fish passage. Under current operations, the weirs allow Merced NWR to divert water from the Eastside Bypass during low-flow conditions, including water supplies from MID, into portions of the refuge within the Eastside Bypass or areas to the west. Adequate water supplies during diversion periods is critical to refuge operations. An existing groundwater well on the refuge site would be replaced to provide an alternative water source. The updated well would pump approximately 240 acre-feet per year of water to the refuge, which is anticipated to be sufficient to maintain refuge operations consistent with existing conditions. MID water supplies could be used on the portion of the refuge east of the Eastside Bypass. The groundwater well would be constructed prior to weir removal. The well would provide an uninterrupted water supply to the refuge during project construction. Project construction would not interfere with agricultural water conveyance or operations supporting agricultural water users of the NWR. Therefore, this impact would be less than significant.

e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?
(No Impact)

See item a). The proposed project would not generate demand for wastewater treatment. There would be no impact.

f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?
(Less-than-Significant Impact)

The construction activities associated with the levee stability improvements, Merced NWR weir removals, and the Dan McNamara Road crossing modifications may result in a short-term increase in solid waste (construction waste from culvert replacement and associated road work). However, this solid waste would not exceed the permitted capacity at receiving landfills in the project area given current available landfill capacity. This impact would be less than significant.

g) Comply with federal, state, and local statutes and regulations related to solid waste?
(No Impact)

See item f). The transportation and disposal of solid waste would be in accordance with applicable Federal, State, and local statutes and regulations. There would be no impact.

h) Affect power and energy facilities?
(Less-than-Significant Impact with Mitigation Incorporated)

Construction activities associated with the project would rely primarily on diesel- and gas-powered construction equipment and would cause little to no increase in local power demands. The project area is located in a rural agricultural area of Merced County and there are no nearby homes or businesses that would experience power or energy interruptions during project construction. Additionally, construction activities associated with the project would not affect power generation at local power plants. However, construction activities could encounter or require the relocation of both known and unknown local power distribution infrastructure and other existing subsurface utilities, including currently mapped and potentially unmapped pipelines associated with individual and community natural gas and propane systems. This impact is potentially significant.

DWR and/or Reclamation would implement Mitigation Measure UTIL-1 before construction to reduce this potentially significant impact.

> **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.

By surveying for and avoiding or relocating existing utility infrastructure prior to construction activities, Implementation of Mitigation Measure UTIL-1 would reduce the potentially significant impact on utility infrastructure to a less-than-significant level.

3.23 Mandatory Findings of Significance

	Environmental Issue	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Beneficial Impact
XXII.	**MANDATORY FINDINGS OF SIGNIFICANCE – Would the project:**					
a)	Does the project 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, 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?	☐	☒	☐	☐	☐
b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☒	☐	☐	☐
c)	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐	☐

3.23.1 Discussion

a) Does the project 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, 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?
(Less-than-Significant Impact with Mitigation Incorporated)

As discussed in Section 3.4, "Biological Resources – Fisheries," Section 3.5, "Biological Resources – Vegetation and Wildlife," and Section 3.6, "Cultural Resources," any potentially significant impacts related to plant, fish, or wildlife habitat or populations, special-status species, and important historical or cultural resources would be reduced to a less-than-significant level through implementation of avoidance and minimization measures and by incorporating mitigation measures. No known cultural resources would be affected by the proposed project and if unidentified resources are encountered during construction, mitigation measures are in place to ensure that impacts would be less than significant.

For many fish and wildlife species, including target SJRRP species, the proposed project would increase fish and wildlife populations and habitats, and provide opportunities for additional future Restoration Flow increases to meet the Restoration Goal throughout the Restoration Area. Beneficial impacts would result from the proposed project both in the short-term and long-term. As explained in more detail in Section 3.4, "Biological Resources – Fisheries," Section 3.5, "Biological Resources – Vegetation and Wildlife," and Section 3.6, "Cultural Resources," the proposed project would have a less-than-significant impact with mitigation incorporated, as well as overall beneficial impacts to fish and wildlife resources in and adjacent to the Eastside Bypass.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)
(Less-than-Significant Impact with Mitigation Incorporated)

Please refer to Section 4.1, "Cumulative Impacts," in Chapter 4, "Other Required Analyses," for a discussion of cumulative impacts and the project's potential to contribute to these impacts. As discussed in Section 4.1, the proposed project with mitigation incorporated would not result in any impacts that would cause a cumulatively considerable incremental contribution to a significant cumulative impact. The project results in a less-than-significant impact with mitigation incorporated.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?
(Less-than-Significant Impact)

As discussed in the individual topic sections throughout Chapter 3, "Environmental Setting, Impacts, and Mitigation Measures," any potentially significant impacts with the potential to adversely affect human beings (including aesthetics, air quality, greenhouse gas emissions, hazards and hazardous materials, land use and planning, noise, population and housing, public services, recreation, transportation and traffic, and utilities and service systems) would be reduced to a less-than-significant level by incorporating mitigation measures that would avoid, minimize, rectify, reduce or eliminate, or compensate for potentially significant impacts. These sections consider both direct and indirect impacts. None of the project impacts would cause substantial adverse effects on human beings, either directly or indirectly, but could potentially benefit human beings living in or near the floodplain by improving critical Eastside Bypass levee sections to current USACE standards and reducing potential flood risks in the local vicinity of the levee improvements. Overall, this impact would be a less-than-significant impact.

This page intentionally left blank.

Chapter 4. Other Required Analyses

This chapter includes a discussion of cumulative impacts, as well as other analyses required under NEPA and/or CEQA.

4.1 Cumulative Impacts

4.1.1 Past, Present, and Future Related Projects and Plans

The following past, present, and future related projects and plans have been identified as having the potential to affect the same resources as the proposed project. The future projects and plans are considered to be probable and reasonably foreseeable. The projects included in this cumulative impact analysis include flood management and restoration projects affecting the San Joaquin River that could result in adverse or beneficial effects similar to those of the proposed project in the Eastside Bypass or downstream in the San Joaquin River: San Joaquin River Restoration Program. The SJRRP has been summarized in Chapter 1, "Introduction." Cumulative impacts of the entire program were evaluated in Chapter 26, "Cumulative Impacts," in the SJRRP Draft PEIS/R (SJRRP 2012); this chapter is incorporated by reference. The PEIS/R concluded that the following impacts had the potential to result in an incremental contribution to a significant cumulative impact:

- Air Quality: Construction-related emissions of criteria air pollutants and precursors.
- Biological Resources – Fisheries: Potential direct mortality or reduced fecundity of wild fall-run Chinook salmon in San Joaquin River tributaries resulting from disease outbreak.
- Climate Change: Construction-related emissions of greenhouse gases (program level); operational-related emissions of greenhouse gases (project level).
- Cultural Resources: Disturbance or destruction of cultural resources.
- Hydrology: Groundwater changes in groundwater levels and groundwater quality in Central Valley Project/State Water Project water service areas.
- Land Use Planning and Agriculture: Conversion of important farmland to nonagricultural uses and cancellation of Williamson Act contracts; substantial diminishment of agricultural land resource quality and importance because of altered inundation and/or soil saturation, and altered water deliveries.
- Noise: Exposure of sensitive receptors to generation of temporary and short-term construction noise, and increased off-site traffic noise levels.
- Utilities and Service Systems: Reduced water supplies for Friant Division water contractors.
- Visual Resources: Long-term changes in scenic vistas, scenic resources, and existing visual character.

Descriptions of Related Projects

- The Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and Structural Improvements Project (Reach 4B/ESB Project) is a high-priority SJRRP project that proposes to implement specific channel and structural modifications required by the Settlement in the area of Reach 4B of the San Joaquin River. The project includes the construction, operation, and maintenance of improvements in Reach 4B of the San Joaquin River and the flood bypass system to achieve the Restoration Goal. The Reach 4B/ESB Project addresses key elements in Paragraph 11(a) and 11(b) of the Settlement: Phase 1 improvements refer to the improvements specified in Paragraph 11(a) of the Settlement, whereas Phase 2 improvements refer to the improvements specified in Paragraph 11(b). Specifically, Paragraph 11(a) of the Settlement stipulates:

    - Modifications in San Joaquin River channel capacity to the extent necessary to ensure conveyance of at least 475 cfs through Reach 4B

    - Modifications at the Reach 4B Headgate on the San Joaquin River channel to ensure fish passage and enable flow routing of between 500 cfs and 4,500 cfs into Reach 4B, consistent with any determination made in Paragraph 11(b)(1)

    - Modifications to the Sand Slough Control Structure to ensure fish passage

    - Modifications to structures in the Mariposa bypass channel to the extent needed to provide anadromous fish passage on an interim basis until completion of the Phase 2 improvements (*Note: the proposed project analyzed in this IS/EA addresses modifications to structures in the Eastside Bypass channel to the extent needed to provide anadromous fish passage on an interim basis until completion of the Phase 2 improvements*)

    - Modifications in the Eastside and Mariposa bypass channels to establish a suitable low-flow channel if the Secretary of the Interior (Secretary), in consultation with the Regional Administrator (RA), determines such modifications are necessary to support anadromous fish migration through these channels

- Paragraph 11(b)(1) of the Settlement includes additional language on long-term flows in Reach 4B of the San Joaquin River:

    - Modifications in the San Joaquin River channel capacity (incorporating new floodplain and related riparian habitat) to ensure conveyance of at least 4,500 cfs through Reach 4B unless the Secretary of the Interior, in consultation with the RA and with the concurrence of NMFS and USFWS, determines that such modifications would not substantially enhance achievement of the Restoration Goal

- Eastside Bypass Conveyance Project. Reclamation proposes to excavate accumulated sand in the low-flow channel of the Mariposa Slough/Eastside Bypass, remove inoperable concrete culverts currently impeding flows at the low-flow El Nido Road crossing, and remove the low-flow crossing to improve hydraulic conditions at this location (Reclamation 2016).

- San Luis and Merced NWR Comprehensive Conservation Plan. The San Luis and Merced NWR Comprehensive Conservation Plan (CCP) is in preparation by USFWS and will help guide management of these refuges for 15 years; describe significant refuge resources and their importance; identify how these refuges can best protect these resources; clarify what public uses are,

and are not, compatible with managing significant resources; and identify the role of these refuges within the local community and as a national resource.

- Arroyo Canal Fish Screen and Sack Dam Fish Passage Project. Reclamation proposes to replace Sack Dam and install a new fish screen structure in Arroyo Canal to accomodate fish passage in the San Joaquin River.

- Central Valley Flood Management Planning Program. DWR launched the Central Valley Flood Management Planning (CVFMP) Program in 2008 to improve integrated flood management in California's Central Valley. The CVFMP Program efforts include the preparation of the Central Valley Flood Protection Plan (CVFPP) to fulfill the requirements of the Central Valley Flood Protection Act of 2008 (DWR 2016a).

  - Central Valley Flood Protection Plan. The CVFPP was prepared by DWR in coordination with local flood management agencies, the Central Valley Flood Protection Board (CVFPB), United States Army Corps of Engineers (USACE), Federal Emergency Management Agency (FEMA), and Reclamation (DWR 2012). The CVFPP is a guidance document that proposed a State system-wide investment approach for improving integrated flood management and flood risk-reduction for areas protected by State Plan of Flood Control (SPFC) facilities along the Sacramento River and San Joaquin River systems. The SPFC represents the portion of the Central Valley flood management system for which the State has provided assurances of non-federal cooperation to the United States. SPFC facilities include levees, weirs, bypass channels, pumps, and dams. The CVFPP provides general planning and guidance for flood management system improvements over the next 20–25 years. The CVFPP was adopted in 2012 by the CVFPB and will be updated every five years. The draft CVFPP 2017 Update and the Supplemental Program Final EIR have been released (DWR 2017). The CVFPP and associated studies and plans from the contributing planning efforts mentioned after this point are all in the feasibility study and planning stages; CEQA and NEPA documents have not been completed for those plans.

    The preferred method for improving flood management is called the State Systemwide Improvement Approach (SSIA). The SSIA identifies several opportunities for improving flood control and ecosystem restoration in the Eastside Bypass project area, including:

    – Removing (either physically or administratively) intermittent SPFC levees that are no longer functioning along the Mariposa Bypass,

    – Upgrades to structures in upper San Joaquin bypasses (Mariposa Bypass Control Structure and Mariposa Drop Structure), and

    – Fish passage improvements at Sand Slough Control Structure.

    The planning efforts that contribute to the 2017 CVFPP recommendations include the Central Valley Flood System Conservation Strategy.

  - Central Valley Flood System Conservation Strategy. The Central Valley Flood System Conservation Strategy (Conservation Strategy) is integral to implementing the 2012 CVFPP SSIA. The Conservation Strategy focuses on the integration and improvement of ecosystem functions with flood risk reduction projects and identifies specific tools and approaches to restore natural areas to benefit fish and wildlife (DWR 2016b).

- FloodSAFE California. In 2007, DWR developed FloodSAFE California, a comprehensive program to address the State of California's flood management challenges. The four main elements of the program include improving emergency response, improving flood management systems, improving operations and maintenance, and informing and assisting the public.

  DWR, with Federal and State agencies, local sponsors, and other stakeholders, have developed a draft FloodSAFE Strategic Plan, which was released to the public in June 2008. The plan identifies objectives intended to eliminate unacceptable risks of flood damage statewide. These objectives include providing at least a 200-year level of flood protection to all urban and urbanizing areas in the Sacramento-San Joaquin Valley by 2025, establishing an interagency mitigation banking program by 2013, designing and implementing a computer-assisted decision support system based on advanced forecasts for reservoirs by 2014, completing an emergency operations plan for the Sacramento-San Joaquin Delta (Delta) by December 31, 2009, and developing a Central Valley Flood Protection Plan (DWR 2008).

- San Joaquin River Salinity Management Plan. This plan describes actions taken by Reclamation to reduce or mitigate salinity and boron total maximum daily loads transferred from the Delta to the San Joaquin River basin.

  Salt load reduction actions include the Grassland Bypass Project, which is designed to improve water quality in the channels used to deliver water to wetland areas and the San Joaquin River, and the development of a Wetlands Best Management Practices Plan with the United States Fish and Wildlife Service (USFWS), California Department Fish and Wildlife (CDFW), and Grasslands Conservation District to reduce the impacts of discharges from managed wetlands into the San Joaquin River (Reclamation 2010).

- Central Valley Joint Venture. The Central Valley Joint Venture (CVJV) is made up of representatives from various agencies and organizations that are working together to protect, restore, and enhance wetlands and associated habitats for waterfowl, shorebirds, waterbirds, and riparian songbirds. The CVJV was formed to provide overall leadership, guidance, resources, and support for bird habitat conservation in the Central Valley of California.

  The CVJV's 2006 Implementation Plan outlines habitat goals for six bird groups, including breeding and non-breeding waterfowl, breeding and non-breeding shorebirds, riparian dependent songbirds, and waterbirds. The CVJV accomplishes its habitat goals through land protection, restoration, and enhancement. In the 2006 Implementation Plan, the San Joaquin Basin (which includes the Reach 4B/ESB Project area) has a wetland restoration goal of 20,000 acres and a goal of 5,084 acres per year for enhancing existing wetlands and states that agricultural easements are necessary to buffer residential and urban growth in many areas (CVJV 2006).

- 2030 Merced County General Plan. The 2030 Merced County General Plan was adopted in December 2013 (Merced County 2013). The general plan includes a plan for the comprehensive and long-range management, preservation, and conservation of "open-space lands" and contains provisions for managing and conserving Merced County's natural resources and protecting life, health, and property from natural hazards.

- Riparian Habitat Joint Venture. The Riparian Habitat Joint Venture (RHJV) project was initiated in 1994 and involves 18 Federal, State, and private organizations that have signed a Cooperative Agreement to protect and enhance habitats for native landbirds throughout California. The RHJV

reinforces other collaborative efforts currently underway that protect biodiversity and enhance natural resources and the human element they support. The RHJV's 2004 Riparian Bird Conservation Plan outlines a variety of objectives to protect and enhance habitat for riparian birds (RHJV 2004).

- Sustainable Groundwater Managment Act. The State enacted SGMA in 2014 that establishes a framework for groundwater-dependent areas to be operated in a sustainable manner. SGMA requires that Groundwater Sustainability Agencies (GSA) be created and act as the governing body with respect to groundwater management. The GSA is charged with developing a Groundwater Sustainability Plan to outline the regions plans to reach a condition where any overdraft is halted and groundwater is managed sustainably.

4.1.2 Cumulative Impact Analysis

The proposed project is a component of the SJRRP. The 2012 SJRRP Draft PEIS/R contains a comprehensive analysis of the cumulative impacts of the SJRRP considered in the context of a variety of other water resources, restoration, and physically proximate projects (please refer to Chapter 26, "Cumulative Impacts," in the SJRRP Draft PEIS/R). The PEIS/R identified potential cumulative impacts as summarized above under Section 4.1.1, "Past, Present, and Future Related Projects and Plans." As discussed below, the proposed project with mitigation incorporated would not result in any impacts that would cause a cumulatively considerable incremental contribution to a significant cumulative impact.

As described in Chapter 3, "Environmental Setting, Impacts, and Mitigation Measures," construction of the proposed project would result in potentially adverse less-than-significant effects (before or after mitigation) on air quality, biological resources (fisheries), biological resources (vegetation and wildlife), geology and soils, hazards and hazardous materials, hydrology and water quality, noise, and recreation, but would not result in significant impacts. For air quality, which is always evaluated in a cumulative impact context, construction emissions of the proposed project with Mitigation Measure AQ-1 would be below SJVAPCD significance thresholds. Most adverse impacts of the proposed project that could make a cumulatively considerable incremental contribution to a significant cumulative impact would be temporary and related to construction activities. If construction of one or more of the related projects described above were to occur during the same time frame as the proposed project and in the vicinity of the proposed project, a significant cumulative impact could result from overlapping construction-related impacts. However, there are no known construction projects proposed in the vicinity of the proposed project elements during the proposed project's 2019-2020 construction seasons. Therefore, the proposed project would not make any cumulatively considerable incremental contributions to significant, construction-related cumulative impacts.

