Chapter 16
Evaluation of Other Indirect and Additional Actions

16.1 Introduction

This chapter covers a broad range of topics related to the Lower San Joaquin River (LSJR) Alternatives 2, 3, and 4 and the South Delta Water Quality (SDWQ) Alternatives 2 and 3. It programmatically evaluates other indirect actions and additional actions associated with LSJR Alternatives 2, 3, and 4. The actions include those that the regulated community could take to reduce potential reservoir or water supply effects associated with implementing LSJR Alternatives 2, 3, and 4 with or without adaptive implementation or that would inform the body of scientific information under LSJR Alternatives 2, 3, and 4 with adaptive implementation (i.e., non-flow measures). This chapter also identifies and evaluates the reasonably foreseeable methods of compliance that the regulated community could take to comply with the SDWQ Alternatives 2 and 3 to meet the requirements of Public Resources Code Section 21159 and Section 3777 of the State Water Resources Control Board's (State Water Board's) regulations. It augments the analyses in the preceding chapters relating to the reasonably foreseeable methods of compliance, such as reducing surface water diversions and releasing or bypassing flows at reservoirs in order to comply with the LSJR Alternatives 2, 3, and 4 with or without adaptive implementation. This chapter identifies potentially significant adverse environmental impacts associated with all of these actions and the mitigation measures that would minimize or avoid significant impacts. For the reasonably foreseeable methods of compliance and the other actions, this analysis takes into account a reasonable range of environmental, economic, and technical factors. (Pub. Res. Code, § 21159, subd. (c).)

A project-level analysis is not required for other indirect actions, additional actions, or the reasonably foreseeable methods of compliance. (See, e.g., Id., subd. (d).). Future project-specific actions the State Water Board would take to impose responsibility for implementing the objectives, such as conditioning of water rights through a water rights proceeding or water quality certification under Section 401 of the Clean Water Act through the Federal Energy Regulatory Commission licensing process, would be further analyzed at the time of those actions, undergoing a separate California Environmental Quality Act (CEQA) and economic review. The State Water Board does not under the Porter-Cologne Water Quality Control Act specify the actual means by which other entities choose to comply with the revised water quality objectives. (See, e.g., Cal. Wat. Code, § 13360, subd. (a).) The actual environmental effects will depend on the decisions made by the regulated entities. Any potential environmental impacts depend upon the action, and mitigation selected by or required of the entities implementing site-specific projects. CEQA may require a project-level analysis when actions are undertaken or approved.

This evaluation assumes that all responsible entities will conduct, as appropriate, site-specific environmental analyses to evaluate potentially adverse, project-level environmental impacts, alternatives, and mitigation measures. This evaluation also assumes that responsible entities will design, evaluate, and implement studies, pilot projects, management practices, and controls in compliance with all applicable laws, regulations, ordinances, and formally adopted municipal and/or agency codes, standards, and practices. The specific actions that could be undertaken by an entity to comply with the revised water quality objectives will depend on a number of factors, including feasibility, cost, flexibility, time to implement, location, and likelihood of success.

This chapter is also intended to meet California Water Code (Water Code) Section 13141 requirements. Prior to the implementation of an agricultural water quality control program, the State Water Board must provide an estimate of the total cost of the program together with an identification of potential sources of financing. The SDWQ alternatives are not specifically intended to regulate agriculture; however, this chapter evaluates the associated costs and sources of financing in Sections 16.4.4, *Agricultural Return Flow Salinity Control,* 16.4.5*, South Delta Temporary Barriers,* and 16.4.6, *Low Lift Pumping Stations*.

16.1.1 Chapter Scope and Organization

The chapter is organized primarily by other indirect actions and additional actions that could occur under the LSJR alternatives and the methods of compliance that could occur under the SDWQ alternatives.

Section 16.2, *Lower San Joaquin River Alternatives – Other Indirect Actions*, describes actions that could be undertaken in response to indirect effects of the alternatives (e.g., surface water supply reduction). This chapter presents a suite of reasonably foreseeable actions affected entities may undertake to address possible surface water supply reductions anticipated under LSJR Alternatives 2, 3, and 4 with or without adaptive implementation and analyzes the indirect environmental impacts associated with those actions. While not any one option alone would provide replacement of surface water that may be needed under LSJR Alternatives 2, 3, and 4, with or without adaptive implementation a combination could reduce water supply effects (i.e., less surface water supply to meet various demands). The different types of other indirect actions that could be taken in response to each of the alternatives are unknown; therefore, specific combinations of actions cannot be predictably matched with each alternative. While entities could take one or more of these actions, the combination of actions that entities would take under each alternative is speculative and unknowable. The cost and potential environmental effects of these actions are programmatically evaluated in this chapter using reference projects, standard assumptions regarding the type and potential location of these actions, and impact mechanisms likely to occur as a result of taking these actions. The other indirect actions evaluated in Section 16.2 include:

- Transfer/Sale of Surface Water
- Substitution of Surface Water with Groundwater
- Aquifer Storage and Recovery
- Recycled Water Sources for Water Supply
- In-Delta Diversions
- Water Supply Desalinization
- New Surface Water Supplies

Section 16.3, *Lower San Joaquin Alternatives – Non-Flow Measures*, describes measures that would inform the body of scientific information potentially used to make adaptive implementation decisions under LSJR Alternatives 2, 3, and 4 with adaptive implementation (i.e., non-flow actions). Not any one measure alone could fully inform the body of scientific information, and as such, a combination could occur. Specific combinations of measures cannot be predictably aligned with each alternative because entities could take one or more of these non-flow measures, the combination of measures that entities would take under each alternative is speculative and unknowable. The cost and potential environmental effects of non-flow measures are programmatically evaluated using reference projects, standard assumptions regarding the type and potential location of these measures, and impact mechanisms likely to occur under these measures. The non-flow measures are grouped into habitat restoration, fish passage, and other actions as follows:

- Habitat Restoration
  - Floodplain and Riparian Habitat Restoration
  - Reduce Vegetation-Disturbing Activities in Floodplains and Floodways
  - Gravel Augmentation
  - Enhance In-Channel Complexity
  - Improve Temperature Conditions
- Fish Passage Improvements
  - Fish Screens (screen unscreened diversions in tributaries and LSJR)
  - Physical Barrier in the Southern Delta
  - Removal or Modification to Human-Made Barriers to Fish Migration
- Other
  - Predatory Fish Control
  - Invasive Aquatic Vegetation Control

Section 16.4, *Southern Delta Water Quality Alternatives – Reasonably Foreseeable Methods of Compliance,* describes reasonably foreseeable methods of compliance measures that could be undertaken by the regulated community to comply with the SDWQ alternatives. The cost and potential environmental effects of these methods of compliance are programmatically evaluated using reference projects, standard assumptions regarding the type and potential location of these measures, and impact mechanisms likely to occur under these measures. The methods of compliance in Section 16.4 include:

- New Source Water Supplies
- Salinity Pretreatment Programs
- Desalination
- Agricultural Return Flow Salinity Control
- Southern Delta Temporary Barriers
- Low Lift Pumping Stations

Section 16.5, *Sources of Funding*, provides a brief summary of the federal and state sources of funding for those actions that could occur under the LSJR or SDWQ alternatives.

Section 16.6, *Potential Mitigation Measures*, summarizes potential mitigation measures that could be applied by other lead agencies and responsible entities to reduce potentially significant impacts identified in the environmental evaluations of Sections 16.2, 16.3, and 16.4. These potential mitigation measures were developed based on a review of similar projects. The scope, scale, and location of a particular project would dictate the need for, and the type of, mitigation. While the particular circumstances and location of a project may result in significant and unavoidable impacts post mitigation, lead agencies and entities may be able to fully mitigate impacts to a less-than-significant level (using one or more of the potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*). In addition, as required by CEQA (State CEQA Guidelines § 15126.2) lead agencies and entities would describe a reasonable range of alternatives based on project-specific conditions and project-specific objectives, and one of the alternatives may, in and of itself reduce significant environmental impacts. The effectiveness of mitigation is contingent upon several other factors, such as those listed below.

- The ability of lead agencies and entities to implement the mitigation.
- The other responsible agencies involved in the project.
- The thresholds lead agencies use to evaluate the impact.
- Site-specific conditions.

Section 16.6 identifies potential and appropriate mitigation measures for each action by resource. Lead agencies or other entities may fully mitigate impacts to a less-than-significant level (using one or more of the potential mitigation measures identified in this section in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*). However, depending on project specifics, implementing mitigation measures may not be fully able to reduce significant impacts, and such impacts may remain significant and unavoidable after mitigation. Therefore, until such time that potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

Section 16.7, *Cumulative Impacts*, provides a broad cumulative impact discussion for all actions identified in this chapter.

16.2 Lower San Joaquin River Alternatives—Other Indirect Actions

This section describes the actions that affected entities may take to develop alternative water supply sources needed to replace surface water that may no longer be available due to implementation of an LSJR alternative and its associated environmental effects. The actions evaluated include:

- Transfer/Sale of Surface Water
- Substitution of Surface Water with Groundwater
- Aquifer Storage and Recovery

- Recycled Water Sources for Water Supply
- In-Delta Diversions
- Water Supply Desalinization
- New Surface Water Supplies

16.2.1 Transfer/Sale of Surface Water

Reductions in surface water diversions are expected as a result of approving an LSJR alternative and the respective program of implementation. One reasonably foreseeable method to augment a water source is to obtain a surface water supply from another party. General costs and potential environmental impacts associated with obtaining surface water supplies are evaluated below along with a more specific discussion of the costs and potential environmental impacts associated with the City and County of San Francisco (CCSF) developing other alternative water supplies.

Cost Evaluation

General

This analysis focuses on the costs to a water purveyor (e.g., irrigation or water supply district) to obtain alternative surface water supplies. For this potential action, it was assumed that a water purveyor would have either purchased water through contracts, transfers, or implementation of Water Code Section 1485.[1] The duration and cost for purchasing water are subject to many factors, but a useful indicator of water prices is the Environmental Water Account (EWA) Spot Price. A summary of EWA contract sales is listed in Table 16-1, *Environmental Water Account Contract Sales 2002–2004*.

[1] Section 1485 of the Water Code provides that any municipality, governmental agency, or political subdivision that produces disposal water meeting the requirements of the appropriate regional board, and that disposes that water in the San Joaquin River, may file an application to appropriate the same amount of water out of the San Joaquin River or the Sacramento-San Joaquin Delta, downstream.

Table 16-1. Environmental Water Account Contract Sales 2002–2004

Year	Buyer	Seller	Type	Quantity (AF)	Price ($/AF)	2010 Nominal Price ($/AF)
2004	Westlands WD	Widren WD	CVP	2,990	$1,500	$1,741
2004	Westlands WD	Centinella WD	CVP	2,500	$1,400	$1,625
2003	West Kern WD	Berrenda Mesa WD	SWP	6,000	$1,000	$1,161
2003	Lemoore Naval Military Base	Tulare Lake Basin WSD	SWP	5,000	$2,150	$2,496
2003	Coachella Valley WD	Tulare Lake Basin WSD	SWP	9,900	$2,150	$2,496
2002	City of Tracy	Banta Carbona ID	CVP	2,500	$1,000	$1,161
2002	City of Tracy	West Side ID	CVP	5,000	$1,000	$1,161
2002	Zone 7	Tulare Lake Basin WSD	SWP	400	$1,600	$1,858
2002	Zone 7	Belridge WSD	SWP	2,219	$1,500	$1,741
					Average	$1,716

Source: USBR 2006a.
WD = Water District.
ID = Irrigation District.
WSD = Water Storage District.
CVP = Central Valley Project.
SWP = State Water Project.
AF = acre-feet.

A water transfer is a change in the way water was originally allocated. A water transfer may change the place of use, the point(s) of diversion, or the purpose of use. A water transfer cannot increase the amount of water a diverter is permitted to use, nor can it change the season when water is diverted. Water transfers can be temporary (i.e., short-term or temporary transfers of 1 year or less), long-term (more than 1 year), or permanent. Water Code Section 1735 and California Code of Regulations Section 811 et seq. allow a water right permittee, licensee, or adjudicated water right holder to file a petition for a long-term transfer of water involving the change in the point of diversion or place or purpose of use with the State Water Board. A summary of long-term transfers is listed in Table 16-2, *Long Term Transfers 1997–2005*.

Table 16-2. Long-Term Transfers 1997–2005

Year	Buyer	Seller	Water Source	Length	Quantity (AF/y)	Price ($/AF)	2010 Nominal Price
2003	City of Lodi	Woodridge ID	NOD	40 years	6,000	$200	$238
2003	Cities of Tracy, Lathrop, Manteca, and Escalon	South San Joaquin ID	SOD	30 years	43,090	$191	$228
2003	Newhall Land & Farming Co.	Nickel Family	SOD	30 years	1,600	$475	$566
2000	Contra Costa WD	East Contra Costa ID	NOD	Permanent	8,200	$25	$32
2000	Northridge WD	Placer County Water Agency	NOD	15 years	12,000	$435	$565
1997	Metropolitan WD	Arvin Edison WSD	SOD	25 years	50,000	$165	$233
						Average	$310

Source: USBR 2006a.
WD = Water District.
ID = Irrigation District.
WSD = Water Storage District.
AF/y = acre-feet per year.
AF = acre-feet.

Based on the nominal prices shown in Tables 16-1, *Environmental Water Account Contract Sales 2002–2004,* and 16-2, *Long Term Transfers 1997–2005*, a reasonable cost of $1,716 per acre-foot is assumed for an EWA contract sale or $310 per acre-foot for a long-term transfer. These cost estimates are based solely on the projected cost of surface water and do not include capital costs (e.g., conveyance of water from source to point of use), administrative, engineering, or legal costs related to securing the water supply.

CCSF Cost Evaluation

Reductions in surface water diversions could potentially affect CCSF by reducing some portion of their current water supply obtained from the Tuolumne River during a 6-year drought as described in Appendix L, *City and County of San Francisco Analyses*. Under certain LSJR alternatives (i.e., higher unimpaired flow[2] LSJR Alternatives 3 and 4), the San Francisco Public Utilities Commission (SFPUC) may need to obtain water through a water transfer as described in Appendix L. The cost of this water transfer to CCSF depends ultimately on the amount of water needed, purchase price per AF of water, and the duration of the transfer. Details are presented in Appendix L. Annual costs could range between $14 million and $208 million depending on the LSJR alternative (Table L.5-1).

[2] *Unimpaired flow* represents the water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds. It differs from natural flow because unimpaired flow is the flow that occurs at a specific location under the current configuration of channels, levees, floodplain, wetlands, deforestation and urbanization.

Environmental Evaluation

Summary of Potential Action

A surface water transfer would involve transferring a volume of water from one party to another based upon an agreed upon price and subject to the applicable Water Code and California Code of Regulations requirements where the point of diversion or place or purpose of use of water is proposed to be changed. Only water that is available under applicable operational restrictions, or water rights, can be transferred. Water Code provisions require that surface water transfers must occur (1) without injuring any other legal user of water; (2) without unreasonably affecting fish, wildlife, or other instream beneficial uses; and (3) without unreasonably affecting the overall economy or environment of the county from which the water is being transferred, in the case of transfers using a state or local agency’s conveyance facility. Temporary changes of point of diversion, place of use, or purpose of use involving surface water transfers based on post-1914 appropriative[3] water rights must obtain approval from the State Water Board consistent with Water Code Section 1725 et seq. These changes approved under Water Code Section 1725 are exempt from CEQA. Long-term or permanent water transfers would require an analysis of environmental impacts by the agency(ies) selling and transferring water. The State Water Board would be a responsible agency and would review and act on any environmental document. Transfers that require the use of State, regional, or a local public agency's conveyance facilities require the owner of the conveyance facilities (e.g., DWR, USBR) to determine that the transfers will not harm any other legal user of water, will not unreasonably affect fish and wildlife, and will not unreasonably affect the overall economy of the county from which the water is transferred. Both DWR and USBR provide guidance on the requirements and approvals needed to transfer water using their facilities, which generally includes the need for CEQA and/or NEPA documentation and ESA consultation to address fish and wildlife resources.

There are three common types of water transfers: groundwater substitution, cropland idling, and reservoir storage releases (DWR and State Water Board 2015). For water transfers based on groundwater substitution, a water user with surface water diversion rights would forgo diverting surface water and would pump groundwater for the period of the transfer, and in so doing, make the forgone surface water diversions available to a user downstream. Cropland idling water transfers would make water available by reducing the consumptive use of surface water applied for irrigation. This would result in the idling of land that would have been planted during the transfer period in the absence of the transfer. With water transfers involving reservoir storage releases, surface water would be made available for transfer by reservoir storage release when reservoir operations release water in excess of what would be released annually under normal operations, and the water must be released at a time when it can be captured and/or diverted downstream.