The proposed project would have minor operations and maintenance requirements and, therefore, minor impacts that would not make a cumulatively considerable incremental contribution to any significant cumulative impacts. The primary site-specific flow-related cumulative impacts in the Eastside Bypass includes the proposed project, the increases in flows to approximately 580 cfs resulting from Reclamation's seepage easements expected to be implemented in 2018, the increase in flows to approximately 2,500 cfs due to the increased conveyance capacity from long-term project-related levee improvements and additional seepage and system improvements in other SJRRP reaches, and ultimately an increase in flows to approximately 4,500 cfs with additional SJRRP levee improvements. Flow-related impacts from the proposed project in conjunction with these other future actions that increase flows in the Eastside Bypass up to approximately 2,500 cfs would be less than significant, and flows could not increase to that level until seepage concerns are addressed by Reclamation as described in the

SJRRP PEIS/R (SJRRP 2011a). Furthermore, flow-related impacts represent SJRRP actions for which the potential impacts have been fully analyzed and disclosed, and mitigated to the extent feasible, as described in the SJRRP PEIS/R (SJRRP 2011a). Additional operations-related cumulative impact analyses are presented below.

Flood-Related Cumulative Impacts

Several key SJRRP programs are in place to mitigate potential seepage-, erosion-, and flood-related impacts (especially the Physical Monitoring and Management Plan that includes a Flow Monitoring and Management Component Plan, Seepage Monitoring and Management Component Plan, and Channel Capacity Monitoring and Management Component Plan). Consequently, the proposed project's operations and maintenance impacts would not make a cumulatively considerable incremental contribution to any significant cumulative impacts. The "Cumulative Impacts" chapter and Appendix D, "Physical Monitoring and Management Plan," of the SJRRP PEIS/R (2012) are hereby incorporated by reference as they fully evaluate, at a project- and program-level, the flow-related cumulative impacts.

Flow-Related Cumulative Impacts to Fisheries

The proposed project, combined with additional seepage and system improvements in other SJRRP reaches, would indirectly allow for increased maximum flows in the Eastside Bypass. Adult salmon migrating upstream would enter the bypass system through the Lower Eastside Bypass through a modified Eastside Bypass Control Structure to allow fish passage and would pass up the Middle Eastside Bypass before rejoining the San Joaquin River channel at the junction of Reach 4B1 and Reach 4A. Juvenile anadromous fish 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.

During high flow periods, adult fish could potentially stray into Bear Creek or Owens Creek, which are tributaries to the Lower Eastside Bypass and historically to the San Joaquin River. If Bear or Owens Creeks are flowing, adult spring and fall-run Chinook salmon may be attracted and stray into the creeks and experience reduced reproductive success due to delays, metabolic expenditure, or possible failure in reaching spawning areas. However, historical flow gauge data for Bear and Owens Creeks show they only flow during large rain events in January through May during the wettest years. Therefore, straying spring-run Chinook salmon would have ample time to reorient and return to the mainstem San Joaquin River prior to spawning in fall and before flows in Bear Creek and Owens Creek recede; however, the metabolic cost of straying could still reduce reproductive fitness even after reorientation. Both Bear and Owens Creeks historically flowed into the San Joaquin River which would have created similar conditions in which straying would have been possible, but when the cost of straying was much less costly due to significantly higher population sizes. The proposed project would contribute to restoring habitat connectivity to the San Joaquin River, which reestablishes the potential for Chinook salmon to naturally migrate and repopulate an area which once consisted of robust populations of fall-run and spring-run Chinook salmon.

Although there may be an increased straying risk for adult Chinook salmon into Bear and Owens Creeks at higher flow rates, the stray rate and habitat availability would more closely resemble that of historic and natural conditions. The additional fish passage benefits from increased flows and fish barrier removal under the proposed project would be much greater than the potential straying risk. Therefore, the incremental contribution from the proposed project to a cumulative impact from changes in flow conditions on fish would be a beneficial cumulative impact.

The long distance (100 miles) between Friant Dam and the project area results in significant warming of Restoration Flows prior to arriving at the project area. Upon reaching the project area, water temperatures would be driven primarily, and many times exclusively, by ambient conditions. During certain times of the year, groundwater seepage may also impact water temperatures. Implementation of the proposed project and additional seepage and system improvements in other SJRRP reaches would increase Restoration Flows in the Eastside Bypass which could potentially have a positive effect for salmonids through decreased water temperature under certain conditions, which would be beneficial to target fish species. Therefore, the proposed project would not have a cumulatively considerable incremental contribution to a significant cumulative impact on water temperatures and associated effects on fish.

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. Likewise, the proposed project and additional SJRRP projects would increase flows from approximately 580 cfs to approximately 2,500 cfs in the Eastside Bypass, and coupled with fish barrier removal and modifications, would provide greater habitat availability and connectivity for anadromous as well as resident fish species. Therefore, changes in habitat conditions would be a beneficial impact and the proposed project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to fish passage.

Transportation and Traffic Cumulative Impacts

Section 3.20, "Transportation and Traffic," discusses these construction-related impacts and determines that the direct and indirect impacts would be less than significant for a variety of reasons. Once project construction is completed, there are no further increases in truck traffic in the area, and Fire Station #61, as the first responder, can still provide emergency response times to all areas affected by the intermittent closure of Dan McNamara Road at the Eastside Bypass; alternative routes are easily available. The propoposed project would not make a cumulatively considerable incremental contribution to any significant cumulative impacts related to temporary, construction-related actions.

Restoration Flows up to 580 cfs without the proposed project, and then up to 2,500 cfs with the proposed project and other future SJRRP projects, would result in greater frequency of Dan McNamara Road closures at the Eastside Bypass as discussed below.

North of Sandy Mush Road, Dan McNamara Road is an unpaved, two-lane road with narrow lanes and no points of interest in either direction. As such, traffic disruption caused by closure of Dan McNamara Road during Restoration Flows would be expected to be minimal, and would not change substantially from existing conditions or the no action alternative. However, any closures due to increased Restoration Flows would result in vehicles being routed on South Gurr Road, SR 59, or SR 165 to SR 140 instead of using local roadways and Dan McNamara Road. Traffic demand on Dan McNamara Road is currently low and would be expected to stay low as the road is rough and subject to flooding under existing conditions and into the future. Ongoing traffic detours would be less than significant, with no substantial physical or traffic effects.

Increased Restoration Flows at Dan McNamara Road resulting from increased conveyance capacity in the Eastside Bypass from the proposed project and in combination with additional SJRRP projects would not substantially affect vehicular passage compared to existing conditions or the no action

alternative. This is because Restoration Flows would increase from a maximum of approximately 300 cfs under existing conditions to approximately 580 cfs under the no action alternative, but the proposed project would improve and allow road passage at flows between 25 cfs and approximately 200-400 cfs because the new culverts with increased flow capacity would contain these flows that currently inundate the road and prevent vehicle passage. Furthermore, at Restoration Flows above 200-400 cfs that would exceed the capacity of the new culvert, there would be no measurable change in road closure frequency or duration because whether under existing conditions, no action alternative conditions, or conditions with the proposed project and other SJRRP projects as flows more than 200-400 cfs would preclude vehicle passage on Dan McNamara Road at the Eastside Bypass. As explained in Section 3.20, "Transportation and Traffic," alternative routes are easily available. Consequently, impacts to transportation routes or emergency access, particularly at Dan McNamara Road, from the proposed levee modifications in combination with other SJRRP projects facilitating Restoration Flows up to 2,500 cfs would not result in a significant cumulative impact.

One 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 current inundation at flows above the existing culvert capacity of about 25 cfs. This increase in road closure at low flows would occur primarily during drought years when Restoration Flows are reduced. As described above, even with additional road closures with this option combined with future SJRRP projects that would facilitate increased Restoration Flows at Dan McNamara Road up to 2,500 cfs and ultimately to 4,500 cfs, the available alternative emergency routes would result in minimal, if any, delays to emergency vehicles. Therefore, the culvert removal without replacement option would not have a cumulatively considerable incremental contribution to a significant cumulative impact on transportation routes or emergency access at Dan McNamara Road, or with respect to any other significant cumulative impact.

Subsidence-Related Cumulative Impacts

Subsidence is a long-term concern in the region. The proposed project would have minimal, if any, effects on subsidence. Modifying the existing structures would have no effect on subsidence. The small amount of groundwater replacement water that would be used by the Merced NWR would not be a cumulatively considerable incremental contribution to the significant cumulative impact of subsidence. Moreover, the proposed project has been designed to minimize the effects of subsidence on the modified structures to the extent practicable. It is also expected that SGMA would minimize future subsidence in the region over the long-term by requiring sustainable groundwater management. For these reasons, the proposed project would not cause a cumulatively considerable incremental contribution to the significant cumulative impact on subsidence.

4.2 Growth-inducing Impacts

Constructing the project would not remove an obstacle to population or economic growth. No utility (i.e., domestic water, wastewater treatment, sewer, or stormwater treatment) expansion is proposed. No new, additional transportation facilities are proposed, nor is there any proposal to increase the capacity of existing facilities. Although construction of the project would directly generate temporary construction jobs in addition to providing indirect and induced temporary employment, this temporary increase would not induce growth because the construction workforce would be relatively small; if this workforce could not be obtained from the local construction labor pool, workers would potentially come from other areas on a temporary basis, and increased economic activity would not be of a magnitude that

would drive demand for new housing. Because service systems would not be constructed or expanded, the project would not remove an impediment to growth.

The project would not remove obstacles to growth or require construction of additional community service facilities that could cause significant environmental effects. Although the project includes improvements to levees, these non-urban levees provide flood risk reduction only to agricultural areas. The improved levees would provide flood risk reduction to areas that are zoned for agricultural use, and additional barriers (i.e., lack of utilities and urban services, distance to existing developed areas) would preclude residential or commercial development in the areas which would receive improved flood risk reduction.

4.3 Relationship between Short-Term Uses and Long-Term Productivity

Construction activities would include short-term uses of capital, labor, fuels, and construction materials as well as habitats, agricultural areas, and recreation areas. General commitments of construction materials are largely irreversible because most of the construction materials are unsalvageable (see Section 4.4, "Irreversible and Irretrievable Commitments of Resources"). Construction would also result in short-term, construction-related effects such as interference with local traffic and circulation and increased air emissions, ambient noise levels, dust generation, and disturbance of wildlife. These effects would be temporary, occurring primarily during construction, and are not expected to alter the long-term productivity of the natural environment.

In the short term, implementing the proposed project would directly increase demand for construction and technical services on a relatively small scale. The additional economic activity in these sectors could create jobs for construction contractors and workers; consulting engineers and designers; environmental consultants, such as biologists, botanists, and ecologists; and other personnel. It also would indirectly result in a minor increase in economic activity in industries that provide construction materials and industries providing goods and services to construction workers. In turn, the demand for these services could result in a minor increase in new jobs.

Grazing lands would be reduced in the short term as staging areas are used temporarily during construction. This impact would be minor and have negligible effects on employment and economic activity.

In summary, the short-term uses would generate some local, short-term economic activity that would decrease over the long term as construction activities are completed. The benefits to self-sustaining salmon and other fish populations would continue into the long term.

Long-term productivity would be maintained or increased, and there would be a short-term increase in construction-related economic activity. No identified adverse effects would pose a long-term risk to human health and safety.

4.4 Irreversible and Irretrievable Commitments of Resources

NEPA requires a discussion of the irreversible and irretrievable commitments of resources that may be involved should an action be implemented. An irreversible and irretrievable commitment of resources is

the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled or those that are consumed or reduced to unrecoverable forms. The proposed action would result in the irreversible and irretrievable commitment of the following:

- Construction materials
- Nonrenewable energy
- Land area

Project activities would commit material resources to the construction of modified facilities. The proposed project involves the use of construction materials committed to a variety of actions that would construct and modify existing facilities. The proposed project would commit a relatively small quantity of these material resources.

A large amount of material resources committed as a result of the proposed project would be fill material (soil, and to a much lesser extent, rock aggregate) primarily for earthen levee construction. The Merced County area is projected to have 21 to 40 years of permitted aggregate resources remaining (California Geological Survey 2012).

The proposed project would commit nonrenewable energy in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for the construction, operation, and maintenance of actions. However, these commitments of nonrenewable energy resources used for implementing the proposed project are not expected to adversely affect other activities that require electricity, gasoline, diesel fuel, and oil.

Grazing lands would be reduced in the short term as construction staging areas and would be used temporarily during construction. This conversion would be short term and not irreversible or irretrievable.

Chapter 5. Consultation, Coordination, and Compliance

This chapter summarizes the activities undertaken by DWR and Reclamation to satisfy CEQA, NEPA, and related regulatory requirements regarding consultation, coordination, and compliance for the Eastside Bypass Improvements Project. In addition, this chapter lists permits, petitions, and compliance documents potentially needed to implement the proposed project. This chapter also summarizes the public scoping process used to involve the public and agencies in the development of the proposed project as part of the larger Reach 4B investigations that were initiated in 2010.

5.1 Public Outreach and Agency Involvement

DWR and Reclamation jointly conducted initial public outreach and agency involvement efforts related to development of the Reach 4B Project EIS/R starting in 2009; the Reach 4B Project EIS/R initially included the four early implementation actions that are the subject of this IS/EA. A revised notice of intent (NOI) and notice of preparation (NOP) to prepare a joint EIS/R was released to the public for the entire Reach 4B Project on November 16, 2010. (Since then, Reclamation and DWR have decided to separate the near-term [to be completed by 2020] and long-term [to be completed by 2029] elements of the Reach 4B Project [now called the Reach 4B/ESB 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.)

These public outreach and agency involvement efforts assisted DWR and Reclamation in determining the scope of this IS/EA for the Eastside Bypass Improvements Project, developing the project components, defining potential environmental impacts and the significance of those impacts, and identifying appropriate mitigation measures. DWR and Reclamation will continue to solicit public and agency input on the proposed project through public review of this IS/EA.

The following sections describe the public outreach and agency involvement efforts addressing the proposed project.

5.1.1 Reach 4B/ESB Project Scoping

Relevant portions of the scoping conducted for the original 4B Project by DWR and Reclamation are briefly summarized below because the proposed project analyzed in this IS/EA was a portion of the larger project addressed during previous DWR and Reclamation scoping activities for the Reach 4B/ESB Project.

Public Scoping Meetings

DWR and Reclamation extensively publicized and held three public scoping meetings in 2009 and 2010 (two in Los Banos and one in Merced), regarding preparation of an EIS/R for the Reach 4B/ESB Project, which included the four early implementation actions of the proposed project. Approximately 820 interested parties in Reclamation's project mailing database were contacted, including Federal,

State, and local agencies; elected officials; irrigation districts; county planning departments; landowners; academics; and other individuals that showed an interest in the Reach 4B/ESB Project. Each public meeting included an overview of key Reach 4B components, including the four early implementation actions of the proposed project.

Approximately 70 people attended the three meetings, including members of the public, landowners, elected officials, and representatives from public agencies. Public agencies providing comments were the Federal Emergency Management Agency, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Native American Heritage Commission, Central Valley Flood Protection Board, San Joaquin Valley Air Pollution Control District, CalTrans, Merced County Department of Public Works, San Luis Canal Company, Madera Irrigation District, San Joaquin River Exchange Contractors and Water Authority and San Joaquin River Resource Management Coalition, Grasslands Water District, and Lower San Joaquin Levee District. Individuals and others providing comments were Carolyn Butts, John Cameron, Michael Cannon, Norman Cedarquist, Gough Federighi, Jacqueline Elaine Lawrence, D. McNamara, James L. Nickel, Ernie Nosio, Julie Rentner (River Partners).

Other Public Outreach

Reclamation conducted the following additional public outreach activities since the public scoping meetings:

- Issued an initial public scoping report in January 2010 (SJRRP 2010).
- Issued a revised public scoping report in July 2011 (SJRRP 2011).
- Participated in Technical Work Groups and Sub-Groups to provide support for the development, evaluation, and refinement of Reach 4B alternatives.
- Facilitated regular SJRRP stakeholder meetings.
- Hosted bi-weekly or as-needed meetings during the alternative formulation process.
- Organized two Value Planning sessions in November and December 2011.
- Held an Alternatives Evaluation Workshop in December 2011.
- Held multiple landowner and stakeholder meetings regarding alternatives formulation.
- Exchanged many calls and emails with individual landowners to discuss specific issues.

5.1.2 Agencies and Organizations Consulted

In addition to the agencies and organizations consulted above, DWR and Reclamation have coordinated with the other Implementing Agencies (NMFS, USFWS, and CDFW), the Settlement Parties (include Departments of the Interior and Commerce, Natural Resources Defense Council, and Friant Water Users Association), CEQA Responsible Agencies, NEPA Cooperating Agencies (EPA, NMFS, CSLC, CVFPB, and CDFW), and Native American Tribes identified in Section 5.1.3, “Native American Consultation,” below.

5.1.3 Native American Consultation

On behalf of Reclamation, Davis-King & Associates contacted the NAHC in 2009 to request a Sacred Lands File search for sacred sites within the Reach 4B/ESB Project area, which includes the proposed project action area. NAHC responded that its records show an absence of sacred sites but provided an extensive contact list of Native American groups that potentially would be interested in the Reach 4B/ESB Project actions. These Native American groups were notified of the public scoping meetings held for the Reach 4B/ESB Project. Reaching out to Native American groups, including the groups that were provided an opportunity to review this IS/EA, demonstrates compliance with EO B-10-11.

As part of cultural resources identification efforts, the NAHC was contacted by Reclamation on March 14, 2013. A request was made of the NAHC to conduct a search of their Sacred Lands File as well as to provide a list of Native American representatives who might have knowledge of cultural resources within the project area. The NAHC responded on March 25, 2013 that a search of their Sacred Lands File had failed to indicate the presence of Native American sacred sites in the project area. Letters to all seven Native American representatives from the list provided by NAHC were sent by Reclamation in March 2013. Reclamation contacted the NAHC again in 2017 specifically with respect to the proposed project. The NAHC responded that a search of their Sacred Lands File had failed to indicate the presence of Native American sacred lands in the project area.