Of the three common types of water transfers, those associated with cropland idling or groundwater substitution would be more likely to occur under the LSJR alternatives with or without adaptive implementation within the watersheds of the Stanislaus, Tuolumne, and Merced Rivers. This is because, as the available surface water supplies become more limited, a higher value is placed on the supply. For these two types of transfers, reservoir releases would generally be unchanged. Water transfers involving reservoir storage releases in excess of what would normally be released annually

[3] Appropriative rights to surface water are rights to use water that is surplus, or unappropriated, to the needs of riparian owners and prior appropriators and prescriptors.

is less likely to occur especially under the LSJR alternatives because most of the water rights associated with existing reservoirs would be fully used and the reservoir releases would occur regardless of the water transfer (i.e., release of excess water would not be a response to the LSJR alternatives). The number and location of surface water transfers that entities would undertake in response to surface water reductions as a result of approving the LSJR alternatives is speculative and unknowable. Individual agencies or entities would decide whether a water transfer would be suitable for their particular circumstances. The water transfer would have the same maximum diversion and the same season of diversion, but would result in a change to the end use of the water (i.e., the terms and conditions of the right).

Water transfers or sales of stored water by agencies or entities can occur in a manner that either contributes to achieving streamflow requirements or potentially exceeds such requirements. For example, in 2013, OID and SSJID released 80 TAF into the Stanislaus River below Goodwin that exceeded the RPA base flow and pulse flow requirements, causing flows to increase by approximately 2,000 cubic feet per second (cfs) over and above the NMFS RPA New Melones dry year type requirement (NOAA Fisheries 2013). This flow release in late April, described as “water rights water,” contributed to the pulse flow requirements at Vernalis under D-1641 that would not otherwise have occurred from any other source. Even though USBR, as the operator of the CVP and New Melones, bears responsibility for meeting the objectives, in times of scarcity the stored water in New Melones and elsewhere in the Stanislaus system is claimed by OID and SSJID as senior and contract entitlements, or appropriative water rights. Thus, in the years 2014, 2015, and 2016, USBR filed Temporary Urgency Change Petitions (TUCPs) for modifications of Vernalis flow requirements due to inability to meet the normal requirements. In 2016, OID and SSJID made another water sale of 75 TAF that contributed to streamflow at Vernalis (State Water Board 2016). The sale of transfer water releases to downstream users may meet multiple benefits including contributing to instream flow requirements in transit.

The Water Supply Improvement Program (WSIP) Program Environmental Impact Report (PEIR) evaluated a water transfer between SFPUC and Modesto Irrigation District (MID) and Turlock Irrigation District (TID) for 25 million gallons per day (mgd) during drought years. The final WSIP PEIR reduced the water transfer to 2 mgd during droughts (SFPUC 2008; BAWSCA 2016). While neither 25 mgd nor 2 mgd may be enough to potentially compensate for the potential need under the LSJR alternatives described in Appendix L, *City and County of San Francisco Analyses*, Section L4, *Water Bank Account Modeling*, this information provides context for the potential to transfer water, the types of impacts associated with the transfer of water, and potentially mitigation measures needed to reduce potentially significant impacts. Further, this is an example of a potentially large consumptive use in the extended plan area that could potentially be satisfied though a water transfer. As such, information and potential mitigation measures from the WSIP PEIR is incorporated below, where appropriate, into the discussion of potential environmental effects associated with a water transfer.

Since the program of implementation would result in conditioning water rights and Clean Water Act Section 401 water quality certification conditions to meet the LSJR alternatives, it is not expected that additional intakes or other construction activities would occur for water transfers because the overall volume of water in the watersheds available for surface water diversions would be reduced, and such transfers would likely use existing infrastructure. Because new infrastructure would likely not be constructed, there would be no construction-related environmental effects resulting from such transfers. If new infrastructure was required, potential environmental effects associated with construction would be similar to those impacts discussed for recycled water sources (Section 16.2.4, *Recycled Water Sources for Water Supply*) and new source water supplies (Section 16.4.1, *New Source Water Supplies*), for example. Groundwater wells could potentially be constructed as part of groundwater substitution transfers, and if this were to occur, potential environmental effects associated with construction and operation would be similar to those impacts discussed for substitution of surface water with groundwater (Section 16.2.2, *Substitution of Surface Water with Groundwater*). SFPUC identified various activities that could be undertaken by the selling party of the water transfer (i.e., MID/TID) in the WSIP PEIR, as summarized in Attachment 1 of Appendix H, *Supporting Materials for Chapter 16*. These various activities generally involve the construction or operation of different facilities and these measures are similar to mitigation summarized in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* for impacts discussed in Section 16.2.2, Section 16.2.4, or Section 16.4.1.

Potential Environmental Effects

The type of potential environmental effects, as well as the magnitude and severity of such effects, associated with surface water transfers would be dependent upon the type of surface water transfer(s), the volume of water transferred, the location and duration of the transfer, and use(s) that the water is being transferred to and from. The type, magnitude, and severity of environmental effects would depend on the transferring entity's ability to absorb a reduction in surface water, depending on the use, for a period of time, and the receiving entities particular demand and the duration of the water transfer needed to satisfy the demand.

The WSE modeling results capture conditions under which a sale or transfer of water could occur because the modeling describes the needed amount of water to meet the LSJR alternatives, the potential reduction in surface water supply, and change in reservoir and river conditions under each LSJR alternative. The potential reduction in surface water supply and changes in reservoir and river conditions would occur regardless of if a water transfer is implemented in response to the LSJR alternatives. However, impacts disclosed in other parts of this document could be relevant to a potential water transfer and would capture the types of effects that could occur, depending on the type, location, and duration of the water transfer and the entities involved. For example, if a transfer is made from an irrigation district to a municipality in order to compensate for a surface water supply shortage imposed by the LSJR alternatives, the potential agricultural effects on the irrigation district would fall within those presented in Chapter 11, *Agricultural Resources*, because the analysis in Chapter 11 assigns all reductions in diversions to agriculture. However, if a municipality receives water from an irrigation district, then the municipality may not have a water supply shortage, as discussed in Chapter 13, *Service Providers,* and the effects potentially would be less than those disclosed in Chapter 13. The evaluation of potential environmental effects resulting from new surface water transfers, in response to the LSJR alternatives is general, references information from other parts of this document as needed, and provides examples of the types of effects that may result from water transfers depending on the type and duration of the transfer because the specifics of each transfer cannot be predicted or known at this time.

SFPUC evaluated a water transfer in the WSIP PEIR. The evaluation determined that impacts would be less than significant on the following resources on the Upper Tuolumne River: streamflow and reservoir water levels, geomorphology, surface water quality, surface water supplies, groundwater, fisheries, biological resources, recreational and visual resources, and energy resources. However, mitigation measures, are required to reduce impacts to a less-than-significant level for terrestrial biological resources and are further discussed below (SFPUC 2008, 2012; ESA+Orion Joint Venture 2012).

Agricultural Resources

Surface water transfers based on cropland idling could affect agricultural uses. If cropland is idled, rotationally fallowed, or deficit irrigated (i.e., reduction in irrigation water applied) regardless of the duration, it would still be considered farmland. However, as discussed in Chapter 11, *Agricultural Resources*, lands designated as Prime Farmland, Unique Farmland, Farmland of Statewide Importance, require irrigation water to meet the designation. If irrigation water was reduced due to a longer-term transfer to non-agricultural use, conditions may result similar to those described in Chapter 11, in the plan area. As a result, agricultural impacts associated with cropland idling would be similar to those described in Chapter 11 (Impact AG-1, LSJR Alternative 2 with adaptive implementation, and LSJR Alternatives 3 and 4 with or without adaptive implementation) and would be significant. Mitigation measures are proposed in Chapter 11, but impacts would be significant and unavoidable.

Air Quality

Surface water transfers based on groundwater substitution could affect air quality by potentially increasing emissions from an increase in groundwater pumping. Power needed for increased groundwater pumping would come from facilities that currently generate power, such as other renewable generating sources or non-renewable sources. The generation of additional power could result in increased criteria pollutant[4] emissions at other power facilities. However, these power facilities are already built and permitted to emit a maximum amount of criteria pollutants. These facilities are required to offset additional power generation by using pollution credit under existing regulations. Therefore, if additional emissions are generated as a result of an increase in groundwater pumping, these emissions would be generated by facilities that are permitted to do so. The permit requirements would ensure that there would be no net increase in pollutant emissions, and would be consistent with the air quality plans because there would be no net increase due to the facility's permit requirements. Impacts would be less than significant.