Reclamation sent requests for contact to representatives from the California Valley Miwok Tribe, the Dumna Wo-Wah Tribal Government, the North Fork Mono Tribe, the North Fork Rancheria of Mono Indians, the North Valley Yokuts Tribe, Picayune Rancheria of Chukchansi, the Santa Rosa Rancheria Tachi Yokut Tribe, the Southern Sierra Miwuk Nation, the Table Mountain Rancheria, the Tejon Indian Tribe, the Tule River Indian Tribe, and the Wuksache Indian Tribe/Eshorn Valley Band in July 2017. Only one response to these requests for contact has been received to date. The Dumna Wo-Wah Tribal Government requested further consultation regarding the project. As the lead Federal agency for the project, Reclamation will continue to consult with Indian Tribes and Native American tribal representatives who may have knowledge of or an interest in the project area.

In compliance with AB 52, DWR sent a request dated August 14, 2017, to NAHC requesting a search of the Sacred Lands file and a Native American contact list for the proposed project. NAHC responded on August 18, 2017 that a search of its Sacred Lands File had failed to indicate the presence of Native American sacred sites in the project area and provided the following Native American contacts: Amah Mutsun Tribal Band, Dumna Wo-Wah Tribal Government, North Valley Yokuts Tribe, Picayune Rancheria of Chukchansi Indians, and Southern Sierra Miwuk Nation. On August 22, 2017, DWR sent project notification letters and invitations by certified mail to these tribes to consult under AB 52 on the project by certified mail on August 22, 2017 to all five Native American representatives listed in the NAHC letter. On November 2, 2017, DWR sent follow-up project notification letters and invitations to consult under DWR's policy by certified mail. No tribes have accepted the invitation to consult under AB 52.

DWR and Reclamation will continue to consult with interested tribes through further project review and coordination as required.

5.1.4 Future Public Involvement

In accordance with CEQA and NEPA review requirements, this IS/EA is being circulated for a 30-day public review period to Federal, State, and local agencies, as well as interested organizations and

individuals, who may wish to review the document and provide written comments. The 30-day public review period will begin on December 11, 2017.

Written comments on this IS/EA can be addressed to either of the following agency leads or sent to their email addresses or fax numbers but must be received by 5:00p.m. on January 9, 2018:

Karen Dulik
California Department of Water Resources
South Central Region Office
3374 E. Shields Avenue
Fresno, CA 93726
Karen.Dulik@water.ca.gov
Fax: (559) 230-3301
Phone: (559) 230-3361

Becky Victorine
Bureau of Reclamation
San Joaquin River Restoration Program
2800 Cottage Way
Sacramento, CA 95825
rvictorine@usbr.gov
Fax: (916) 978-5469
Phone: (916) 978-4624

The draft document was sent to the State Clearinghouse and is available online on the Reclamation website: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=30741

A printed copy of the IS/EA, including all documents referenced therein, is available for review from Karen Dulik or Becky Victorine at their respective offices above during normal business hours, as well as at the Merced County Library, 2100 O Street, Merced, CA 95340 (209-385-7484).

5.2 Regulatory Compliance

The proposed project would comply with the environmental laws and regulations described in the individual resource sections in Chapter 3, "Environmental Setting, Impacts, and Mitigation Measures." DWR and Reclamation, as applicable, will obtain the required permits and approvals for the proposed project prior to project implementation. Permits and approvals that may be required for the proposed project are presented in **Table 5-1**.

Table 5-1. Permits and Approvals that May Be Required for the Eastside Bypass Improvements Project

Coordinated Agency	Required Permit/Approval	Required For
Federal Agencies		
U.S. Bureau of Reclamation	Project Approval/NEPA Compliance	Funding and project implementation
U.S. Army Corps of Engineers	Federal Clean Water Act Section 404 Permit	Discharge of dredged or fill material into water of the United States, including wetlands
National Marine Fisheries Service	Magnuson-Stevens Fishery Conservation and Management Act Compliance	Potential impacts on Essential Fish Habitat of species covered by the act
	Federal Endangered Species Act Section 7 Consultation	Potential impacts on Federally listed anadromous fish species or critical habitat
	Fish and Wildlife Coordination Act Report	Potential impacts on preservation, conservation, and enhancement of anadromous fish and wildlife habitat
U.S. Fish and Wildlife Service	Federal Endangered Species Act Section 7	Potential impacts on Federally listed species

Table 5-1. Permits and Approvals that May Be Required for the Eastside Bypass Improvements Project

Coordinated Agency	Required Permit/Approval	Required For
	Consultation	or critical habitat
	Migratory Bird Treaty Act Compliance	Potential impacts on migratory birds
	Fish and Wildlife Coordination Act Report	Potential impacts on preservation, conservation, and enhancement of fish and wildlife habitat and embodied in the original SJRRP Coordination Act Report
	Merced National Wildlife Refuge Special Use Permit	Consistency with numerous NWR requirements (see Section 3.12, "Land Use and Planning")
State Agencies		
California Department of Water Resources	Project Approval/CEQA Compliance	Funding and project implementation
Central Valley Flood Protection Board	Encroachment Permit (CCR Title 23)	Activities that may affect a regulated floodway
California Department of Fish and Wildlife	California Endangered Species Act Consultation (Section 2081)	Incidental take or otherwise lawful activities that may adversely affect State-listed species
	Lake and Streambed Alteration Agreement (Section 1602 of the California Fish and Game Code)	Any activity that may substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake
California Office of Historic Preservation	National Historic Preservation Act Section 106 Authorization	Any actions that may have an adverse impact on historical resources
Central Valley Regional Water Quality Control Board	Clean Water Act Section 401 Certification	Discharge of pollutants into navigable waters or their tributaries
	Federal Clean Water Act Section 402 General Construction Activity Stormwater Permit	Stormwater discharges to navigable waters associated with construction activity for greater than 1 acre of land disturbance
Local Agencies		
San Joaquin Valley Air Pollution Control District	Authority to Construct/Permit to Operate	For construction or replacement of emission sources

Notes: CCR = California Code of Regulations, CEQA = California Environmental Quality Act, NEPA = National Environmental Policy Act, USACE = United States Army Corps of Engineers, USC = United States Code

This page intentionally left blank.

Chapter 6. List of Preparers

The following is a list of individuals who authored chapters or sections of this IS/EA, provided significant technical advice in their area of expertise, provided project description engineering details, and/or participated in document review.

Lead CEQA Agency: California Department of Water Resources

Name	Title/Role	Qualifications and Experience
Paul Romero, P.E.	Supervising Engineer, Water Resources / Project Manager	B.S Civil Engineering; 28 years of experience
Karen Dulik	Environmental Program Manager / Environmental Compliance Manager	M.S. Soil Science; 19 years of experience
Alexis Phillips-Dowell, P.E.	Senior Engineer, Water Resources / Project Manager: near-term fish passage actions; hydraulics modeling	B.S. Environmental Engineering; 9 years of experience
Christa J. Collin	Senior Environmental Scientist / Environmental Compliance Support	B.S. General Biology; 11 years of experience
Laurence Kerckhoff	Senior Legal Counsel	J.D.; 17 years of experience

Lead NEPA Agency: Bureau of Reclamation

Name	Title/Role	Qualifications and Experience
Elizabeth A. Vasquez	Deputy Program Manager, San Joaquin River Restoration Program / Project Manager	M.S. Environmental Science and Management; 13 years of experience
Rebecca Victorine	Natural Resource Specialist	B.S. Agricultural Systems and the Environment; 20 years of experience
Regina Story	Civil Engineer, Water Resources / Construction estimate	B.S. Civil Engineering; 2 years of experience
Blair Greimann	River Hydraulics and Sedimentation / Technical analysis and design	Ph.D. Civil Engineer, Profession Engineer; 18 years of experience
Don Portz	Lead Fish Biologist, San Joaquin River Restoration Program / Fisheries, fish passage	Ph.D. Fish Ecology/Physiology; 20 years of experience

Consultant: GEI Consultants, Inc.

Name	Qualifications and Experience	Participation

Consultant: GEI Consultants, Inc.

Name	Qualifications and Experience	Participation
Phil Dunn	B.S. Zoology, M.S. Fisheries Biology; 36 years of experience	Project Director/Project Manager; NEPA/CEQA Compliance and Document QA/QC; Introduction; Statement of Purpose and Need, and Project Objectives; Project Description; Cumulative Impacts
Wendy Copeland	B.S. Plant Science, M.S. Plant Pathology; 17 years of experience	Aesthetics; Agriculture and Forestry Resources; Environmental Justice; Geology and Soils; Land Use and Planning; Paleontology; Recreation; Population and Housing
Irene Ramirez	B.S. Mathematics; 5 years of experience	Air Quality; Greenhouse Gas Emissions
Martha Moore, PE	B.S. Environmental Resources Engineering; 30 years of experience	Air Quality Senior Reviewer; Greenhouse Gas Emissions Senior Reviewer
Mark Ashenfelter	B.S. Zoology (Zoology and Marine Biology), M.S. Natural Resources (Fisheries); 12 years of experience	Biological Resources – Fisheries; Hydrology and Water Quality – Surface Water Resources, Surface Water Quality
Kelly Fitzgerald-Holland	B.A. Environmental Studies, M.S. Environmental Science; 20 years of experience	Biological Resources – Vegetation and Wildlife
Jesse Martinez, R.P.A.	B.A. Anthropology, M.A. Anthropology; 18 years of experience	Cultural Resources – Archaeology, Indian Trust Assets, Tribal Cultural Resources
Barry Scott, R.P.A.	B.A. Anthropology, M.A. Anthropology; 30 years of experience	Cultural Resources Senior Reviewer
Patricia Ambacher	B.A. History, M.A. History with emphasis in Public History; 13 years of experience	Cultural Resources – Built Environment Resources
Erica Bishop	B.S. Geography, M.A. Water Resources; 13 years of experience	Hazards and Hazardous Materials; Hydrology and Water Quality – Groundwater Resources, Groundwater Quality, Hydrology, Flooding; Public Services; Utilities and Service Systems
Drew Sutton	B.A. Geosciences, M.C.R.P, City and Regional Planning; 17 years of experience	Noise; Transportation/Traffic; Growth-Inducing Impacts; Socioeconomics
Andrea Shephard, PhD	B.S. Marine Biology/Biology, Ph.D. Biological Oceanography; 22 years of experience	Consultation, Coordination and Compliance, List of Preparers
Siying Chen	B.S. Geographic Information Sciences, M. Eng Transportation Engineering; 5 years of experience	Geographic Information Systems
Maria Pascoal	B.A. Graphic Design; 13 years of experience	Document Graphics
Charisse Case	Certificate of Completion, Business Administration; 29 years of experience	Document Production

Key:
B.A. = Bachelor of Arts
B.S. = Bachelor of Sciences
J.D. = Juris Doctor
M.A. = Master of Arts
M.Eng = Master of Engineering
M.C.R.P. = Master of City and Regional Planning
M.S. = Master of Sciences
P.E. = Professional Engineer
Ph.D = Doctor of Philosophy
R.P.A. = Registered Professional Archaeologist

Chapter 7. References

1. Introduction

San Joaquin River Restoration Program (SJRRP). 2011. *San Joaquin River Restoration Program Draft Programmatic Environmental Impact Statement/Environmental Impact Report*. Sacramento, CA.

_____. 2012. *Third Party Working Draft Framework for Implementation*. Sacramento, CA.

_____. 2017. *Channel Capacity Report 2017 Restoration Year.* Technical Memorandum. Sacramento, CA.

2. Project Description

California Department of Water Resources (DWR). 1969. *Lower San Joaquin River Flood Control Project. Final Design Report.* Division of Design and Construction Design Branch, Sacramento, CA.

_____. 1991. *California Well Standards, Bulletin 74-90*. Well Standards Coordinator. Division of Local Assistance, Sacramento, CA.

_____. 2012. *Task 2 Draft Technical Memorandum. Evaluation of Partial Fish Passage Barriers.* South Central Region Office, Sacramento, CA.

_____. 2017. *CVFPP 2017 Update, Draft Supplemental Program Environmental Impact Report*. December 2016. Central Valley Flood Management Planning, Sacramento, CA.

Merced County. 2009. *Merced County Improvement Standards and Specifications.* Amended in 2015. Department of Public Works, Merced County, CA.

National Marine Fisheries Service (NMFS). 2001. *Guidelines for Salmonid Passage at Stream Crossings.* Southwest Region, Sacramento, CA

_____. 2008. *Anadromous Salmonid Passage Facility Design.* Northwest Region, Portland, OR.

_____. 2011. *Anadromous Salmonid Passage Facility Design.* Northwest Region, Portland, Oregon.

San Joaquin River Restoration Program (SJRRP). 2011. *Reach 4B, Eastside Bypass, and Mariposa Bypass Low Flow Channel and Structural Improvements Project Public Scoping Report Addendum.* Sacramento, CA.

_____. 2015. *Technical Memorandum. Channel Capacity Report, 2015 Restoration Year*. Sacramento, CA.

_____. 2017. *Channel Capacity Report 2017 Restoration Year.* Technical Memorandum. Sacramento, CA.

U.S. Army Corps of Engineers (USACE). 1993. *San Joaquin River Mainstem, California,* Reconnaissance Report, Sacramento District, Sacramento, CA.

_____. 2000. *Design and Construction of Levees Engineering and Design Manual* (Manual No. 1110-2-1913). Engineering and Design, Washington, D.C.

_____. 2003. *Engineering Manual: Slope Stability* (Manual No. 1110-2-1902). Engineering and Design, Washington, D.C.

_____. 2005. *Design Guidance for Levee Underseepage* (Engineering Technical Letter No. 1110-2-569). Engineering and Design, Washington, D.C.

U.S. Bureau of Reclamation (Reclamation). 1967. *Lower San Joaquin River Flood Control Project Operation and Maintenance Manual for Levees, Irrigation and Drainage Structures, Channels and Miscellaneous Facilities, Part I, II, and III.* Amended in 1978. Washington, D.C.

U.S. Fish and Wildlife Service (USFWS). 2010. *Best Management Practices to Minimize Adverse Effects to Pacific Lamprey*. U.S. Department of Agriculture Forest Service, and U.S. Bureau of Land Management.

3.1 Aesthetics

Federal Highway Administration (FHA). 1988. *Visual Impact Assessment for Highway Projects.* Publication No. FHWA-HI-88-054. Office of Environmental Policy. Washington, D.C. Available at: http://www.dot.ca.gov/ser/downloads/visual/FHWAVisualImpactAssmt.pdf. Accessed July 21, 2017.

Merced County. 2013 (December). *2030 Merced County General Plan*. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf. Accessed July 7, 2017.

_____. 2015 (December). *Merced County Improvement Standards and Specifications*. Available at: https://www.co.merced.ca.us/DocumentCenter/Home/View/1579. Accessed July 3, 2017.

U.S. Department of Agriculture, Forest Service. 1995. *Landscape Aesthetics: A Handbook for Scenery Management*. Agriculture Handbook No. 701. Available at: http://www.fs.fed.us/cdt/carrying_capacity/landscape_aesthetics_handbook_701_no_append.pdf. Accessed July 21, 2017.

3.2 Agriculture and Forestry Resources

California Department of Conservation. 2015. *Merced County Important Farmland 2014, Sheet 1 of 2*. Available at: http://www.conservation.ca.gov/dlrp/fmmp/Pages/Merced.aspx. Accessed July 11, 2017.

Merced County. 2013. *2030 Merced County General Plan*. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf. Accessed July 11, 2017.

_____. 2016. *Merced County GIS Williamson Act and General Plan Shapefiles.* Accessed March 7, 2017. Available at: http://www.co.merced.ca.us/index.aspx?NID=1624.

3.3 Air Quality

California Air Resources Board (CARB). 2009. *The California Almanac of Emissions and Air Quality*. Available at: https://www.arb.ca.gov/aqd/almanac/almanac09/almanac09.htm.

_____. 2016. *Proposed 2016 State Strategy for the State Implementation Plan*. Sacramento, CA. Available at: https://www.arb.ca.gov/planning/sip/2016sip/2016statesip.pdf.

Merced County. 2013. *2030 Merced County General Plan*. Available at: http://www.co.merced.ca.us/DocumentCenter/View/6766.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2002. *Extreme Ozone Attainment Demonstration Plan*: San Joaquin Valley Air Basin Plan Demonstrating Attainment of Federal 1-hour Ozone Standards. Fresno, CA.

_____. 2015. *Guidance for Assessing and Mitigating Air Quality Impacts* (GAMAQI). Available at: http://www.valleyair.org/transportation/GAMAQI_3-19-15.pdf.

_____. 2016. *Guidance to Conduct Detailed Analysis for Assessing Odor Impacts to Sensitive Receptors*. Available at: http://www.valleyair.org/transportation/GAMAQI-Detailed-Analysis-for-Assessing-Odor-Impacts-to-Sensitive-Receptors.pdf .

U.S. Environmental Protection Agency (EPA). 2016. National Ambient Air Quality Standards (NAAQS) Table. Available at: https://www.epa.gov/criteria-air-pollutants/naaqs-table.

3.4 Biological Resources – Fisheries

Bailey, H.C., E. Hallen, T. Hampson, M. Emanuel, and B.S. Washburn. 2000. *Characterization of reproductive status and spawning and rearing conditions for splittail (Pogonichthys macrolepidotus), a cyprinid of Special Concern, endemic to the Sacramento-San Joaquin estuary*. Unpublished manuscript. University of California, Davis.

Bams, R.A. 1970. *Evaluation of a revised hatchery method tested on pink and chum salmon fry,* Journal of the Fisheries Research Board of Canada: 27: 1429–1452.

Baxter, R.D. 1999. *Status of splittail in California.* California Fish and Game 85: 28–30.

_____. 2000. *Splittail and longfin smelt.* IEP Newsletter 13: 19–21.

Beamish, R.J. 1980. *Adult biology of the River Lamprey (Lampetra ayresi) and the Pacific lamprey (Lampetra tridentata) from the Pacific coast of Canada*. Canadian Journal of Fisheries and Aquatic Science 37: 1906–1923.

Bjornn, T.C., and D.W. Reiser. 1991. *Habitat requirements of salmonids in streams. Pages 83–138 in W. R. Meehan, editor.* Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication No. 19.

Brandes, P.L., and J.S. McLain. 2001. *Juvenile Chinook salmon abundance, distribution, and survival in the Sacramento-San Joaquin Estuary.* Pages 39-138 in Brown, R.L., editor. Fish Bulletin 179: Contributions to the biology of Central Valley salmonids. Volume 2. California Department of Fish and Game, Sacramento, CA.

Brown, L.R., and P.B. Moyle. 1993. *Distribution, ecology, and status of the fishes of the San Joaquin River drainage, California*. California Fish and Game 79: 96-114.

California Department of Fish and Game (CDFG). 1957. Report on water right applications 23, 234, 1465, 5638, 5817, 5818, 5819, 5820, 5821, 5822, 9369, United States of America – Bureau of Reclamation; water right applications 6771, 6772, 7134, 7135, City of Fresno; water right application 6733 – Fresno Irrigation District on the San Joaquin River, Fresno/Madera, and Merced counties, California. CDFG, Region 4, Fresno, CA.

_____. 1998. *A status review of the spring-run Chinook salmon (Oncorhynchus tshawytscha) in the Sacramento River drainage.* Candidate Species Report 98-01. Sacramento, CA.

_____. 2008. Gleason, E., M. Gingras, and J. DuBois. 2007 *Sturgeon fishing report card: preliminary data report.* Bay Delta Region, Stockton, CA.

_____. 2009. DuBois, J., M. Gingras, and R. Mayfield. *2008 Sturgeon fishing report card: preliminary data report.* Bay Delta Region, Stockton, CA.

California Department of Fish and Wildlife (CDFW). 2017. Rarefind 5, a program created by CDFW allowing access to the California Natural Diversity Database. Species list for the Stevinson, Sandy Mush, Turner Ranch, San Luis Ranch, Arena, Santa Rita Bridge, and Delta Ranch quadrangles. Originally Accessed on August and December 2012, and January 4 2013. Updated on March 2017.

Clark, G.H. 1943. Salmon at Friant Dam - 1942. *California Fish and Game 29(3):89-91*.

Fisher, F.W. 1994. Past and present status of Central Valley Chinook salmon, Conservation Biology 8: 870–873.

Fry, D.H. Jr. 1961. King salmon spawning stocks of the California Central Valley, 1940-1959. California Fish and Game 47: 55-71.

Goodman, D.H., S.B. Reid, M.F. Docker, G.R. Haas, and A.P. Kinziger. 2008. Mitochondrial DNA evidence for high levels of gene flow among populations of a widely distributed anadromous lamprey *Entosphenus tridentatus* (Petromyzontidae). Journal of Fish Biology 72:400-417.

Goodman, D.H. and S.B. Reid. 2012. Pacific Lamprey (Entosphenus tridentatus) assessment and template for conservation measures in California. U.S. Fish and Wildlife Service, Arcata, CA. 117 pp.

Goodman, D.H., S.B. Reid, N.A. Som, and W. R. Poytress. 2015. *The punctuated seaward migration of Pacific lamprey (Entosphenus tridentatus):* environmental cues and implications for streamflow management. Canadian Journal of Fisheries and Aquatic Sciences 72(12):1817-1828.

Gruber, J. J., Z. J. Jackson, and J. P. Van Eenennaam. 2012. *2011 San Joaquin River sturgeon spawning survey.* Stockton Fish and Wildlife Office, Anadromous Fish Restoration Program, U. S. Fish and Wildlife Service, Stockton, CA.

Healey, M.C. 1991. *The life history of Chinook salmon. Pages 311–393 in C.* Groot and L Margolis, editors. Pacific salmon life histories. University of British Columbia Press, Vancouver, Canada.

Heming, T.A. 1982. Effects of temperature on utilization of yolk by Chinook salmon (Oncorhynchus tshawytscha) eggs and alevins. Canadian Journal of Fisheries and Aquatic Sciences 39: 184–190.

Jackson, Z.J., J.J. Gruber, and J.P. Van Eenennaam. 2016. White Sturgeon Spawning in the San Joaquin River, California, and Effects of Water Management. Journal of Fish and Wildlife Management: Vol. 7, No. 1, pp. 171-180. doi: http://dx.doi.org/10.3996/092015-JFWM-092

Jeffres, C.A., J.J. Opperman, P.B. Moyle. 2008. Ephemeral floodplain habitats provide best growth conditions for juvenile Chinook salmon in a California River. Environmental Biology of Fishes 83:449–458.

Kan, T.T. 1975. *Systematics, variation, distribution, and biology of lampreys of the genus Lampetra in Oregon.* Dissertation for the Doctor of Philosophy. Oregon State University, Corvallis, 194 pp.

Klimley, A.P., Chapman, E.D., Cech Jr, J.J., Cocherell, D.E., Fangue, N.A., Gingras, M., Jackson, Z., Miller, E.A., Mora, E.A., Poletto, J.B. and Schreier, A.M. 2015. *Sturgeon in the Sacramento–San Joaquin Watershed: New Insights to Support Conservation and Management.* San Francisco Estuary and Watershed Science, 13(4).

Kohlhorst, D.W. 1976. *Sturgeon spawning in the Sacramento River in 1973,* as determined by distribution of larvae. California Fish and Game 62:32-40.

Kohlhorst, D.W., L.W. Botsford, J.S. Brennan, and G.M. Cailliet, 1991. Aspects of the structure and dynamics of an exploited central California population of white sturgeon (*Acipenser transmontanus*), in "Acipenser," P. Wouldiot, ed., Bordeaux, France, pp. 277 – 293.

Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer, editors. 1980. *Atlas of North American freshwater fishes.* North Carolina State Museum of Natural History, Raleigh, NC.

Lindley, S.T., R.S. Schick, A. Agrawal, M. Goslin, T.E. Pearson, E. Mora, J.J. Anderson, B. May, S. Greene, C. Hanson, A. Low, D. McEwan, R.B. MacFarlane, C. Swanson, and J.G. Wouldiams. 2006. *Historical population structure of Central Valley steelhead and its alteration by dams.* San Francisco Estuary & Watershed Science 4(1):1–19.

McCabe, G. T., Jr., and C. A. Tracy. 1994. Spawning and early life history of white sturgeon, Acipenser transmontanus, in the lower Columbia River. Fisheries Bulletin 92:760–772.

McEwan, D.R. 2001. Central Valley steelhead. Pages 1-43 in R. L. Brown, editor. Contributions to the biology of Central Valley salmonids. Fish Bulletin 179: Volume 1. California Department of Fish and Game, Sacramento, CA.

McEwan, D., and T.A. Jackson. 1996. *Steelhead restoration and management plan for California. Management report.* California Department of Fish and Game, Inland Fisheries Division, Sacramento, CA.

Meeuwig, M.H., J.M. Bayer, and J.G. Seelye. 2005. *Effects of temperature on survival and development of early life stage Pacific and western brook lampreys.* Transactions of the American Fisheries Society 134:19–27.

Meng, L., and P.B. Moyle. 1995. *Status of splittail in the Sacramento-San Joaquin Estuary.* Transactions of the American Fisheries Society 124: 538–549.

Merced County. 2013. *2030 Merced County General Plan*. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf.

Michael, J.H. 1980. *Repeat spawning of Pacific lamprey.* California Fish and Game Notes 66:186–187.

Moore, J.W., and J.M. Mallatt. 1980. *Feeding of larval lamprey.* Canadian Journal of Fisheries and Aquatic Sciences 37:1658–1664.

Moyle, P.B. 2002. *Inland fishes of California: revised and expanded.* University of California Press, Berkeley.

Moyle, P. B., and D. M. Baltz. 1985. Microhabitat use by an assemblage of California stream fishes: developing criteria for instream flow determinations. Transactions of the American Fisheries Society 114:695-704.

Moyle, P.B., R.D. Baxter, T. Sommer, T.C. Foin, and S.A. Matern. 2004. *Biology and population dynamics of Sacramento Splittail (Pogonichthys macrolepidotus) in the San Francisco Estuary: a review.* San Francisco Estuary and Watershed Science [online serial] 2(2):1-47.

Moyle, P.B., R.M. Quinones, J.V. Katz, and J. Weaver. 2015. *Fish Species of Special Concern in California, Third Edition.* California Department of Fish and Wildlife, Sacramento, CA.

National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS). 2014. 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 California Central Valley steelhead. California Central Valley Area Office, Sacramento, CA.

Nicholas, J.W., and D.G. Hankin. 1989. *Chinook salmon populations in Oregon coastal river basins:* descriptions of life histories and assessment of recent trends in run strengths, Report EM 8402-Oregon Department of Fish and Wildlife, Research and Development Section, Corvallis, OR.

Pacific Fishery Management Council (PFMC). 2016. Pacific Coast Salmon Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California as Amended through Amendment 19. PFMC, Portland, OR. 91 p.

Polis, G. A., and K. O. Winemiller. 1996. *Food webs: integration of patterns and dynamics.* Chapman and Hall, New York, NY.

Rutter, C. 1908. The fishes of the Sacramento-San Joaquin basin, with a study of their distribution and variation, Bulletin of the U. S. Bureau of Fisheries 27: 103–152.

Saiki, M.K. 1984. Environmental conditions and fish faunas in low elevation rivers on the irrigated San Joaquin Valley floor, California. California Fish and Game 70: 145-157.

San Joaquin River Restoration Program (SJRRP). 2010. Fisheries management plan: a framework for adaptive management in the San Joaquin River Restoration Program. Sacramento, CA.

_____. 2011a. *San Joaquin River Restoration Program. Appendix B. 2011 Draft Annual Technical Report*. Fish passage evaluation. Task 1, evaluation of partial fish passage barriers. Sacramento, CA.

_____. 2011b. Programmatic biological assessment. Sacramento, CA.

_____. 2012a. San Joaquin River Restoration Program Fish Passage Evaluation. Task 2, Draft Technical Memorandum, Evaluation of Partial Fish Passage Barriers. Sacramento, CA.

_____. 2012b. *San Joaquin River Restoration Programmatic Final Environmental Impact Statement/Environmental Impact Report.* Accessed on March 27, 2017. Available at: https://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=2940.

_____. 2013. *Thermal Conditions in Riverine Pools from the Eastside Bypass/Reach 4 to Reach 5*. Sacramento, CA.

_____. 2017. *Fisheries Framework: Spring-run and Fall-run Chinook Salmon.* Available at: http://www.restoresjr.net/wp-content/uploads/Version-5.1_-SJRRP-Fisheries-Framework-062617-Final-Draft.pdf.

Sommer, T., R. Baxter, and B. Herbold. 1997. *Resilience of splittail in the Sacramento-San Joaquin estuary.* Transactions of the American Fisheries Society 126: 961–976.

Sommer, T.R., M.L. Nobriga, W.C. Harrell, W. Batham, and W.J. Kimmerer. 2001. *Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival.* Canadian Journal of Fisheries and Aquatic Sciences 58: 325-333.

U.S. Environmental Protection Agency (EPA). 2012. Clean Water Act 402 National Pollutant Discharge Elimination System (NPDES) Permit Requirements for “Good Samaritans” at Orphan Mine Sites. Memorandum to Regional Administrators, Regions I-X.

U.S. Fish and Wildlife Service (USFWS). 2012. Fish Assemblage Monitoring, Unpublished Data.

_____. 2015. *San Joaquin River White Sturgeon Telemetry Study.* Available at: https://www.researchgate.net/profile/Zachary_Jackson/publication/306012944_2014_San_Joaquin_River_White_Sturgeon_Telemetry_Study/links/57aa168708ae3765c3b49584/2014-San-Joaquin-River-White-Sturgeon-Telemetry-Study.pdf.

_____. 2017a. *Information for Planning and Conservation (IPaC) Trust Resource Report: My Project, Merced County.* Accessed March 16, 2017.

_____. 2017b. *Fish Assemblage Inventory and Monitoring 2013-2014*. Final Monitoring and Analysis Plan Report. San Joaquin River Restoration Program, Sacramento, CA.

Van de Wetering, S.J. 1998. Aspects of life history characteristics and physiological processes in smolting pacific lamprey (Lampetra tridentata) in a central Oregon coast stream. Master of Science Thesis. Oregon State University, Corvallis, 59 pp.

Vernier, J.M. 1969. Chronological table of embryonic development of rainbow trout, Canada Fisheries and Marine Service Translation Series 3913.

Wang, J.C.S. 1986. *Fishes of the Sacramento-San Joaquin estuary and adjacent waters, California: a guide to the early life histories.* Technical Report 9. Prepared for the Interagency Ecological Study Program for the Sacramento-San Joaquin Estuary by California Department of Water Resources, California Department of Fish and Game, U.S. Bureau of Reclamation and U.S. Fish and Wildlife Service.

_____. 1995. Observations of early life stages of splittail (Pogonichthys macrolepidotus) in the Sacramento-San Joaquin estuary, 1988 to 1994. IEP Technical Report 43.

Ward, David., James H. Petersen and John J. Loch. 2013. Index of Predation on Juvenile Salmonids by Northern Squawfish in the Lower and Middle Columbia River and in the Lower Snake River. Transactions of the American Fisheries Society, Volume 124, Issue 3.

Ward, P.D., and T.R. McReynolds. 2001. Butte and Big Chico creeks spring-run Chinook salmon, Oncorhynchus tshawytscha, life history investigation 1998-2000, Inland Fisheries Administrative Report No. 2001-2, California Department of Fish and Game, Sacramento, CA.

Yoshiyama, R.M., E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 1996. Historical and present distribution of chinook salmon in the Central Valley drainage of California, Sierra Nevada Ecosystem Project: final report to congress, Volume III: Assessments, commissioned reports, and background information. University of California, Center for Water and Wildland Resources, Davis, pp. 309-362.

Yoshiyama, R.M., F.W. Fisher, and P.B. Moyle. 1998. *Historical abundance and decline of Chinook salmon in the Central Valley region of California.* North American Journal of Fisheries Management 18: 487-521.

Young, P.S., and J.J. Cech, Jr. 1995. *Salinity and dissolved oxygen tolerance of young-of-the-year and juvenile Sacramento splittail.* Consensus building in resource management. American Fisheries Society, California-Nevada Chapter.

_____. 1996. *Environmental tolerances and requirements of splittail.* Transactions of the American Fisheries Society 125: 664–678.

3.5 Biological Resources – Vegetation and Wildlife

California Department of Food and Agriculture (CDFA). 2010. *Noxious Weed Pest Ratings.* Available at: http://www.cdfa.ca.gov/phpps/ipc/weedinfo/winfo_list-pestrating.htm

California Department of Fish and Game (CDFG). 2012. Rarefind 4, a program created by CDFW allowing access to the California Natural Diversity Database. Species list for the Stevinson, Sandy Mush, Turner Ranch, San Luis Ranch, Ingomar, Gustine, Arena, Los Banos, Santa Rita Bridge, Delta Ranch, Volta, Bliss Ranch, El Nido, and Atwater quadrangles.

California Department of Fish and Wildlife. 2017. *Rarefind 5, a program created by CDFW allowing access to the California Natural Diversity Database.* Species list for the Sandy Mush, Turner Ranch, and Santa Rita Bridge quadrangles. Accessed on July 12, 2017.

Cal-IPC. 2006. *California Invasive Plant Inventory.* Cal-IPC Publication 2006-02. California Invasive Plant Council: Berkeley, CA. Available online at: www.cal-ipc.org. Accessed in 2006.

California Department of Water Resources (DWR). 2002. *Riparian Vegetation of the San Joaquin River*. Prepared for U.S. Bureau of Reclamation. Sacramento, CA.

_____. 2011. *Final Geomorphology Technical Memoranda and Maps.* South NULE Geomorphic Assessments. Prepared by Kleinfelder West, Inc. Sacramento, CA.

California Native Plant Society (CNPS). 2017. *Inventory of Rare and Endangered Plants (online edition, v8-01a), (CNPS: Arena, Delta Ranch, San Luis Ranch, Sandy Mush, Santa Rita Bridge, Stevinson, and Turner Ranch quadrangles).* Accessed on July 12, 2017. Available at: http://www.rareplants.cnps.org/

California Wildlife Habitat Relationships System (CWHR). 2010. *A habitat classification scheme developed to support the CWHR System, a wildlife information system and predictive model for California's regularly-occurring birds, mammals, reptiles and amphibians.* Available at www.dfw.ca.gov/biogeodata/cwhr/wildlife_habitats.asp.

Cowardin, L. M., Carter, V., Golet, F. C., and E.T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the U.S.* Department of the Interior, Fish and Wildlife Service, Washington, D.C. Accessed on July 13, 2016. Available at: https://web.archive.org/web/20140121073314/http://www.fws.gov/wetlands/Documents/classwet/index.html.

Davis, M.A., and K. Thompson. 2000. *Eight Ways to Be a Colonizer, Two Ways to Be an Invader: A Proposed Nomenclature Scheme for Invasion Ecology.* Bulletin of the Ecological Society of America 81: 226-230.

Endangered Species Profiles (ESRP). 2006. *Species Featured in Recovery Plan for San Joaquin Valley Arid Upland and Riparian Communities*. California State University, Stanislaus. Available at: http://esrp.csustan.edu/speciesprofiles.

Holland, R.F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* California Department of Fish and Game, Sacramento, CA.

Merced County. 2013. *2030 Merced County General Plan*. Merced, CA.

Miles, S,R. and C.B. Goudey. 1997. *Ecological Subregions of California: Section and Subsection Descriptions*. USDA Forest Service, Pacific Southwest Region Publication R5-EM-TP-005. San Francisco, CA.

Regional Water Quality Control Board, Central Valley Region (RWQCB). 2016. *Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley Region (5), Fourth Edition, 1998.* Revised April 2016.