Surface water transfers based on cropland idling could affect agricultural uses and could affect air quality. Cropland idling would result in reduced irrigation to existing agricultural lands and could result in less water spread over more acreage (such as increased agricultural irrigation efficiencies) or less water applied to the same crops with a potential reduction in yield. If a reduction in irrigation water resulted in a reduction of agricultural acres actively farmed, or a reduction in the intensity of acreage farmed, air quality would potentially benefit (i.e., reduced smoke, fugitive dust, and equipment exhaust emissions) because there would be a reduction in controlled field burning, soil tilling, crop harvesting, and herbicide/pesticide application. In addition, some lands where irrigation is reduced or removed would still retain crop stubble cover, experience vegetative regrowth, or both. This plant matter would serve to reduce the potential for fugitive dust emissions. In the event that some croplands became and remained unvegetated, fugitive dust emissions could increase from wind-blown dust in those areas. However, in those same areas active agricultural activities and

[4] The federal and state governments have established ambient air quality standards (AAQSs) for the following criteria pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (both particulate matter smaller than 10 microns or less in diameter [PM10] and particulate matter smaller than 2.5 microns or less in diameter [PM2.5]), and lead.

associated emissions that usually occur on a permanent basis, such as crop burning, soil tillage, crop harvesting, and pesticide and herbicide application would be reduced or eliminated. Therefore it is anticipated that the limited amount of fugitive dust emissions associated with unvegetated areas would be significantly less than the potential long-term emissions associated with active agricultural activities. Consequently, impacts would be less than significant.

Biological Resources

In general surface water transfers for groundwater substitution or cropland idling may have small effects on instream flow, but effects on biological resources are unlikely. Reservoir releases for water supply would likely not go beyond what was simulated by the WSE model and disclosed in Chapter 7, *Aquatic Biological Resources* and Chapter 8*, Terrestrial Biological Resources*. The WSE model releases water needed to satisfy water rights. There would be no releases for diversions beyond what would meet full water rights. Releases would only be greater than what is needed for water rights and instream flow requirements when flood-control releases are needed, which are also included in the model. In addition, in acting on petitions related for water transfers involving the change of point of diversion, place of use or purpose of use, the State Water Board would have to find no unreasonable effects on fish and wildlife or other instream beneficial uses to approve the transfer. Therefore, impacts would be expected to be less than significant in the plan area. However, as discussed in the WSIP PEIR, impacts on terrestrial biological resources in the Upper Tuolumne River, and consequently in the extended plan area, as a result of a water transfer would be potentially significant and could be mitigated to a level of less than significant (SFPUC 2008, 2012; ESA+Orion Joint Venture 2012). These mitigation measures include the following and Attachment 1 of Appendix H, *Supporting Materials for Chapter 16* provides descriptions of the mitigation measures for biological resources associated with the water transfer described in the WSIP PEIR.

- Measure 5.3.6-4a Avoidance of Flow Changes by Reducing Demand for Don Pedro Reservoir Water
- Measure 5.3.6-4b Fishery Habitat Enhancement
- Measure 5.3.7-2 Controlled Releases to Recharge Groundwater in Streamside Meadows and Other Alluvial Deposits
- Measure 5.3.7-6 Lower Tuolumne River Riparian Habitat Enhancement

Under the LSJR alternatives as described in Appendix L, *City and County of San Francisco Analyses*, there could be a need for a larger water transfer or a longer duration than the one described by the WSIP PEIR. If this were to occur, it is anticipated that the mitigation incorporated into the WSIP PEIR for biological resources would be required and SFPUC can and should implement them. It is possible that additional mitigation to protect biological resources may be necessary, but it is infeasible to identify them until project-specific details like the amount of water and the transfer period are known. Until such time that the potential mitigation measures identified in the WSIP PEIR are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

Surface water transfers based on cropland idling could affect special-status terrestrial species that use the fields for forage, cover, nesting and breeding and the magnitude and severity of the effect would depend on the duration of the transfer and location and extent of cropland. Similar to what is discussed in Chapter 8, *Terrestrial Biological Resources*, while agricultural lands usually provide greater habitat function when compared to urban or industrial land use types, it is expected that potential idling of active agriculture on some lands would not result in a significant adverse effect on special-status and sensitive species. A reduction of active agricultural management, soil tilling, crop harvesting, and herbicide and pesticide application would potentially benefit special-status species by reducing disturbance to potentially suitable habitat and by reducing overall population and habitat fragmentation. Special-status species within the plan area or extended plan area, such as California tiger salamander (*Ambystoma californiense*), San Joaquin kit fox (*Vulpes macrotis mutica*), Swainson's hawk (*Buteo swainsoni*), and various other California native wildlife populations declined as a result of the conversion of California's annual grasslands to agricultural lands (CDFG 2000; Estep 1989; Loredo et al. 1996; Wheeler 2003; CDFW n.d.). Idle lands could prove valuable in providing habitat connectivity and reducing fragmentation for special-status and sensitive species, depending on the location and the amount left idled. The special-status terrestrial wildlife habitat value for idled fields or pasture lands is typically higher than that of active agricultural fields due to the lack of seasonal anthropogenic disturbances and a reduction of the overall vegetative uniformity (USFWS 2009; USFWS 2010; CDFW 2014; Woodbridge 1991). As such, idling with the resultant halting of mechanized agriculture, pesticide and rodenticide application, and anthropogenic disturbance is unlikely to result in a substantial adverse effect on sensitive or special-status species. Furthermore, crops are regularly idled or fallowed for different periods of time throughout the Central Valley, based on weather conditions, crop conditions, crop pricing, water availability, and other variables that factor into farming profitability and decision making. Finally, when agricultural lands are being idled for surface water transfers, landowners are encouraged to cultivate or retain non-irrigated cover crops or natural vegetation for the purpose of providing habitat to waterfowl and other wildlife. (Water Code, § 1018.) Accordingly, cropland idling water transfers would not likely substantially affect special-status terrestrial wildlife and would likely be less than significant.

Hydrology, Water Quality, Geology and Soils

Surface water transfers implemented through cropland idling would be unlikely to substantially affect surface hydrology and surface water quality or result in substantial flooding, sediment, or erosion. While water quality may depend on the timing of the transfer (e.g., lower flows in fall may reduce water quality), surface water transfers typically must be within the same season. As such, the transfer would not be expected to result in a violation of a water quality standard or a degradation of water quality in a river. Water transfers would follow flood control rules and regulations governing releases from reservoirs and as such would not be expected to result in flooding or levee failure as a result of releases during different times of the year from reservoirs because as a result of following flood control rules and regulations channel capacities would not be exceeded. The potential mobilization of sediment and the potential for stream channel alteration and erosion would be considered low given the flows would be within the historic variation. Impacts would be less than significant.

Cropland idling could result in a reduction of acres designated as Prime, Unique, and Farmland of Statewide Importance, but not beyond what is identified in Chapter 11, *Agricultural Resources*. Less-intensive uses such as dryland farming, deficit-irrigation (i.e., reduction in irrigation), and grazing, could take place on lands that are no longer regularly irrigated. In addition, implementation of water conservation measures could allow less water to service more acres. For example, some crops (e.g., alfalfa and pasture) are able to survive under deficit irrigation where only a portion of the crop water demands are met (Putnam et al. 2015a, 2015b). While there could be a decline in yield for these types of crops or a reduction in the full use of pasture, if the full water requirements were continually restricted, they could still potentially remain in agricultural use (Putnam et al. 2015a, 2015b). Finally, even some fallowed lands would be expected to retain crop stubble cover, ultimately experience vegetative regrowth, or both. This root material and regrowth would stabilize soils and serve to reduce the potential for erosion. Currently, there is active agriculture in all three watersheds of the Stanislaus, Tuolumne, and Merced Rivers and along the LSJR. While the level of connectivity of any specific active agricultural acreage to local drainages (i.e., the ability of loose soil to be delivered to a stream) is unknown, soil disturbance associated with active agriculture practices and irrigation practices currently results in disturbance of topsoil and leads to soil erosion, primarily in the plan area. Active agricultural production, such as soil disturbance resulting from soil tillage, the harvesting of crops, and other activities, is a source of erosion and sedimentation associated (Grismer et al. 2006; O'Geen 2006; Singer 2003). Furthermore, even when soil is not being disturbed, agriculture practices often result in bare soil during the rainy season, which is more susceptible to erosion than soil with vegetation. In contrast, if lands are subject to less intensive use due to a reduction in surface water irrigation (e.g., dryland farming, deficit irrigation, or grazing), there would be no change or potentially less sedimentation and erosion. If active agriculture is reduced, there may be an initial period of increased sedimentation or erosion; however, ultimately, it is expected that the reduced tillage and other activities would result in less sedimentation and erosion. As such, reducing existing levels of soil disturbance associated with active agricultural practices and irrigation could reduce erosion and the loss of topsoil. Thus, the potential for soil erosion and sediment delivery to streams would be reduced overall. Consequently, impacts would be less than significant.