Swainson's Hawk Technical Advisory Committee (SHTAC). 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley. May 31. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83990&inline.

U.S. Army Corps of Engineers (USACE), Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Final Report.

_____. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region.

U.S. Department of Agriculture (USDA). 2017. *Introduced, Invasive, and Noxious Plants. Plants Database. U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS).* Accessed March 2017. Available at: https://plants.usda.gov/java/noxious?rptType=State&statefips=06.

U.S. Department of the Interior, U.S. Bureau of Reclamation (Reclamation). 1998a. *Historical Riparian Habitat Conditions of the San Joaquin River – Friant Dam to the Merced River.* Prepared by Jones and Stokes Associates, Inc. Sacramento, CA.

_____. 1998b. *Analysis of Physical Processes and Riparian Habitat Potential of the San Joaquin River – Friant Dam to the Merced River.* Prepared by Jones & Stokes Associates, Inc. Sacramento, CA.

_____. 2011. *San Joaquin River Restoration Program Draft Programmatic Environmental Impact Statement/Environmental Impact Report*. Sacramento, CA.

_____. 2012a. *Draft and Final EA for the San Joaquin River Invasive Vegetation Monitoring and Management.* Sacramento, CA.

_____. 2012b. *Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and Structural Improvements Project First Administrative Draft Survey Results Technical Memorandum.* Sacramento, CA.

_____. 2016. *Supplemental Information on Potential Effects of the San Joaquin River Restoration Program (SJRRP) on the Fresno Kangaroo Rat (Dipodomys nitratoides) (FKR).* Sacramento, CA.

_____. 2017a. *Elderberry shrub survey results within the San Joaquin River Restoration Program Reach 4B Eastside Bypass Improvements Project*. Prepared by Environmental Science Associates. Sacramento, CA.

_____. 2017b. *Draft San Joaquin River Restoration Program Reach 4B Eastside Bypass Improvements Project: Special-Status Plant Survey Report*. Prepared by Environmental Science Associates. Sacramento, CA.

_____, 2017c. *Draft San Joaquin River Restoration Program Reach 4B Eastside Bypass Improvements Project: Aquatic Resources Delineation Report*. Prepared by Environmental Science Associates. Sacramento, CA.

U.S. Fish and Wildlife Service (USFWS). 1997. *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. Sacramento, CA.

_____. 1998. *Recovery plan for upland species of the San Joaquin Valley, California.* Region 1, Portland, OR. 319 pp.

_____. 1999. *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance.* Sacramento, CA.

_____. 2002. *Recovery Plan for the California Red-Legged Frog (Rana aurora draytonii).* Portland, OR.

_____. 2003. *Endangered and Threatened Wildlife and Plants: Final Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Southern Oregon.* 68 FR 46684 46867.

_____. 2005a. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon.* Portland, OR. xxvi + 606 pp.

_____. 2005b. *Final Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Southern Oregon; Re-evaluation of Non-Economic Exclusios from August 2003 Final Designation Federal Register 70:11140-11154.*

_____. 2005c. *Final Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Southern Oregon; evaluation of Economic Exclusions From August 2003 Final Designation; Federal Register 70:46923-46999.*

_____. 2006. *Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants; Final Rule. Federal Register 71:7117–7166.*

_____. 2008. *Invasive Species.* Resource Mapping and Spatial Analysis.

_____. 2011. *Standardized Recommendations for Protection of San Joaquin Kit Fox Prior to or During Ground Disturbance.* Sacramento Fish and Wildlife Office, Sacramento, CA.

_____. 2017a. *Information for Planning and Conservation (IPaC) Trust Resource Report: My Project, Merced County.*

_____. 2017b. *Administrative Draft San Luis and Merced NWR Comprehensive Conservation Plan* (in progress). Sacramento, CA.

_____. 2017c. *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (*Desmocerus californicus dimorphus*). Sacramento, CA. 28 pp.

U.S. Forest Service (USFS). 2009. *San Joaquin Basin In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment).* McGinley, M (Topic Editor). First published in the Encyclopedia of Earth September 22, 2009; Last revised Date September 22, 2009; Retrieved January 2, 2013. Available at: http://www.eoearth.org/article/San_Joaquin_Basin_(Bailey).

3.6 Cultural Resources

Byrd, B. F., Wee, S., and Costello, J. 2009. Cultural Resources Sensitivity Study and Research Design for the San Joaquin River Restoration Program, Fresno, Madera, Merced, and Stanislaus Counties, California. Far Western Anthropological Research Group, Inc., Davis, California. Report prepared for MWH Environmental Permitting, Sacramento, California on behalf of the US Bureau of Reclamation, Mid-Pacific Region, Sacramento, CA.

Fredrickson, D. 1973. *Early Cultures of the North Coast Ranges*. California. Ph.D. Dissertation, Department of Anthropology. University of California, Davis.

———. 1974. *Cultural Diversity in Early Central California: A View from the North Coast Ranges*. Journal of California Anthropology 1: 41-54.

Holm, L., Peske, C., and Holson, J. 2017. *Cultural Resources Report for the Eastside Bypass Improvmenet Project, Merced County, California*. Pacific Legacy, Inc. Berkeley, CA.

Holson, John. 2017. Memo to Carolyn Buckman and Andria Loutsch, CDM Smith regarding results of Eastside Bypass Improvements Archaeological Survey.

Igler, D. 2001. *Industrial Cowboys: Miller & Lux and the Transformation of the Far West, 1850-1920*. University of California Press, Berkeley.

Kelley, Robert Lloyd. 1989. *Battling the Inland Sea: American Political Culture, Public Policy and the Sacramento Valley, 1850-1986*. University of California Press, Berkeley.

Kroeber, A. L. 1925. *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin. 78. Washington, D.C.: Smithsonian Institution.

Merced County. 2013. *2030 Merced County General Plan*. Merced, CA.

Moratto, M. 1984. *California Archaeology*. New York: Academic Press.

Norby, Heather. 2017. Email correspondence to Caroyln Buckman, CDM Smith, regarding Document Query – Lower San Joaquin River Flood Control Project, November 16.

Norby, H. and S. Wee. 2017. Draft Eastside Bypass Improvements Project, Merced County, Historical Resources Inventory & Evaluation Report. Prepared by JRP Historical Consulting, LLc, Davis, CA. Prepared for U.S. Bureau of Reclamation, Sacramento, CA.

Olsen, W., and Payen, L. A. 1969. *Archaeology of the Grayson Site, Merced County, California*. California Department of Parks and Recreation, Archaeological Reports 12. Sacramento, CA.

Rosenthal, J. S., White, G. G., and Sutton, M. 2007. The Central Valley: A View from the Catbird's Seat. In *California Prehistory: Colonization, Culture and Complexity*. Pp. 147-163. New York: Altamira Press.

Russo, Mitch, ed. 2010. *Fact Sheet: Sacramento River Flood Control Project Weirs and Flood Relief Structures*. Accessed May 2016. Available at http://www.water.ca.gov/newsroom/docs/WeirsReliefStructures.pdf.

Schneider, T., S. Lane, and J. Holson. 2017. Cultural Resources Survey and Inventory for the San Joaquin River Restoration Program Reach 4B1, Eastside Bypass Reach 2, and Eastside Bypass Reach 3 Merced County, California. Prepared by Pacific Legacy, Inc. for the U.S. Bureau of Reclamation, Mid-Pacific Region.

U.S. Bureau of Reclamation and the California Department of Water Resources. 2012. *San Joaquin River Restoration Program Final Programmatic Environmental Impact Statement/Environmental Impact Report*. Sacramento, CA.

Wallace, W. J. 1978. *Northern Valley Yokuts.* In *California*. Handbook of North American Indians 8:462-470. Washington, D.C.: Smithsonian Institution.

Willey, H. I. 1886. Grants of Land in California Made by Spanish or Mexican Authorities Table. In, *Report of the Surveyor General of the State of California, from August 1, 1884 to August 1, 1886*. State Printing Office, Sacramento, CA. California State Lands Commission. Accessed July 25, 2017. Available at: http://www.slc.ca.gov/Info/Reports/Surveyors_General/Willey_1884_1886.pdf

3.7 Environmental Justice

Council on Environmental Quality (CEQ). 1997. *Environmental Justice Guidance under the National Environmental Policy Act*. Accessed July 21, 2017. Available at: https://www.epa.gov/environmentaljustice/ceq-environmental-justice-guidance-under-national-environmental-policy-act

U.S. Census Bureau. 2015a. *American Community Survey 1 Year Estimates (Demographics).* Accessed on February 10, 2017. Available at: http://factfinder2.census.gov.

_____. 2015b. *American Community Survey 1 Year Estimates (Economics).* Accessed on February 10, 2017. Available at: http://factfinder2.census.gov.

U.S. Environmental Protection Agency (EPA). 1998. *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis*. Accessed July 21, 2017. Available at: https://www.epa.gov/sites/production/files/2015-04/documents/ej-guidance-nepa-compliance-analyses.pdf.

3.8 Geology and Soils

California Department of Water Resources (DWR). 2012. *Urban Levee Design Criteria.*

California Geological Survey. 2008. Probabilistic Seismic Hazards Ground Motion Interpolator. Accessed July 7, 2017. Available at: http://www.quake.ca.gov/gmaps/PSHA/psha_interpolator.html.

_____. 2017. Alquist-Priolo Earthquake Fault Zone Maps. Accessed July 10, 2017. Available at: http://www.conservation.ca.gov/cgs/rghm/ap.

Jennings, C. W. and Bryant, W. A. 2010. *2010 Fault Activity Map of California*. California Geological Survey Geologic Data Map No. 6. Sacramento, CA. Accessed July 3, 2017. Available at: http://www.conservation.ca.gov/cgs/cgs_history/Pages/2010_faultmap.aspx.

Merced County. 2013. *2030 Merced County General Plan*. Accessed July 7, 2017. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf.

_____. 2015. *Merced County Improvement Standards and Specifications*. Accessed July 3, 2017. Available at: https://www.co.merced.ca.us/DocumentCenter/Home/View/1579.

U.S. Army Corps of Engineers (USACE). 1997. *Design Guidance on Levees*. ETL 110-2-555. Washington, D.C.

_____. 2000. *Design and Construction of Levees*. EM 1110-2-1913. Washington, D.C.

_____. 2005. *Design Guidance for Levee Underseepage*. ETL 1110-2-569. Washington, D.C.

_____. 2016. *Earthquake Design and Evaluation for Civil Works Projects*. ER 1110-2-806. Washington, D.C.

U.S. Department of the Interior, Bureau of Reclamation (Reclamation). 2011. *San Joaquin River Restoration Program Draft Programmatic Environmental Impact Statement/Environmental ImpactReport*. Sacramento, CA.

U.S. Natural Resources Conservation Service. 2016. Web Soil Survey. Accessed July 3, 2017. Available at: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

Wagner, D.L., Bortugno, E.J., and McJunkin, R.D. 1991. Geologic Map of the San Francisco-San Jose Quadrangle.

3.9 Greenhouse Gas Emissions

California Department of Water Resources (DWR). 2012a. *Final Climate Action Plan, Phase 1: Greenhouse Gas Emissions Reduction Plan*. Available at: http://www.water.ca.gov/climatechange/docs/Final-DWR-ClimateActionPlan.pdf.

_____. 2012b. *Draft Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan.* Initial Study and Draft Negative Declaration. Sacramento, CA. Available At: http://www.water.ca.gov/climatechange/docs/2016/Final-CAP-IS-ND.pdf.

Intergovernmental Panel on Climate Change (IPCC). 2014. Summary for Policymakers. In: *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp. Available at: https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf.

Merced County. 2013 (December). *2030 Merced County General Plan*. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf.

Office of Planning and Research (OPR). 2016. CEQA and Climate Change. Available at: https://www.opr.ca.gov/s_ceqaandclimatechange.php.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2009a. *"District Policy – Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency."* Available at: http://www.valleyair.org/Programs/CCAP/12-17-09/2%20CCAP%20-%20FINAL%20District%20Policy%20CEQA%20GHG%20-%20Dec%2017%202009.pdf.

_____. 2009b. *"Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA."*. Available at: http://www.valleyair.org/Programs/CCAP/12-17-09/3%20CCAP%20-%20FINAL%20LU%20Guidance%20-%20Dec%2017%202009.pdf.

_____. 2015. *Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI)*. March 19. Available at: http://www.valleyair.org/transportation/GAMAQI_3-19-15.pdf.

3.10 Hazards and Hazardous Materials

California Department of Forestry and Fire Protection. 2007. *Draft Fire Hazards Severity Zones in LRA—Merced County*. Accessed July 12, 2017. Available at: http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_zones_maps.

California Department of Public Health. 2008. *Best Management Practices for Mosquito Control on California State Properties*. Sacramento, CA.

_____. 2010. *Epidemiologic Summary of West Nile Virus in California, 2001 - 2008.* Updated May 5, 2010. Accessed March 29, 2017. Available at: http://www.cdph.ca.gov/programs/sss/Documents/Epi-Summaries-CA-2001-2008-083111.pdf#page=77.

_____. 2017. *Coccidioidomycosis (Valley Fever).* Updated March 5, 2017. Accessed March 29, 2017. Available at: http://www.cdph.ca.gov/HealthInfo/discond/Pages/Coccidioidomycosis.aspx.

California Department of Public Health and the Mosquito and Vector Control Association of California. 2012. *Best Management Practices for Mosquito Control in California*. Available at: https://www.cdph.ca.gov/HealthInfo/discond/Documents/BMPforMosquitoControl07-12.pdf. Accessed July 12, 2017.

California Department of Toxic Substances Control (DTSC). 2016. Accessed July 6, 2016. Available at: www.envirostor.dtsc.ca.gov.

Center for Disease Control. 2017. *Hantavirus.* Updated January 2017. Accessed March 29, 2017. Available at: http://www.cdc.gov/hantavirus.

Environmental Data Resources, Inc. 2017. EDR DataMap Area Study. Milford, CT.

GeoTracker. 2017. Accessed March 14, 2017. Available at: http://geotracker.waterboards.ca.gov/case_summary?global_id=T0604700263.

IEEE Standards Association. 2017. C2-2017 - 2017 National Electrical Safety Code(R).

Kwasny, D.C., M. Wolder, and C.R. Isola. 2004. *Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands*. Accessed July 12, 2017. Available at: https://www.cdph.ca.gov/HealthInfo/discond/Documents/BMPforMosquitoControl07-12.pdf.

Mayo Clinic. 2015a. *Diseases and Conditions: Valley Fever.* Updated May 27, 2015. Accessed March 29, 2017. Available at: http://www.mayoclinic.org/diseases-conditions/valley-fever/basics/symptoms/con-20027390.

_____. 2015b. *West Nile Virus.* Updated December 16, 2015. Accessed March 29, 2017. Available at: http://www.mayoclinic.org/diseases-conditions/west-nile-virus/symptoms-causes/dxc-20166291.

Merced County. 2012. *2030 Merced County General Plan, December 10.* Available at: http://www.co.merced.ca.us/index.aspx?NID=100.

_____. 2013 (December). *2030 Merced County General Plan*. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf.

Merced County Mosquito Abatement District (MCMAD). 2017. Accessed March 29, 2017. Available at: http://www.mcmosquito.org/news.html.

U.S. Department of the Interior, Bureau of Reclamation (Reclamation). 2012. *San Joaquin River Restoration Program Draft Programmatic Environmental Impact Statement/Environmental Impact Report* Appendix L, Biological Resources – Vegetation and Wildlife. Sacramento, CA

U.S. Environmental Protection Agency (EPA). 2016. *Pacific Southwest Region 9, Activities in Kettleman City Area.* Website, last updated on April 29, 2016. Accessed July 6, 2016. Available at: http://epa.gov/region9/kettleman/.

3.11 Hydrology and Water Quality

California Data Exchange Center. 2016. *Water Quality Data.* Accessed April 2016. Available at: http://cdec.water.ca.gov/queryQuick.html.

California Department of Water Resources (DWR). 2003. *California's Groundwater: Bulletin 118, Update 2003.* October. Available at:

http://www.water.ca.gov/pubs/groundwater/bulletin_118/california's_groundwater__bulletin_118_-_update_2003_/bulletin118_entire.pdf.

_____. 2004. *California's Groundwater: Bulletin 118, Merced Subbasin Description.* Updated February 27, 2004. Available at: http://water.ca.gov/groundwater/bulletin118/basindescriptions/5-22.04.pdf.

_____. 2006. *California's Groundwater: Bulletin 118, Delta-Mendota Subbasin Description.* Updated January 20, 2006. Available at: http://water.ca.gov/groundwater/bulletin118/basindescriptions/5-22.07.pdf.

_____. 2011. *Flood Control System Status Report, December 2011.* Accessed March 14, 2013. Available at: http://www.water.ca.gov/cvfmp/2017-cvfpp-docs.cfm.

_____. 2014. *CASGEM Basin Prioritization.* Available at: http://www.water.ca.gov/groundwater/casgem/basin_prioritization.cfm.

_____. 2016. *GSA Formation Notification.* Accessed October 30, 2016. http://www.water.ca.gov/groundwater/sgm/gsa_table.cfm.

Merced County. 2016. 2030 Merced County General Plan – Safety Element. Planning Department. Merced, CA.

Merced Integrated Regional Water Management Planning. 2013. *Merced Integrated Regional Water Management Plan, Flood Management Summary.* Merced, CA.

Regional Water Quality Control Board, Central Valley Region (RWQCB). 2016. *Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley Region (5), Fourth Edition, 1998.* Revised April 2016.

State Water Resources Control Board (SWRQB). 2015. *Water Quality Goals as of December 15, 2015 from Search Water Goals Online.* Available at: http://www.swrcb.ca.gov/water_issues/programs/water_quality_goals/search.shtml.

U.S. Army Corps of Engineers (USACE). 1993. *San Joaquin River Mainstem, California,* Reconnaissance Report, Sacramento District, Sacramento, CA.