Groundwater

Surface water transfers implemented through groundwater substitution could result in a lowering of groundwater levels if groundwater is pumped in substitution for transferred water and could contribute to impacts on groundwater levels or groundwater quality, as described in Chapter 9, *Groundwater Resources*. Chapter 9 assumes that reductions in surface water supply would be replaced with groundwater pumping up to a maximum amount. Based on this analysis, significant impacts would occur on four primary subbasins (Eastern San Joaquin, Turlock, Modesto, and the Extended Merced[5]). Impacts under a water transfer would be based on where pumping currently occurs if it is transferred from one basin to another. As such, a water transfer may not affect total pumping but could affect total recharge. Alternatively, water transfers could affect in-lieu groundwater recharge activities. Under in-lieu recharge programs, water users increase their surface water deliveries in order to temporarily decrease the amount of groundwater they pump from the aquifer. Decreased pumping allows natural recharge to accumulate in the underground aquifer for use during dry years. If water that otherwise would have been used to facilitate in-lieu recharge were to be transferred, then groundwater would still be pumped, which could result in a lowering of groundwater levels. In which case, impacts would be similar to those described in Chapter 9 and would be significant. Mitigation measures are proposed in Chapter 9. While these measures are feasible, they would require action by other entities. As such, until such time that the potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

[5] The *Extended Merced Basin* is used to reference the Merced Basin and a portion of the Chowchilla Basin, as defined in Chapter 9, *Groundwater Resources*.

Recreation and Aesthetics

Surface water transfers implemented through cropland idling or groundwater substitution is unlikely to affect recreational resources at reservoirs or in or adjacent to rivers because reservoir releases for water supply would occur regardless of the water transfer. Furthermore, while impacts on recreational resources may result from the timing of the transfer (e.g., more recreational uses during the summer), surface water transfers typically must be within the same season and, as such, would limit impacts to that particular season. In general, water transfers would not affect reservoir storage, total diversions, or river flows at the downstream ends of the rivers and, as such, would have limited effects on recreation and aesthetics. However, water transfers could result in a change in the point of diversion, which could affect river flows between the old and new points of diversion, particularly in the extended plan area. For example, recreational and aesthetic resources in the Upper Tuolumne River could be affected as a result of lower river flows beyond what was previously identified in the WSIP PEIR. This could occur because of the potential large consumptive use upstream (e.g., CCSF) and the potential point of diversion at which it may leave the system (Upper Tuolumne). Although the water transfer would be limited to the capacity of existing infrastructure and existing agreements, depending on the magnitude and severity of the change in river levels, impacts could be significant. These types of conditions are less likely to occur on the Stanislaus River given the relatively small consumptive uses upstream of New Melones Reservoir; however, conditions would also depend on the size of the transfer. The State Water Board has authority when considering transfer petitions, to ensure that reservoir levels in the upper watersheds do not cause significant recreation and aesthetic impacts, unless doing so would be inconsistent with applicable laws. Even with this type of mitigation, the impact is considered significant, because the mitigation may not fully mitigate the impact in all situations.

Greenhouse Gases and Energy

Surface water transfers implemented through groundwater substitution could result in groundwater pumping up to existing capacities, which could produce GHGs in exceedance of applicable thresholds, as described in Chapter 14, *Energy and Greenhouse Gases*. The incremental increase in GHG production could be small because in the absence of the transfer, the recipients of the water transfer could potentially pump groundwater to meet their needs, and the water transfer may prevent this pumping. However, the amount of GHGs produced would depend on the details of the transfer, including the amount of water transferred and what would occur in the absence of the transfer (e.g., groundwater pumping by the recipient or alternative action that may not produce GHGs, such as water conservation). If water is transferred such that it results in a change in the point of diversion in the extended plan area, it is possible that there could be a reduction in the amount of water passed through the major hydropower reservoirs. This would likely either be a small volume or could pass through alternative hydropower facilities (e.g., CCSF water could pass through Kirkwood and Moccasin powerhouses), thus minimizing the potential effect to hydropower. Depending on the actions of the parties in the absence of a transfer and the amount of water transferred, the impacts associated with GHGs would be similar to what is described in Chapter 14, and GHG emissions would be significant. Mitigation measures are proposed in Chapter 14; however, the measures are deemed infeasible; as such, impacts would remain significant and unavoidable.

Other Resources

In addition to the resources discussed above, a water transfer implemented through cropland idling and groundwater substitution would be unlikely to substantially affect the following resources:

noise, traffic, cultural resources (significant historical, archeological, or paleontological resources, or human remains), hazards and hazardous materials, population and housing, public services, land use, mineral resources, and utilities and service systems; therefore, there would either be no impact or a less-than-significant impact on these resources. A water transfer would not result in activities that generate noise or traffic. Noise or traffic on local roads could overall decrease if crops are idled temporarily or long term. Surface water transfers would not result in activities that could disturb cultural resources or human remains because ground-disturbing activities would not occur and reservoirs would be operated within their existing capacities and historical elevation variation (similar to what is described in Chapter 12*, Cultural Resources*). An increase in the use, transport, or disposal of hazardous materials would not occur because reservoir operations do not handle, transport, or use hazardous materials and use of hazardous materials (e.g., pesticides/herbicides) would not increase (and may actually decline) as a result of cropland idling because there would either be fewer crops in acreage or less overall production due to potentially less water. Conflicts with public airports or private airstrips or airport management plans would not occur because water transfers would not use these services. Depending on the parties associated with the transfer of water, utilities and service systems may benefit because they may receive water needed to meet demand. A water transfer is not expected to result in an increase in population or growth or the development of housing, or the need for housing, because the water would be used to meet existing demand in a particular service area for a particular duration of time. A water transfer is not expected to physically divide an established community because construction is not expected. The demand for public services (police, fire, parks, other facilities) is expected to remain unchanged because the water being transferred would meet existing demand and, as such, demand and use for public services is not expected to increase. A water transfer would likely be used to meet existing demand for an existing land use, and as such it would likely not result in a conflict with land use and would support an existing use. A water transfer would either use the existing river channel, or off river channels below the reservoir to transfer the water, as such, it would not result in a loss of a mineral resource of value to the region and the residents of the state or of local importance. The mineral resources adjacent to an existing river channel would continue to exist and could be accessed depending on the demand and needs of the area. A water transfer would not affect utilities or service systems such as storm water drains, solid waste disposal, and wastewater treatment capacity or exceed wastewater treatment standards because a water transfer would not require the use of these types of facilities or services.

16.2.2 Substitution of Surface Water with Groundwater

Reductions in surface water diversions are expected as a result of approving the LSJR alternatives and the respective program of implementation. A reasonably foreseeable method to augment a surface water supply is to obtain more water from groundwater resources. This could be achieved by additional pumping from existing wells or the development of new groundwater wells. The costs and potential environmental impacts associated with obtaining more water from groundwater resources are evaluated below.

Cost Evaluation

Groundwater well characteristics are varied throughout the plan area and extended plan area. Major variables in developing groundwater resources include: soil type, intended use, distance to distribution system, design flow, depth to standing water, and pumping plant efficiency (Burt 2011). These variables then determine specific groundwater well characteristics, such as what type of well to construct, what type of pump is needed, and what level of water treatment is needed. Table 16-3, *Typical Well Pump Test Data in the San Joaquin Groundwater Basin*, is a description of typical groundwater well characteristics in the plan area.

Table 16-3. Typical Well Pump Test Data in the San Joaquin Groundwater Basin

Parameter	Value
Average Input Power	56 kW
Average Weighted Power per Acre-foot Pumped	478 kWh per acre-foot
Average Weighted Total Dynamic Head	260 feet
Average Weighted Flow Rate	1,099 gallons per minute
Average Weighted Depth from Surface to Standing Water Level	189 feet
Average Weighted Motor Horsepower	116 horsepower
Average Weighted Overall Pumping Plant Efficiency	57%

Source: Table is reproduced from data presented by Burt 2011.
Note: All weighted values are weighted by input power (kW).
kW = kilowatt.
kWh = kilowatt hour.

Groundwater well operations and maintenance costs are highly variable and depend on pump efficiency, depth of the water, cost of electricity, volumetric flow, cost of maintenance, proximity to water distribution system, and staff needed to maintain equipment and facilities. The ideal scenario is one with very efficient pumps (above 70 percent efficiency), that require little maintenance, and that pump from relatively shallow wells.

One of the dominant cost categories in the operations and maintenance budget for groundwater wells is the cost for electricity. Energy costs are published annually by the California Public Utilities Commission (CPUC). Historical electric rates are shown in Table 16-4, *Pacific Gas & Electric Average Bundled Rates by Class 2007–2011*.