_____. 2013. *National Levee Database.* Available at: http://nld.usace.army.mil.

_____. 2017. *Navigable Waters in the Sacramento District.* Accessed October 11, 2017. Available at: http://www.spk.usace.army.mil/Missions/Regulatory/Jurisdiction/Navigable-Waters-of-the-US/

U.S. Congress. 1955. *Emergency Flood Control Funds Act of 1955.* Public Law 84-99.

U.S. Department of the Interior, Bureau of Reclamation (Reclamation). 1967. *Lower San Joaquin River Flood Control Project Operation and Maintenance Manual for Levees, Irrigation and Drainage Structures, Channels and Miscellaneous Facilities, Part I, II, and III.* Amended in 1978. Sacramento, CA.

_____. 2010. *Interim Flow Release Program, Water Quality Plan.* Accessed January 28, 2013. Available at: http://www.usbr.gov/mp/nepa/documentShow.cfm?Doc_ID=5866.

_____. 2011. *San Joaquin River Restoration Program Draft Programmatic Environmental Impact Statement/Environmental Impact Report.*

_____. 2012. *Water Quality Assessment and Quality Assurance Summary, Sample Collection.*

_____. 2013. *Water Quality Assessment and Quality Assurance Summary, Sample Collection.*

_____. 2016. *San Joaquin River Restoration Program Subsidence Mapping.* Available at: http://www.restoresjr.net/wp-content/uploads/SubsidenceMappingDecember2016.pdf.

U.S. Environmental Protection Agency (EPA). 2012. *Summary of the Clean Water Act.* Accessed February 7, 2013. Available at: http://www.epa.gov/lawsregs/laws/cwa.html.

_____. 2013. *Overview of the TMDL Process.* Accessed February 7, 2013. Available at: http://yosemite.epa.gov/r10/water.nsf/2fb9887c3bbafaaf88256b5800609bf0/2ac95839fe692ab6882569f100610e6a!OpenDocument.

_____. 2017. *Program Overview: Impaired Waters and TMDLs.* Accessed March 26, 2017. Available at: https://www.epa.gov/tmdl/program-overview-impaired-waters-and-tmdls.

3.12 Land Use and Planning

California Department of Water Resources (DWR). 2002. Merced County Land Use Survey. Accessed July 10, 2017. Available at: http://www.water.ca.gov/landwateruse/lusrvymain.cfm.

Merced County. 2013. *2030 Merced County General Plan*. Accessed July 10, 2017. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf.

U.S. Army Corps of Engineers (USACE). 2017. *Navigable Waters in the Sacramento District.* Accessed October 11, 2017. Available at: http://www.spk.usace.army.mil/Missions/Regulatory/Jurisdiction/Navigable-Waters-of-the-US/

3.13 Mineral Resources

California Division of Oil, Gas, and Geothermal Resources (DOGGR). 2017. Well Finder. Accessed July 12, 2017. Available at: http://www.conservation.ca.gov/dog/Pages/Wellfinder.aspx.

Clinkenbeard, J.P. 1999. *Mineral Land Classification of Merced County, California.* California Geological Survey Open-File Report 99-08. Accessed July 12, 2017. Available at: http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=mlc.

Merced County. 2012. *2030 Merced County General Plan Update Draft Program Environmental Impact Report*. Prepared in consultation with Environmental Planning Partners, Inc., Sloughouse, CA. Accessed July 12, 2017. Available at: https://www.co.merced.ca.us/index.aspx?NID=1926.

_____. 2013. *2030 Merced County General Plan*. Accessed July 12, 2017. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf.

3.14 Noise

California Department of Transportation (Caltrans). 2013a. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. Accessed July 24, 2017. Available at: http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf.

_____. 2013b. *Transportation and Construction Vibration Guidance Manual*. Accessed July 24, 2017. Available at: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf.

Federal Highway Administration (FHWA). 2006. *FHWA Roadway Construction Noise Model User's Guide; Final Report. FHWA-HEP-05-054; DOT-VNTSC-FHWA-05-01*. Accessed August 26, 2013. Available at: http://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf.

_____. 2011. *Highway Traffic Noise: Analysis and Abatement Guidance*. FHWA-HEP-10-025. Accessed July 204, 2017. Available at: http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf.

Merced County. 2017a. Merced County Code. Accessed July 24, 2017. Available at: http://www.qcode.us/codes/mercedcounty/.

_____. 2017b. Merced County Code. Available at: http://www.qcode.us/codes/mercedcounty/.

3.15 Paleontological Resources

Cooper, J. D. and P.J. Eisentraut. 2002. *Orange County Archaeo/Paleo Curation Draft Guidelines, Procedures and Policies - Draft Document.* Prepared for County of Orange, CA.

Davis, S.N. and F.R. Hall. 1959. *Water Quality of Eastern Stanislaus and Northern Merced Counties, California.* Stanford University, CA. Pubs. Geol. Sci., v.6, no. 1, 112 p.

Finger, K.L. 2016. *Paleontological Records Search – San Joaquin River Restoration Program Reach 4B Project.* Completed by the University of California Museum of Paleontology at the request of Paleo Solutions, Inc.

Jahns, R.H. 1954. *Geology of Southern California.* State of California, Department of Natural Resources, Bulletin 170, Volume 1.

Jefferson, G.T. 1991. *A Catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals.* Natural History Museum of Los Angeles, Technical Report #7.

Marchand, D.E. and A. Allwardt. 1977. *Late Cenozoic Stratigraphic Units, Northeastern San Joaquin Valley, California.* No. 77-748. U.S. Geological Survey. p. 7-10, 51-60.

Merced County. 2013. *2030 Merced County General Plan—Recreation and Cultural Resources Element.* Available at: https://www.co.merced.ca.us/index.aspx?NID=100.

PaleoBiology Database (PBDB). 2017. PaleoBiology Database, accessed January 15-18.

Society of Vertebrate Paleontology. 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources–Standard Guidelines. *Society of Vertebrate Paleontology News Bulletin* 163:22–27.

University of California Museum of Paleontology (UCMP). 2017. University of California Museum of Paleontology database, accessed January 15-18, 2017.

Wagner, D.L., Bortugno, E.J., and R.D. McJunkin. 1991. *Geologic Map of the San Francisco-San Jose Quadrangle, California.* California Division of Mines and Geology. Regional Geologic Map 5A (scale 1:250,000).

3.16 Population and Housing

California Department of Finance. 2017a. *P-1 State Population Projections (2010–2060), Total Population by County (5-Year Increments).* Accessed July 14, 2017. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Projections/.

_____. 2017b. *E-1 Population Estimates for Cities, Counties, and the State — January 1, 2016 and 2017.* Accessed July 14, 2017. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-1/.

California Employment Development Department (EDD). 2016. *Occupations in Demand, Merced County, Fastest Growing Occupations.* Accessed July 14, 2017. Available at: http://www.labormarketinfo.edd.ca.gov/data/occupations-in-demand.html.

City of Los Banos. 2009. *City of Los Banos 2030 General Plan Update.* Accessed July 14, 2017. Available at: http://losbanos.org/wp-content/uploads/2013/09/plan_gp_entire.pdf.

City of Merced. 2012. *Merced Vision 2030 General Plan—Executive Summary*. Accessed July 14, 2017. Available at: https://www.cityofmerced.org/civicax/filebank/blobdload.aspx?BlobID=11473.

Merced County. 2013. *2030 Merced County General Plan*. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf.

MIG Inc. 2016. *2014 IMPLAN data.*

U.S. Census Bureau. 2015. 2010-2014 *American Community Survey 5-Year Estimates, Selected Housing Characteristics.* Accessed June 7, 2016. Available at: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

3.17 Public Services

Merced County. 2013. *2030 Merced County General Plan Background Report, Public Facilities and Services Element.* December 2013. Accessed June 13, 2016. Available at: http://www.co.merced.ca.us/index.aspx?NID=1926.

_____. 2016. *"Mission and Goals"*. Accessed June 13, 2016. Available at: http://www.co.merced.ca.us/index.aspx?NID=342.

3.18 Recreation

Merced County. 2013 (December). *2030 Merced County General Plan*. Available at: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_8_nat_resources_pcrd_2011_06_14.pdf.

U.S. Fish and Wildlife Service (USFWS). 2006. *San Joaquin River National Wildlife Refuge: Final Comprehensive Conservation Plan.* Accessed July 19, 2017. Available at: https://catalog.data.gov/dataset/san-joaquin-river-national-wildlife-refuge-final-comprehensive-conservation-plan/resource/7a32b005-054d-4182-9db0-3ef9913c3579.

_____. 2016a. San Luis National Wildlife Refuge Complex Website. Accessed June 13, 2016. Available at: https://www.fws.gov/Refuge/san_luis/.

_____. 2016b. Merced National Wildlife Refuge Website. Accessed June 13, 2016. Available at: https://www.fws.gov/Refuge/Merced/.

_____. 2016c. *Merced National Wildlife Refuge Hunt Map.* Accessed July 19, 2017. Available at: https://www.fws.gov/uploadedFiles/Region_8/NWRS/Zone_1/San_Luis_Complex/San_Luis/Images/Hunt_Maps/Merced_Hunt_Map.pdf.

_____. 2016d. *Lone Tree Unit Hunt Map, Merced National Wildlife Refuge.* Accessed July 20, 2017. Available at: https://www.fws.gov/uploadedFiles/Region_8/NWRS/Zone_1/San_Luis_Complex/San_Luis/Images/Hunt_Maps/Lonetree_Hunt_Map_2014.pdf.

_____. 2017. *Administrative Draft San Luis and Merced NWR Comprehensive Conservation Plan (in progress).* Sacramento, CA.

3.19 Socioeconomics

California Economic Development Department (EDD). 2017. *Unemployment Rates (Labor Force).* Accessed February 9, 2017. Available at: http://www.labormarketinfo.edd.ca.gov/cgi/dataanalysis/areaselection.asp?tablename=labforce.

MIG Inc. 2016. *2014 IMPLAN data.*

3.20 Transportation and Traffic

California Department of Transportation. 2015. *Annual Average Daily Traffic for All Vehicles on California State Highways*. Accessed July 27, 2017. Available at: http://www.dot.ca.gov/trafficops/census/volumes2015/.

Caltrans. *See* California Department of Transportation.

Institute of Transportation Engineers. 1988. *Traffic Access and Impact Studies for Site Development.* Transportation Planners Council. Washington, D.C.

ITE. *See* Institute of Transportation Engineers.

Merced County. 2012a. *2030 Merced County General Plan Revised Draft Background Report – Transportation and Circulation.* Accessed July 27, 2017. Available at: http://web2.co.merced.ca.us/pdfs/planning/generalplan/DraftGP/BackroundRpt_2030/MCGPU_BR_Ch6_Circ-2012-11-30.pdf.

_____. 2012b. *2030 Merced County General Plan Draft Program Environmental Impact Report.* Accessed July 27, 2017. Available at: http://web2.co.merced.ca.us/pdfs/planning/generalplan/DraftGP/DEIR/19_transportation_mcgpu_eir_2012_11_23f.pdf.

_____. 2013. *2030 Merced County General Plan.* December 2013. Accessed July 26, 2017. Available at: http://www.co.merced.ca.us/index.aspx?NID=100.

Transportation Research Board. 2000. *Highway Capacity Manual 2000*. Accessed on March 1, 2017.

3.21 Indian Trust Assets

No references.

3.22 Utilities and Service Systems

California Department of Resources Recycling and Recovery. 2016. *Facility/Site Summary Details: Highway 59 Disposal Site (24-AA-0001) and Billy Wright Disposal Site (24-AA-0002).* Accessed June 9, 2016. Available at: http://www.calrecycle.ca.gov/SWFacilities/Directory/Search.aspx.

Merced County. 2013a. *2030 Merced County General Plan Background Report, Public Facilities and Services Element.* December 2013. Accessed June 13, 2016. Available at: http://www.co.merced.ca.us/index.aspx?NID=1926.

_____. 2013b. *2030 Merced County General Plan, Public Facilities and Services Element.* Accessed June 13, 2016. Available at: http://www.co.merced.ca.us/index.aspx?NID=1926.

Pacific Gas and Electric (PG&E). 2016. *How this System Works: Electric System - Current Electric Grid. Interactive Online Guide.* Accessed June 9, 2016. Available at: http://www.pge.com/myhome/edusafety/systemworks/electric/currentgrid/.

4. Other Required Analyses

California Department of Water Resources (DWR). 2008. *Draft FloodSAFE Strategic Plan.* Accessed March 14, 2013. Available at: http://www.water.ca.gov/floodsafe/docs/FloodSAFE_Strategic_Plan-Public_Review_Draft.pdf.

_____. 2012. *Central Valley Flood Protection Plan.* Sacramento, CA

_____. 2016a. *Central Valley Flood Protection Act of 2008*. Sacramento, CA

_____. 2016b. *Central Valley Flood Protection Plan Conservation Strategy*. Sacramento, CA.

_____. 2017. *State Plan of Flood Control Descriptive Document Update.* Sacramento, CA.

California Geological Survey. 2012. Aggregate Sustainability in California, Map Sheet 52. Available at: http://www.conservation.ca.gov/cgs/information/publications/ms/Documents/MS_52_2012.pdf.

Central Valley Joint Venture (CVJV). 2006. *Central Valley Joint Venture 2006 Implementation Plan.* Accessed February 13, 2013. Available at: http://www.centralvalleyjointventure.org/assets/pdf/CVJV_fnl.pdf.

Merced County. 2013. 2030 *Merced County General Plan.* Prepared by Mintier and Associates, et al. Merced, CA.

Riparian Habitat Joint Venture (RHJV). 2004. *The Riparian Bird Conservation Plan. Version 2.0.* Accessed February 13, 2013. Available at: http://www.prbo.org/calpif/pdfs/riparian_v-2.pdf.

San Joaquin River Restoration Program (SJRRP). 2011a. *San Joaquin River Restoration Program Draft Programmatic Environmental Impact Statement/Environmental Impact Report*. Sacramento, CA.

_____. 2011b. *Appendix D: Physical Monitoring and Management Plan, Draft Programmatic Environmental Impact Statement/Environmental Impact Report*. Sacramento, CA.

_____. 2011c. *Reach 4B, Eastside Bypass, and Mariposa Bypass Low Flow Channel and Structural Improvements Project Public Scoping Report Addendum.* Accessed March 22, 2017. Available at: http://www.restoresjr.net/wp-content/uploads/Program_Docs/4BScopingReportIIFinalRedsize_July2011.pdf

U.S. Department of the Interior, Bureau of Reclamation (Reclamation). 2010. *Reclamation's Salinity Management Plan, Actions to Address the Salinity and Boron Total Maximum Daily Load Issues For the Lower San Joaquin River, November 2010.* Accessed February 13, 2013. Available at: http://cvsalinity.org/index.php/doc2/doc_download/1235-action-plan-public-draft-nov-2010-pdf.html.

5. Consultation, Coordination, and Compliance

San Joaquin River Restoration Program (SJRRP). 2010. *Reach 4B, Eastside Bypass, and Mariposa Bypass Low Flow Channel and Structural Improvements Project Public Scoping Report.* Accessed on March 22, 2017. Available at: http://www.restoresjr.net/wp-content/uploads/R4B//R4BScopingReportPublicDraftMainDoc201001.pdf.

_____. 2011. *Reach 4B, Eastside Bypass, and Mariposa Bypass Low Flow Channel and Structural Improvements Project Public Scoping Report Addendum.* Accessed March 22, 2017. Available at: http://www.restoresjr.net/wp-content/uploads/Program_Docs/4BScopingReportIIFinalRedsize_July2011.pdf

_____. 2012. *Third Party Working Draft Framework for Implementation*. Sacramento, CA.

This page intentionally left blank.

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY **GAVIN NEWSOM**, *Governor*

DEPARTMENT OF WATER RESOURCES
SOUTH CENTRAL REGION OFFICE
3374 EAST SHIELDS AVENUE, ROOM 3
FRESNO, CA 93726-6913

January 18, 2022

Ms. Alicia Marrs
California Fish Passage Forum Coordinator
205 Southeast Spokane Street, Suite 100
Portland, Oregon 97202

Dear California Fish Passage Forum Selection Committee:

This letter is regarding the California Fish Passage Forum's 2022 funding opportunity and U.S. Fish and Wildlife Service's White Sturgeon Telemetry and Eastside Bypass Fish Passage Improvement Project proposals. The Department of Water Resources (DWR) is pleased to support conservation efforts for sturgeon and other native fishes within the Eastside Bypass and project area. The Eastside Bypass Improvements Project is located between the cities of Merced and Los Banos in Merced County in the Eastside Bypass, just east of the mainstem San Joaquin River. DWR is the lead for this effort to improve fish passage and construct a rock ramp downstream of the Eastside Bypass Control Structure. The Eastside Bypass Control Structure components of the Eastside Bypass Improvements Project is in the later design phases of the engineering design process.

DWR and the U.S. Fish and Wildlife Service are part of a larger multi-agency collaboration to implement actions for the San Joaquin River Restoration Program (SJRRP). The SJRRP is the direct result of a Stipulation of Settlement (Settlement) reached in September 2006 by the U.S. Departments of the Interior and Commerce, the Natural Resources Defense Council, and the Friant Water Users Authority, after more than 18 years of litigation. One of the primary goals of the Settlement is to restore and maintain fish populations in "good condition" in the mainstem San Joaquin River below Friant Dam to the confluence of the Merced River (Restoration Area), including naturally reproducing and self-sustaining populations of salmon and other fish (referred to as the Restoration Goal). Constructing channel and structural modifications along the river below Friant Dam are key components to achieving the Settlement's Restoration Goal.

This funding opportunity would be used alongside the funds DWR is providing for barrier remediation at the Eastside Bypass Control Structure, supporting the necessary evaluation and, possibly, further improvements to the construction of a full-width rock ramp roughened channel below the structure and modifications to the structure itself. It would provide the SJRRP with the ability to monitor and implement small-scale experiments to address key uncertainties related to channel capacity and fish passage. The telemetry proposal includes actions to tag sturgeon, install receivers, and download data at specified locations above and below the Eastside Bypass Control Structure.

Tracking White Sturgeon movement and access within the lower reaches of the Restoration Area will serve as a proxy for filling data gaps in our current understanding of the federally threatened Green Sturgeon southern Distinct Population Segment - that is similar in appearance and rarer than the White Sturgeon.

Certain design concepts may have limited fish passage at specified low flow conditions for some species, such as the sturgeon. Fish passage criteria are being evaluated for this project and require close coordination with the fish agencies to achieve the multiple fishery objectives. DWR hosts site-specific project design meetings to coordinate with fisheries experts and incorporate the best available science into SJRRP planning and modeling efforts. This letter represents DWR's continued support in the SJRRP to facilitate multi-agency passage and monitoring collaborations, and recommends the White Sturgeon Telemetry and Eastside Bypass Fish Passage Improvement Project proposals for full funding.

Sincerely,

Paul Romero

Paul Romero
Program Manager
San Joaquin River Restoration Program
Department of Water Resources

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**.

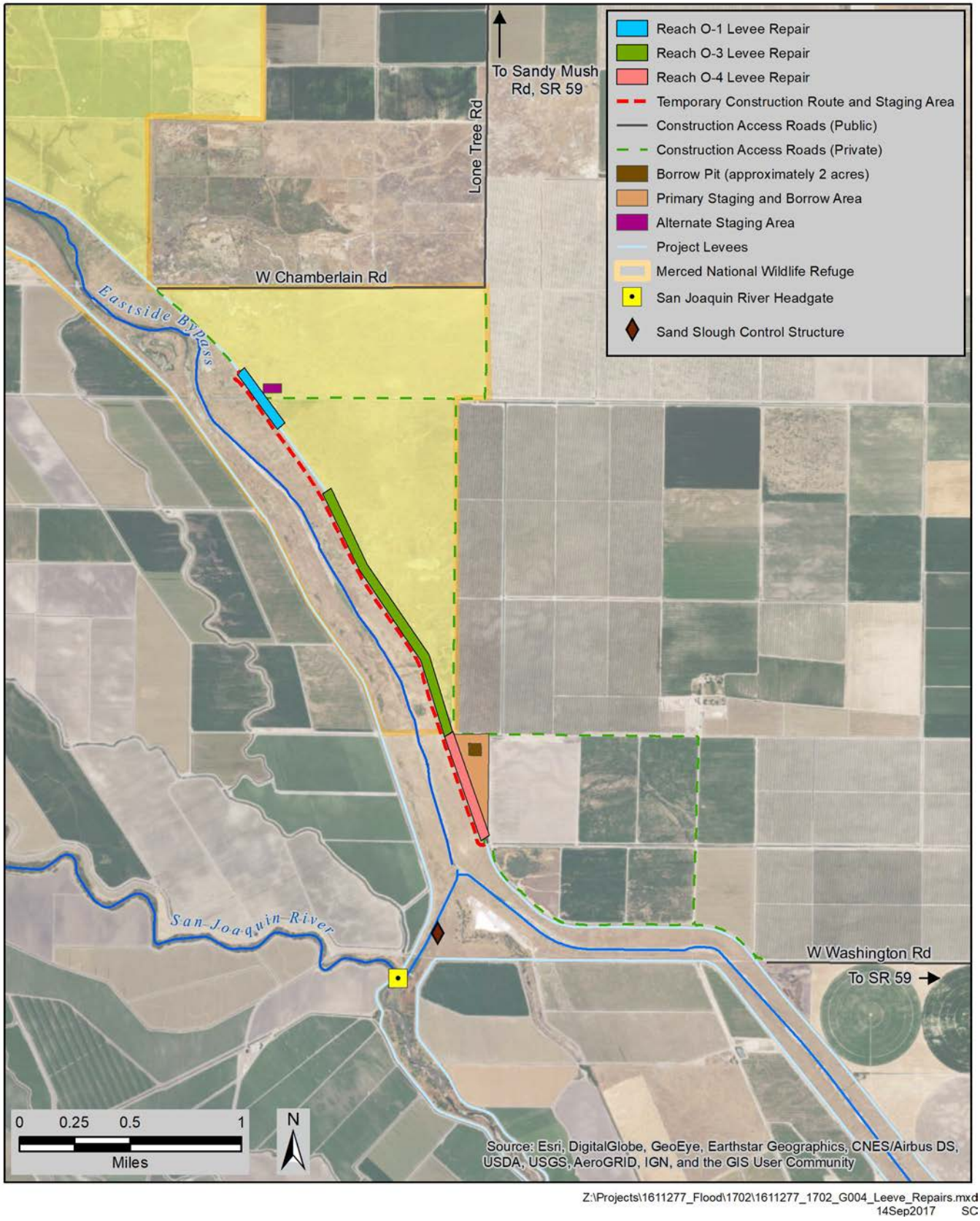
Eastside Bypass Control Structure Modifications

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.

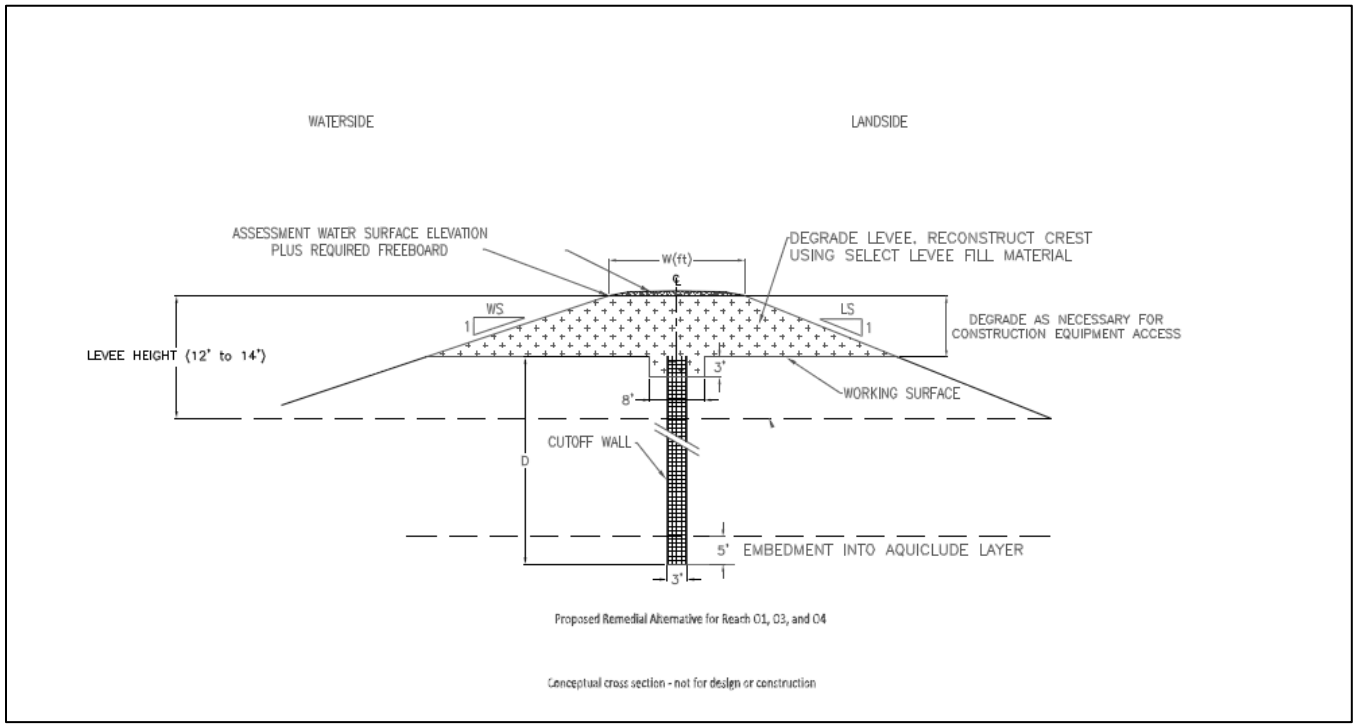
There is currently a stream gage site dedicated to collecting stream flow data approximately 550 feet downstream of the Eastside Bypass Control Structure. To make sure the gage is outside of the influence of the new rock ramp and can accurately measure stage, the gage would be replaced and relocated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

Figure 2-11. Levee Improvement Segments



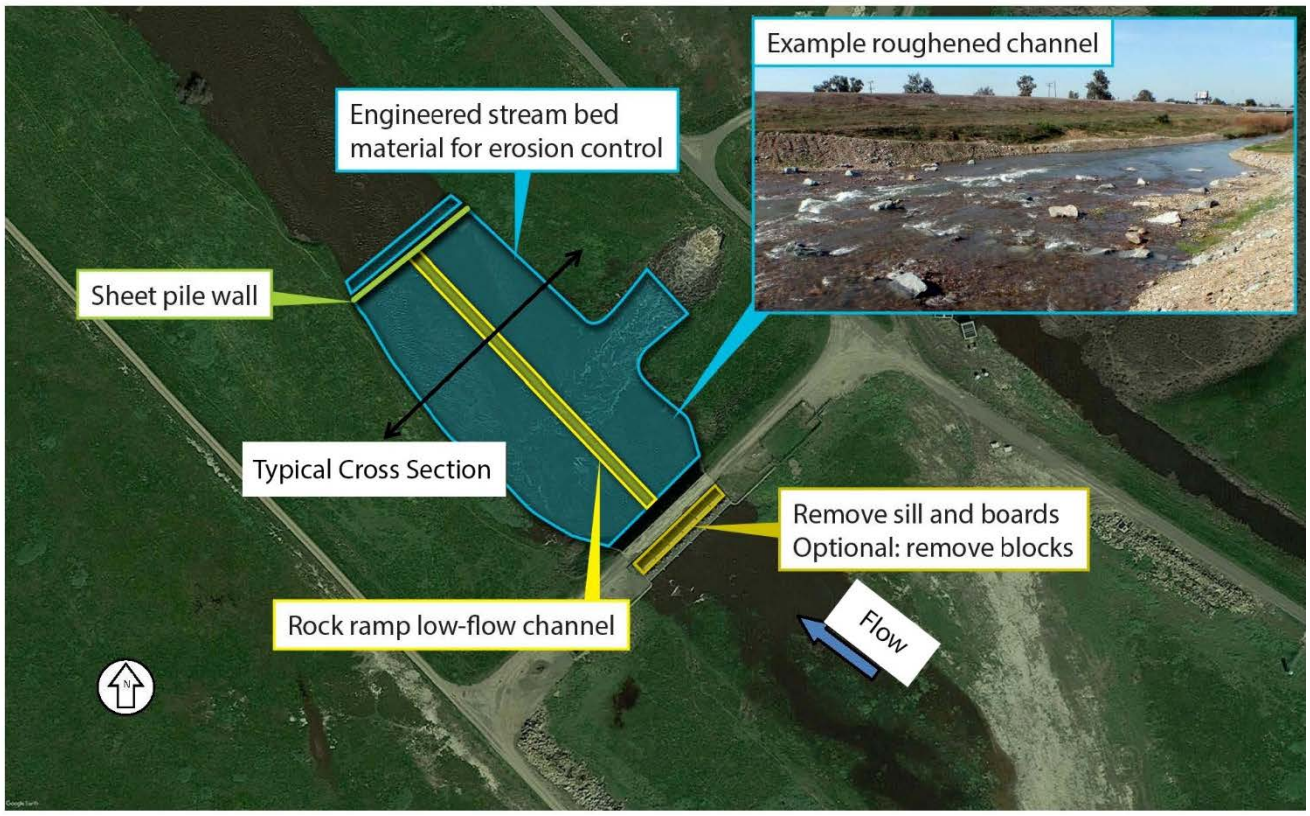
Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

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



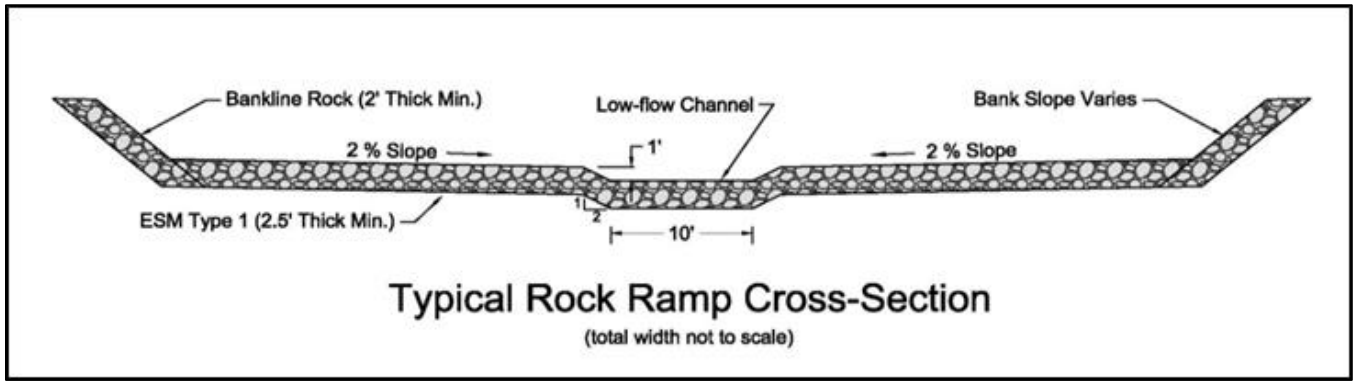
Source: California Department of Water Resources 2017

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**.

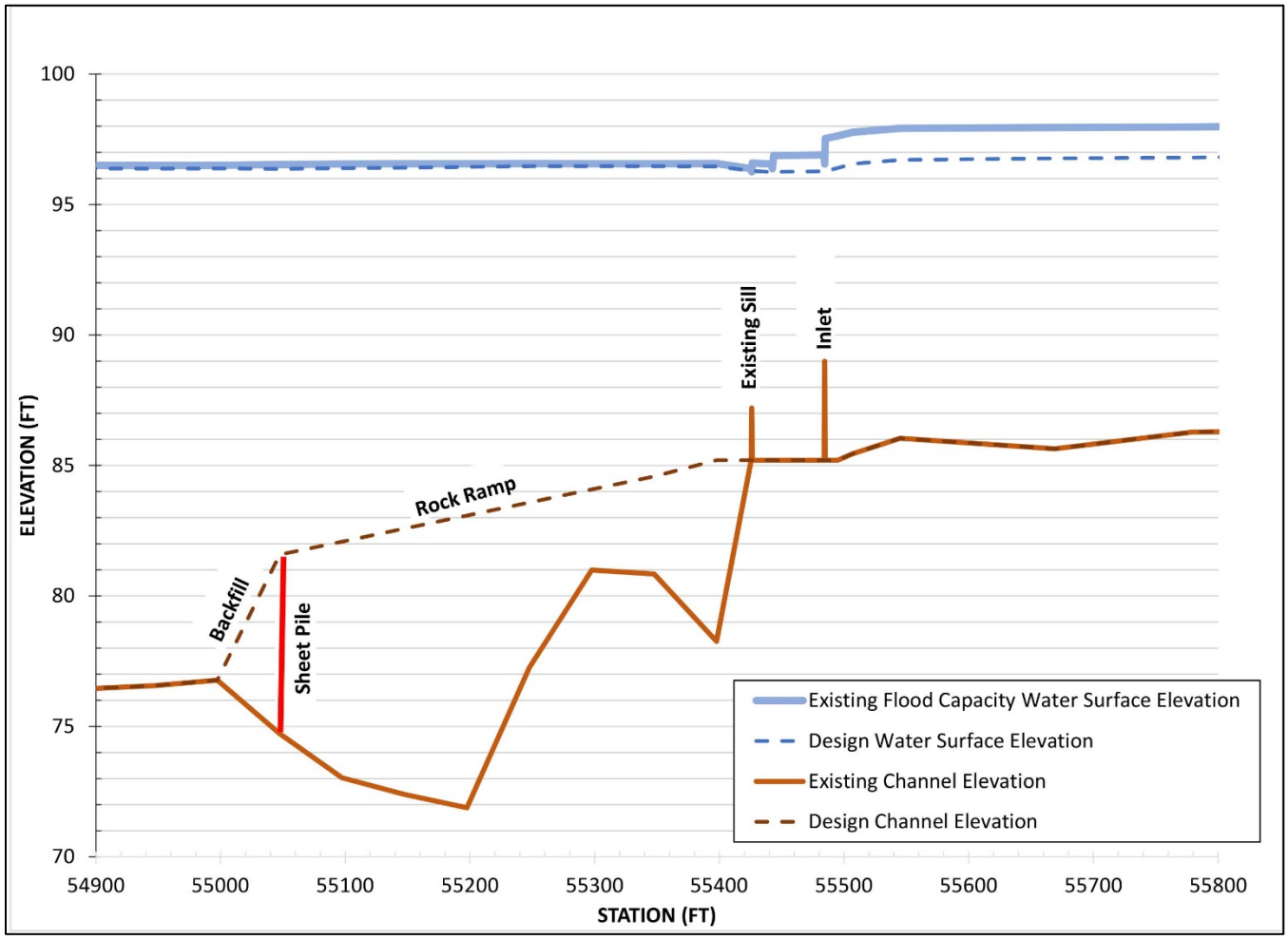
Figure 2-14. Eastside Bypass Control Structure Typical Cross Section



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

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**.