Table 16-4. Pacific Gas & Electric Average Bundled Rates by Class 2007–2011

	Cents per kWh					
Rate Payer Class	2007	2008	2009	2010	2011	Average
Agricultural	12.4	13.2	14.2	14.2	14.6	13.7
Small/Medium Commercial	15.1	14.7	16.4	16.9	16.8	16.0
Large Commercial and Industrial	11.5	10.7	12.4	12.6	12.6	12.0

Source: CPUC 2011.
Note: Table is a summary of data presented by the California Public Utilities Commission. Data omitted was for non-pertinent ratepayer classes (e.g., residential) and data from 2000 to 2006.
kWh = kilowatt hour.

To estimate average electricity costs, average weighted power per AF pumped from Table 16-3, *Typical Well Pump Test Data in the San Joaquin Groundwater Basin*, is multiplied by the average cost per kilowatt hour (kWh) shown in Table 16-4, *Pacific Gas & Electric Average Bundled Rates by Class 2007–2011.*[6] Based on information presented in these tables, it is reasonably estimated that groundwater pumping electrical costs in the plan area are between $57.36 and $76.48 per AF. This estimate is for a groundwater well with the characteristics in Table 16-3, *Typical Well Pump Test Data in the San Joaquin Groundwater Basin*. However, pumps that are more efficient or pump from shallower wells would have a lower electrical cost per AF. Conversely, less efficient pumps and deeper wells would have a higher electrical cost per AF.

Energy costs could represent 50–75 percent of a water utility's budget (Flex Your Power 2012). Using the upper end electricity cost calculated above ($76.48 per AF), the total operations and maintenance cost of a groundwater project could be estimated between $101.97 and $152.96 per AF annually.

As part of the California Water Plan Update 1994, the California Department of Water Resources (DWR) analyzed agricultural groundwater production costs. This analysis described the average costs at specific locations within a region, including capital, operations, maintenance, and replacement costs. These costs are presented in Table 16-5, *Typical Agricultural Groundwater Production Costs by Hydrologic Region*, in 1992 dollars and calculated 2010 dollars (DWR 1994).

Table 16-5. Typical Agricultural Groundwater Production Costs by Hydrologic Region

Groundwater Basin	1992 Groundwater Costs ($/AF)	2010 Groundwater Costs ($/AF)
San Joaquin	$30–$40	$48–$64
Tulare Lake	$40–$80	$64–$127
Sacramento River	$30–$60	$48–$95

Source: DWR 1994.

Note: From DWR Bulletin 160-93 Table 7-10, California Water Plan Update Oct 1994; costs normalized by State Water Board staff.

AF = acre-feet.

Agricultural and municipal groundwater production costs are not the same. Costs to municipal water users would likely be higher due to treatment, permitting, overhead, and labor costs not normally realized by agricultural users. Table 16-6, *Example New Groundwater Well Projects Funded by the California Department of Water Resources Integrated Regional Water Management Implementation Grant Program, Phase 1*, presents a summary of representative groundwater projects funded by the Proposition 84 Integrated Regional Water Management Implementation Grant Program, Phase 1 (IRWM). These projects generally construct a new groundwater well or wells, and the associated facilities to connect the well(s) to a municipal water distribution system. Cost estimates also include soft costs, such as the cost of planning, design, permitting, and administration. These projects were awarded funding in 2011, but costs are represented in 2009 dollars (DWR 2011a).

[6] As described in Appendix G, *Agricultural Economic Effects of the Lower San Joaquin River Flow Alternatives: Methodology and Modeling Results,* average groundwater pumping costs vary. An average energy price of $0.189/kWh, is used in the Statewide Agricultural Production (SWAP) model (CH2MHill 2012). Many irrigation districts have hydropower projects and receive discounted power.

Table 16-6. Example New Groundwater Well Projects Funded by the California Department of Water Resources Integrated Regional Water Management Implementation Grant Program, Phase 1

Applicant	Project	Project Cost	Operations & Maintenance Budget ($/year)	Production (AF/y)	20-Year Amortized Cost ($/AF/y)
City of Sacramento	E.A. Fairbairn Groundwater Well Project[a]	$1,578,454	$240,000	2,250	$142
Sacramento Suburban Water District	Coyle Avenue and Roseview Park Pump Stations and Treatment Systems Project[b]	$5,735,537	$68,000	5,750	$62

Source: DWR 2011a.

Note: All projects generally construct new groundwater wells and associated pumps and facilities to pump groundwater.

AF/y = acre-feet per year.

[a] As part of the E.A. Fairbairn Groundwater Well Project, the City of Sacramento proposes to construct one well, which would operate 65 percent of the time in an average water year and produce 1,462 AF/y. In dry years the well would operate 100 percent of the time, producing 2,250 AF/y, and in wet years, well operation would be reduced to 15 percent of the time, producing 337 AF/y (DWR 2011a).

[b] Sacramento Suburban Water District's project proposes to construct two wells (one 2,250 AF/y and one 3,500 AF/y well).

Within the plan area and extended plan area, there are many water suppliers that rely on groundwater to meet water demands. The City of Merced relies completely on groundwater to meet municipal water demands. The City of Merced operates 22 active groundwater wells, 340 miles of distribution pipelines, 4 major water storage tanks, and supplies 7 billion gallons of water to its customers annually. The City of Merced's 2010–2011 budget for water services and infrastructure was $41,621,784 (City of Merced 2010). Based on the entire operating budget and total groundwater production, this equates to $1,937.50 per AF.

The City of Merced's groundwater pumping costs represent the high end of costs for this potential action because these costs include water treatment, maintenance of a substantial transmission system, funding a significant capital improvement plan, and 29 staff to plan, manage, operate, and maintain the entire water infrastructure for a city of more than 80,000 people (City of Merced 2010). Smaller water systems, such as those operated by smaller water suppliers and agricultural users, are likely to incur less cost per AF produced.

In areas above the rim dams[7] most groundwater originates from cracks or fractures in hard rocks, such as granite, greenstone, and basalt (County of Mariposa 2014). For those attempting to create new wells the location of fractures and the quantity and quality of groundwater within the fractures underlying any particular parcel is unknown (County of Mariposa 2014). Typical groundwater wells

[7] In this document, the term *rim dams* is used when referencing the three major dams and reservoirs on each of the eastside tributaries: New Melones Dam and Reservoir on the Stanislaus River; New Don Pedro Dam and Reservoir on the Tuolumne River; and New Exchequer Dam and Lake McClure on the Merced River.

in the upper watersheds of the Sierra Nevada are drilled to depths of between 150 and 600 feet (ft), include a solid casing or a seal from the land surface to a depth of between 50 and 200 ft, and are either open or have a perforated casing below that depth (Fram and Belitz 2014). Half of all hard rock wells yield 10 gallons per minute (GPM) or less, which is only enough for individual domestic supplies, but if conditions are good they can produce hundreds of GPM (DWR 2011b).

In response to the 2013–2015 drought many additional wells were drilled within the areas above the rim dams of the eastside tributaries. New private well costs were reported ranging from $10,000 to $20,000 (Petersen 2014, James 2015). In 2014 the Lake Don Pedro Community Services District (CSD) proposed construction of a new 72 GPM groundwater well as part of the Yosemite-Mariposa Integrated Regional Water Management Plan. Lake Don Pedro CSD estimated that the well would cost $125,000 to construct and an additional $4,000 annually for maintenance (Lake Don Pedro CSD 2014). In 2015, as the drought worsened, Lake Don Pedro CSD planned construction of three more 100 GPM wells at about $400,000 each, not including potential water treatment costs up to $150,000 per well (Sierra Sun Times 2015). In addition, the Lake Don Pedro CSD reported on June 7, 2016 that another new well had been completed with a total cost of $475,000, mostly funded by grants from DWR and State Water Board (Lake Don Pedro CSD 2016). In Tuolumne County the Twain Harte CSD constructed a 50 GPM well to improve water supply reliability. The well was fully funded by a State Water Board emergency drought grant and the final project cost was $250,000 (Twain Harte CSD 2015).

Environmental Evaluation

Summary of Potential Action

While it is unknown exactly how surface water users could respond to a reduction in their surface water supply as a result of a program of implementation which could limit their water rights, it is reasonable to assume that some amount of groundwater would replace surface water use. Currently, irrigation districts pump groundwater during dry years to supplement surface water diversions. Additionally, some municipalities in the watersheds primarily rely on groundwater and augment their supplies with surface water.