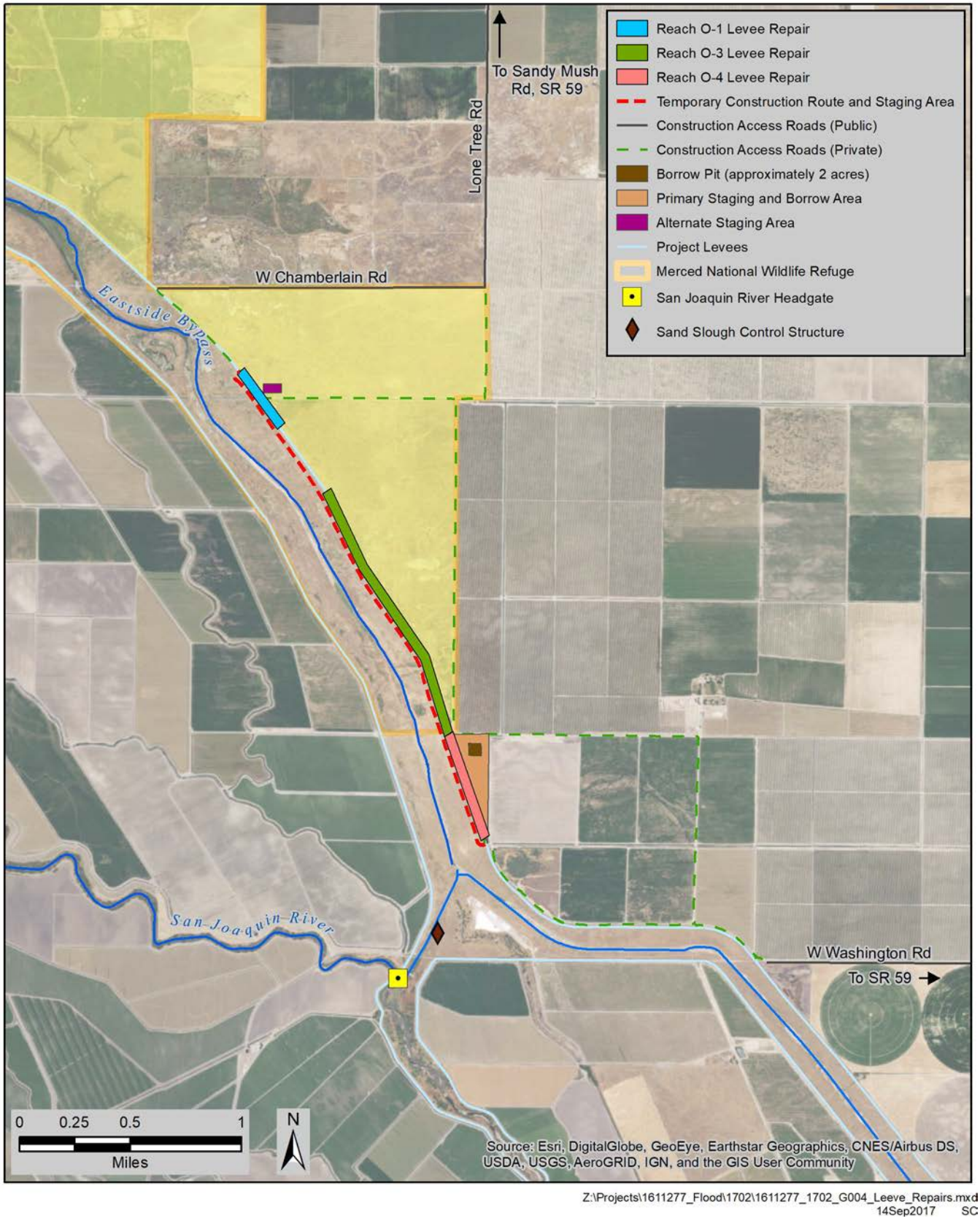
Eastside Bypass Control Structure Modifications

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.

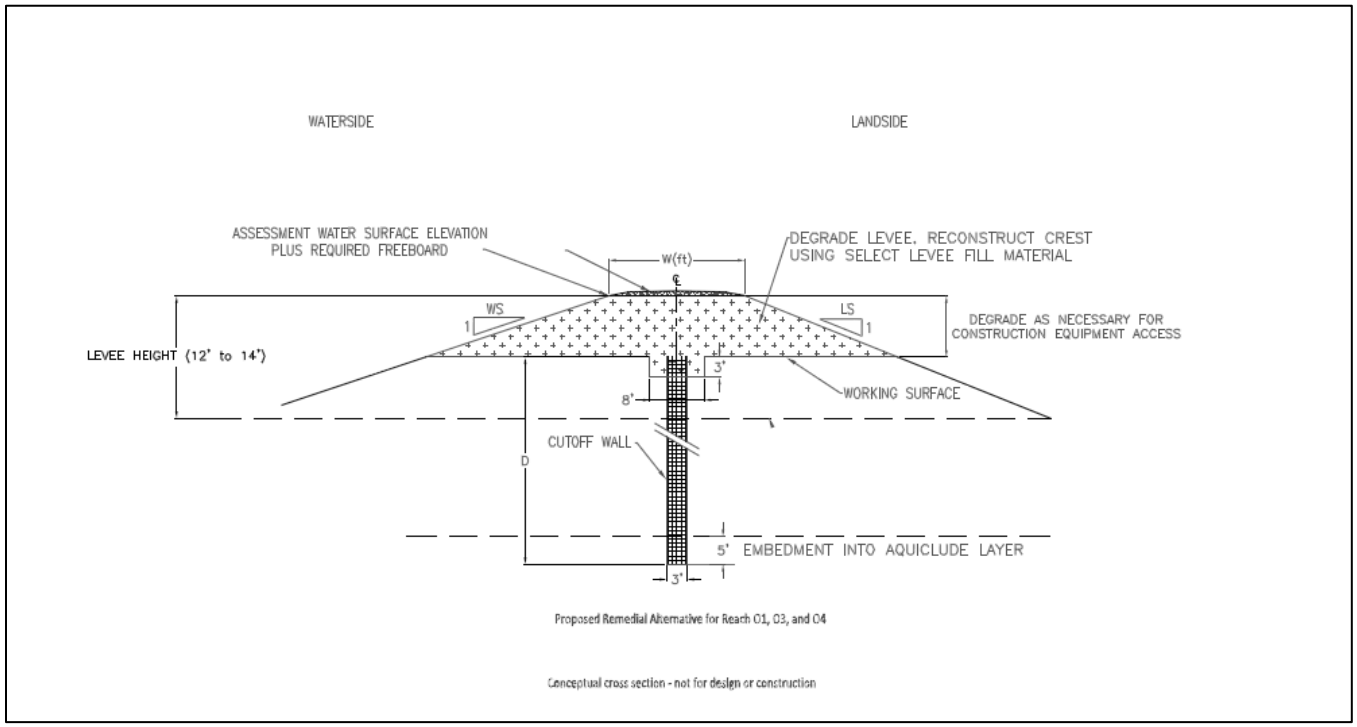
There is currently a stream gage site dedicated to collecting stream flow data approximately 550 feet downstream of the Eastside Bypass Control Structure. To make sure the gage is outside of the influence of the new rock ramp and can accurately measure stage, the gage would be replaced and relocated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

Figure 2-11. Levee Improvement Segments



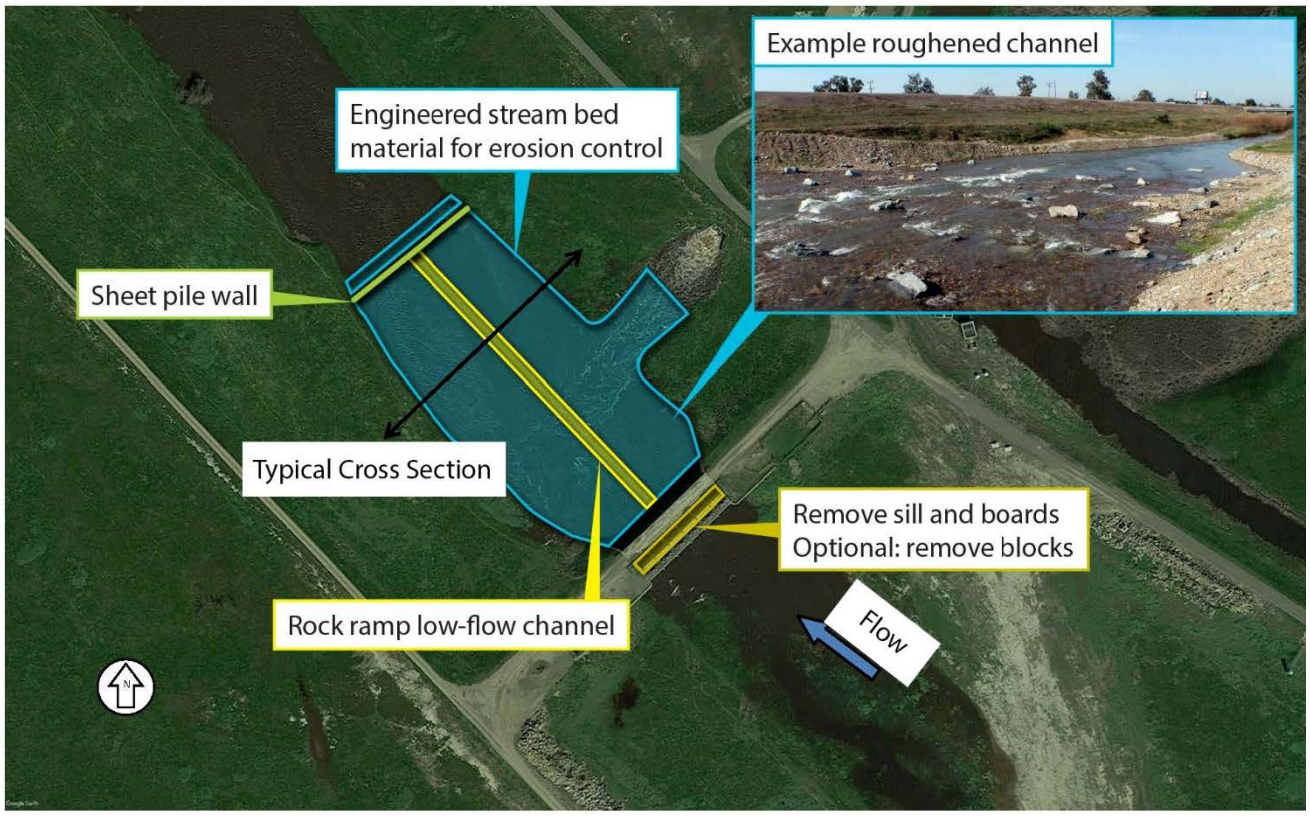
Source: California Department of Water Resources 2017, adapted by GEI Consultants, Inc., 2017

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



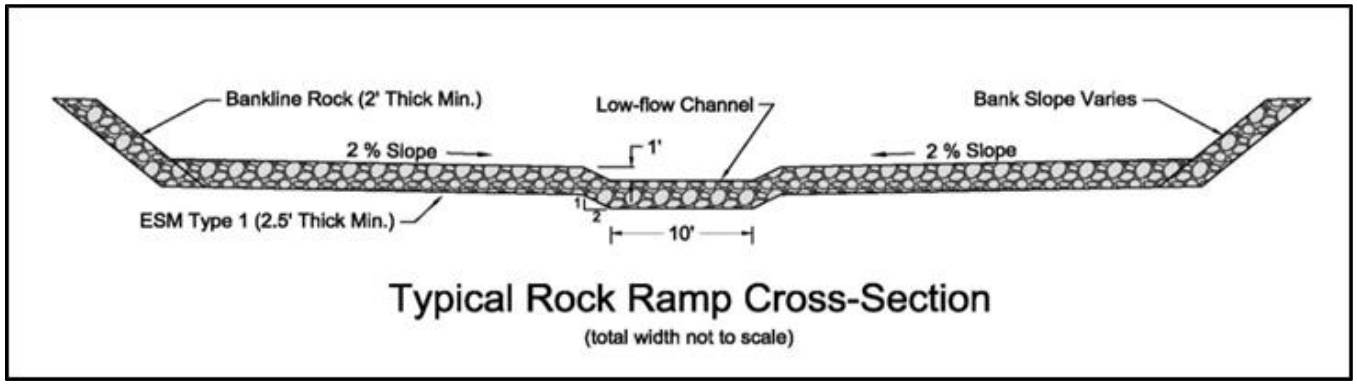
Source: California Department of Water Resources 2017

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**.

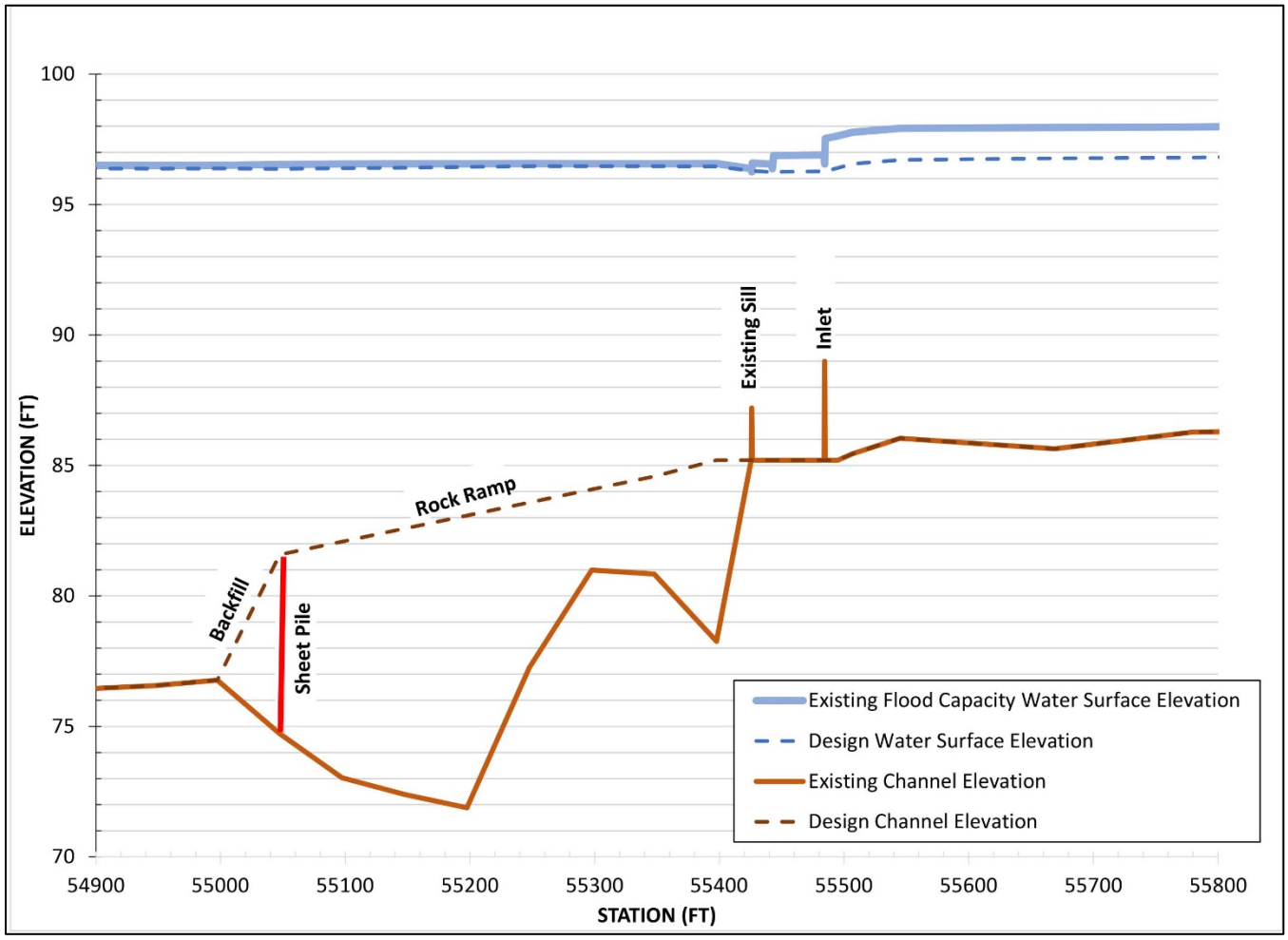
Figure 2-14. Eastside Bypass Control Structure Typical Cross Section



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

Eastside Bypass Fish Passage Improvement Project – Budget Justification and Narrative

The project is currently in 95% design review. Increased costs of the project are at risk of exceeding existing State appropriated funds and USFWS, in collaboration with DWR, is looking for additional funds to support the construction of the project. Without these additional funds, the SJRRP, including DWR, may not have sufficient funds to implement the project and it could be delayed until additional funds are secured. The total cost of the proposal will be $51,890.27, with $50,000 contributing to construction costs and $1,890.27 allocated to administrative duties and environmental compliance. We are requesting $51,890.27 from the California Fish Passage Forum and have secured an additional in-kind contribution from the Department of Water Resources (DWR) of $6,103,000 for construction costs and $170,000 for Department of Water Resources staff to complete the remainder of the design. The project has an unfunded need of $1,500,000, with overall contributions coming from other funding sources. For this proposal, we are requesting $50,000 to contribute towards the construction costs and $1,890.27 for administrative duties and environmental compliance. We would be interested in applying additional funds towards the unfunded construction needs if an opportunity for increased funding arises. Please see the accompanying budget spreadsheet, which is justified below. This funding opportunity would be used alongside the funds DWR is providing for barrier remediation at the Eastside Bypass Control Structure, supporting the necessary evaluation and possibly further improvements to the construction of a full-width rock ramp roughened channel below the structure and modifications to the structure itself.

Proposal Implementation. A GS-13 Supervisory Fish Biologist will dedicate 20 hours at $70.01/hr for overseeing agreement implementation and completing any necessary environmental compliance associated with the movement of funds to the DWR for construction. Fringe at a rate of 35% is estimated for the two tasks at $490.07.

Expected Deliverables. The project will conduct outreach and education to the local and regional community through the following activities: San Joaquin River Restoration Program Bi-Annual Science Meeting presentation (anticipated Fall 2024), which may include participants from the public (the Friant or Fresno community if in-person or the broader public if virtual), water operators and agricultural interested, and tribes; and a featured story in the USFWS Pacific Southwest Highlights online (https://www.fws.gov/cno/). The project will also be chronicled on the SJRRP website (https://www.restoresjr.net/). It is anticipated that the progress on planning and construction-related efforts will be presented at the San Joaquin River Restoration Program Science Meeting (which typically has over 100 attendees), and during the San Joaquin River Restoration Program Eastside Bypass Fish Passage Improvement Project working group meetings.