It is possible that some irrigators/irrigation districts and some municipalities may need to construct and operate new groundwater wells. New agricultural or municipal groundwater wells and associated distribution systems could be constructed and operated by existing irrigation districts (e.g., South San Joaquin Irrigation District, Oakdale Irrigation District, Modesto Irrigation District, Turlock Irrigation District, Merced Irrigation District), water districts (e.g., Stockton East Water District, City of Merced, City of Modesto, Stevinson Water District), or individual agricultural users. Both irrigation districts and water districts provide water to agricultural users for irrigation and municipal users for domestic, municipal, and industrial purposes. It is not possible to estimate the location, timing of construction, details of operation, and number of groundwater wells and associated distribution system that may be constructed in the future. However, it is reasonable to assume that new agricultural groundwater wells would be constructed close to the location of use (e.g., agricultural fields). It is likely these would be operated using electricity from the grid, though some of them could use fossil fuel powered generators. It is assumed new municipal groundwater wells would be located within urban or suburban areas to be located near the existing municipal distribution system. They would be operated using electricity and would be required to follow existing drinking water treatment standards. Some new municipal wells may need well head treatment to comply with state and federal drinking water standards. This type of treatment typically would occur at the wellhead site.

Potential Environmental Effects

Construction of either agricultural groundwater wells for primarily agricultural purposes or municipal groundwater wells for domestic, industrial, and commercial purposes may result in minor, temporary, and localized effects typically associated with construction activities, including dust and air quality effects and ground disturbance. Wells would most likely be placed in areas that are already disturbed through agricultural practices or urban development, so the potential natural and cultural resources (significant historical, archeological, or paleontological resources) effects could be minimal.

It is reasonable to assume that any new wells would be professionally installed by municipal water purveyors or agricultural users using best management practices (BMPs) typically used in drilling new wells, minimizing potential cross-connection of aquifers and related potential effects associated with water quality and hazardous materials. Wells are commonly constructed and operated in both rural and urban areas, are a common land use, and are part of the landscape. Well construction may result in minor increases of electricity and fossil fuel use; however, these increases would largely be offset by a reduction in surface water diversions and the associated pumping costs.

Table 16-7, *Potential Environmental Effects of Substituting Surface Water with Groundwater*, summarizes the potential environmental effects associated with new groundwater supplies. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of new groundwater supplies and is referenced in Table 16-7 where appropriate.

Table 16-7. Potential Environmental Effects of Substituting Surface Water with Groundwater

Potential Environmental Effects of Substituting Surface Water with Groundwater	
Resource	Discussion
Aesthetics	• Construction and operation of new agricultural wells would not be expected to significantly affect the visual character or quality of agricultural areas in the plan area or extended plan area because groundwater wells currently exist in agricultural areas and are part of the visual character of agricultural areas. Wells are generally low to the ground and are typically not located in areas where there are sensitive receptors (e.g., recreationists), which would be affected by changes in views or visual character and quality. Agricultural wells are not expected to have operational lights that would generate substantial light or glare. Impacts would be less than significant. • Construction and operation of new municipal groundwater wells would not be expected to significantly affect the visual character or quality of municipal areas in the plan area or extended plan area because groundwater wells are generally low to the ground, may be contained within a small structure to protect above-ground piping infrastructure, and would likely be fenced for security, which could prevent direct views. Operation of new municipal groundwater wells may have operational and safety lights. Impacts would depend on the location of sensitive receptors to potential lighting; however, lights would be expected to follow lighting guidelines and lighting plans of local jurisdictions approving the construction and operation of the wells. Table 16-38 identifies potential mitigation measures lead agencies (e.g., municipal water purveyors) can and should implement to reduce potentially significant environmental effects associated with lighting. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, depending on the potential location of possible sensitive receptors and the ability of reducing light and glare.
Agriculture and Forestry Resources	• Construction of new agricultural groundwater wells would result in ground disturbance of agricultural land in and immediately around the well site, and accordingly could result in the temporary impact on Prime or Unique Farmland, or Farmland of Statewide Importance. However, because agricultural groundwater wells would be installed to support the continued use of the land for agriculture, it is likely that the land immediately surrounding the new agricultural well would be returned to agricultural use once the well was constructed. Impacts would be less than significant. • Operation of new agricultural groundwater wells would occur on agricultural land (potentially including Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) and would be used to support the continued agricultural use of the land by supplying irrigation water. The groundwater wells would be expected occupy less than one quarter of an acre per well, and therefore, they would not substantially reduce the area available for crop production. Impacts would be less than significant. • Limited forestry resources occur in the plan area. Although extensive forestry resources occur in the extended plan area (e.g., Stanislaus National Forest), it is expected that construction and operation of new agricultural groundwater wells would occur on land zoned for agriculture and not on land zoned for forest land or timberland.

Potential Environmental Effects of Substituting Surface Water with Groundwater	
Resource	Discussion
	Therefore, construction and operation of new agricultural wells would not be expected to result in conflicts with existing zoning for, or cause rezoning of, forest land or timberland, or result in the loss of forest land or conversion of forest land to non-forest use. Impacts would be less than significant. • Construction and operation of new municipal groundwater wells would not be expected to be located on lands used for agriculture, but rather would be located close to the urban and suburban uses they supply and within proximity to existing water supply infrastructure. If new municipal groundwater wells were located on agricultural land (including Prime Farmland, Unique Farmland, or Farmland of Statewide Importance), they would be located on relatively small areas of land, which would represent only a very small fraction of the existing agricultural land. Impacts would be less than significant. • Construction and operation of new municipal groundwater wells would likely not occur on lands zoned for forest or timberlands because the wells would necessarily be located within proximity to urban and suburban areas and existing water supply infrastructure. Accordingly, the construction and operation of new municipal groundwater wells would not be expected to result in the loss of forest land or conversion of forest land to non-forest use. Impacts would be less than significant.
Air Quality	• The plan area is located in the San Joaquin Valley Air Basin (SJVAB) and partially located in the Mountain Counties Air Basin (MCAB). The extended plan area is also partially located in the SJVAB, MCAB, and the Great Basin Valleys Air Basin (GBVAB). New agricultural or municipal groundwater wells could be located in any or all of these air basins, which generally cover San Joaquin, Stanislaus, Merced, Mariposa, Tuolumne, Calaveras, Alpine, and Madera Counties, because the water supplied by the wells would support agricultural and municipal uses in these areas. The plan area and extended plan area occur within the jurisdictions of the San Joaquin Valley Air Pollution Control District (SJVAPCD), Calaveras County Air Pollution Control District (CCAPCD), the Great Basin Unified Air Pollution Control District (GBUAPCD), Mariposa County Air Pollution Control District (MCAPCD), and Tuolumne County Air Pollution Control District (TCAPCD). SJVAPCD's published guidelines, *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002) do not require the quantification of construction emissions. Rather, the guidelines require implementation of effective and comprehensive feasible control measures to reduce PM10[8] emissions (SJVAPCD 2002). SJVAPCD considers PM10 emissions to be the greatest pollutant of concern when assessing construction-related air quality impacts and has determined that compliance with its Regulation VIII, including implementation of all feasible control measures specified in its *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002), constitutes sufficient mitigation to reduce construction-related PM10 emissions to less-than-significant levels and minimize adverse air quality effects. All construction projects must abide by Regulation VIII. This would include the implementation of a Dust Control Plan (Siong pers. comm.). Further consultation with SJVAPCD staff indicates that though explicit thresholds for construction-related emissions of ozone precursors are not enumerated in the *Guide for Assessing and Mitigating Air Quality Impacts*, SJVAPCD considers a significant impact to occur when construction

[8] PM10 standard includes particulate matter with a diameter of 10 micrometers (microns) or less.

Potential Environmental Effects of Substituting Surface Water with Groundwater	
Resource	Discussion
	or operational emissions of reactive organic gases (ROG) or nitrogen oxides (NO_X) exceed 10 tons per year or if PM10 or PM2.5[9] emissions exceed 15 tons per year (Siong pers. comm.). For project components within the boundaries of the CCAPCD, a significant impact would occur if project emissions are greater than 150 pounds per day for ROG, NO_X, or PM10 or less, in either the construction or operational periods. No thresholds for other criteria pollutants, their precursors, or GHGs have been established by the CCAPCD. The GBUAPCD does not have adopted quantitative thresholds of significance for criteria pollutants for proposed projects for the purposes of CEQA, although thresholds from neighboring air districts (e.g., CCAPCD, TCAPCD, SJVAPCD) may be used to evaluate impacts within the GBUAPCD. For construction impacts, the GBUAPCD requires that project proponents adopt comprehensive mitigation measures to mitigate fugitive dust impacts. For emissions associated with the operation of stationary sources, the GBUAPCD considers stationary emissions to be less than significant if they are exempt from Rule 202 pursuant to Rule 209-A(B)(2). Rule 209-A identifies emission limits of 250 pounds per day for ROG, NO_X, sulfur oxides (SO_X), and particulate matter.[10] For project components within the boundaries of the MCAPCD, a significant impact would occur if project operational emissions are greater than 100 tons per year for ROG, NO_X, CO, SO_X, PM10, and PM2.5.[11] For project components within the boundaries of the TCAPCD, a significant impact would occur if project emissions are greater than 100 tons per year or 1,000 pounds per day for ROG, NO_X, CO, SO_X, and PM10.
	• Construction of new agricultural or municipal groundwater wells would likely result in emissions associated with construction equipment and construction vehicles, as well as fugitive dust emissions from ground disturbance. The quantity, duration, and the intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be “diluted” relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Since construction of groundwater wells does not require lengthy construction activities, the potential for significant environmental effects is minimal. Further, construction emissions generated would need to comply with the applicable air pollution control districts’ (APCDs)’ regulations and established thresholds. Lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on air quality associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that

[9] PM2.5 standard includes particulate matter with a diameter of 2.5 micrometers (microns) or less.

[10] For existing stationary sources that have net emissions of 250 pounds or more per day of particulate matter measured as total suspended particulate, a net increase in emissions of 80 or more pounds per day of PM10 due to modifications requires the use of best available control technology.

[11] No construction-period thresholds have been established by MCAPCD.

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	impacts could be mitigated to less than significant once mitigation measures were implemented given the relatively short term of construction and the limited use of equipment. • New municipal groundwater wells would likely use electric power to operate the pumps because of their expected locations in urban and suburban areas and the expected location in close proximity to existing water supply infrastructure. The need for additional energy to operate additional agricultural well pumps could result in increased criteria pollutant emissions at other power facilities. However, the power facilities that would compensate for the additional power are already built and permitted to emit a maximum amount of criteria pollutants. These facilities are required to offset additional power generation by the use of pollution credit. Therefore, if additional emissions are generated, they would be generated by facilities that are permitted to do so. Impacts would be less than significant. • They may use fossil-fuel powered back-up generators during intermittent emergency situations and their cumulative operation could result in exceedances of the thresholds for SJVAPCD, CCAPCD, GBUAPCD, MCAPCD, and TCAPCD. The potential increase in criteria pollutant emissions could be potentially offset by reductions in surface water diversions that often require the use of electric or fuel pumps to lift water into canals. Operations for new groundwater wells would include facility inspection and maintenance activities and are expected to require similar or less inspection and maintenance than existing municipal groundwater wells. It is expected that new groundwater wells would generally require very little maintenance once construction is completed and only as-needed. Emissions generated during operations would be minimal and would comply with applicable emissions thresholds for SJVAPCD, CCAPCD, GBUAPCD, MCAPCD, and TCAPCD. Impacts would be less than significant. • Operation of new agricultural wells is expected to use electric power to operate the pumps because it is a more economical source of power when compared to fossil fuel power generation; however, if fossil fuel powered generators are used to run the groundwater well pumps, there would be air quality pollutant emissions associated with burning fossil fuels (e.g., PM10) and their cumulative operation could result in exceedances of the thresholds for SJVAPCD, CCAPCD, GBUAPCD, MCAPCD, and TCAPCD. For electric wells, the need for additional energy to operate additional agricultural well pumps could result in increased criteria pollutant emissions at other power facilities. However, the power facilities that would compensate for the additional power are already built and permitted to emit a maximum amount of criteria pollutants. These facilities are required to offset additional power generation by the use of pollution credit. Therefore, if additional emissions are generated, they would be generated by facilities that are permitted to do so. Impacts would be less than significant. • The various APCDs have determined some common types of facilities that have been known to produce odors in the region. These facilities include wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants. Construction and operation of new agricultural and municipal wells would not involve the type of facility identified by, for example, SJVAPCD, as a known odor source (SJVAPCD 2002). Consequently, it is expected new agricultural

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	and municipal wells would not create objectionable odors affecting a substantial number of people. Impacts would not occur. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction and operation of new agricultural and municipal groundwater wells would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The construction and operation of new agricultural and municipal groundwater wells would not result in growth because new groundwater wells would be constructed and operated to replace a water source that was reduced (e.g., surface water) rather than to increase capacity to serve new water supply users. The construction and operation of new agricultural and municipal groundwater wells would not result in population or employment growth that would result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Accordingly, this impact is less than significant.
Biological Resources	• It is expected that construction and operation of new agricultural groundwater wells would be in agricultural lands or adjacent to agricultural lands in the plan area and extended plan area. Agricultural lands generally have a low potential for special-status plant species, animal species, and habitat because they are actively managed, modified, and disturbed regularly for agricultural activities. Agricultural groundwater wells have a relatively small footprint (e.g., less than 1/4 of an acre) so the wells could be located to avoid special-status plant species, animal species, or habitat if needed. Therefore, there is a low potential for construction and operation of new agricultural groundwater wells to result in a conflict with local policies or ordinances protecting biological resources, or adopted habitat conservation plans or natural community conservation plans. Table 16-38 lists potential mitigation measures that lead agencies (e.g., irrigation districts) can and should implement in the unlikely circumstance that special-status biological resources and habitat are present within a proposed groundwater well site. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the relatively small footprint of disturbance and relatively short term duration of construction. • It is expected that construction and operation of new municipal groundwater wells in the plan area and extended plan area would be in urban and suburban areas close to existing municipal water supply systems (e.g., wells, distribution pipelines and infrastructure, and water supply treatment facilities). These areas are expected to have a low potential for special-status biological resources and habitat (including federally protected wetlands) to occur because these areas are typically developed with impervious surfaces that generally do not support the required habitat. However, any vegetated areas disturbed during construction would be revegetated, as necessary, to avoid

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	impacts on biological resources. Further, because municipal groundwater wells would have a relatively small footprint (e.g., between 1/4 and 1 acre), it is expected the wells could be located to avoid sensitive biological resources and habitats, if needed. Therefore, there is a low potential for construction and operation of new municipal groundwater wells to conflict with local policies or ordinances protecting biological resources, or adopted habitat conservation plans or natural community conservation plans. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipal water purveyors) can and should implement, in the unlikely circumstance special-status biological resources and habitat are present, to reduce potentially significant environmental effects on special-status biological resources and habitat. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the relatively small footprint of disturbance and the potential ability to avoid sensitive biological resources.
Cultural Resources	• Construction of agricultural and municipal groundwater wells would result in ground-disturbing activities. Ground-disturbing activities have the potential to affect significant unknown cultural resources (significant historical, archeological, or paleontological resources) if they exist at the groundwater well site. • Construction and operation of new agricultural groundwater wells in the plan area and extended plan area would likely be located in existing agricultural lands or adjacent to active agricultural lands. Active agricultural lands are regularly disturbed and are considered permanently disturbed after a period of time. Therefore, construction of agricultural groundwater wells would have a low potential to have existing unknown significant cultural resources. Operation of agricultural groundwater wells has a very low potential to affect cultural resources because the wells would only be pumping groundwater. Impacts would be less than significant. • Construction and operation of new municipal groundwater wells in the plan area and extended plan area would likely exist in urban and suburban areas adjacent or within close proximity to existing water supply infrastructure. While it is unknown if cultural resources exist, urban and suburban areas are likely previously disturbed, reducing the potential for significant unknown cultural resources to exist. Impacts would be less than significant. • Operation of municipal groundwater wells has a very low potential to affect cultural resources because the wells would only be pumping groundwater to the potable water distribution systems. Impacts would be less than significant. • As described above, it is expected the new groundwater well sites would be previously disturbed. The depth of sediment disturbance generally would be minimal (e.g., less than 5 ft), with the exception of the exact location of each well, which could disturb sediment up to the depth of the well (e.g., 35–400 ft). Therefore, it is highly unlikely that human remains, typically buried at depths of 6 ft, would be disturbed during construction. If human remains are uncovered during construction, compliance with the State Health and Safety Code would be required. As specified by Section 7050.5 of the Health and Safety Code, and described in Table 16-38, no further disturbance would occur until the county coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If the coroner recognizes the remains to be Native American, he or she would contact the Native

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	American Heritage Commission (NAHC), which would appoint the Most Likely Descendent. Additionally, if the human remains are determined to be Native American, a plan would be developed regarding the treatment of human remains and associated burial objects, and the plan shall be implemented under the direction of the Most Likely Descendent. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because of the relatively small footprint of disturbance and the low potential for human remains to exist.
Geology and Soils	• It is assumed that placement of any new groundwater wells would be done such that the following would be avoided: areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. Any new facilities would be constructed using the latest geotechnical information for the site-specific conditions. Operation of agricultural or municipal groundwater wells would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, soil erosion, loss of topsoil, or landslides. Further, changing the volume of groundwater pumped would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Construction of agricultural or municipal groundwater wells would result in limited ground-disturbing activities that could cause soil erosion or loss of topsoil; however, ground-disturbing activities would be limited in duration and geography. Ground-disturbing activities on 1 acre or greater would require preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP), as required by the Central Valley Regional Water Quality Control Board (Central Valley Water Board). The SWPPP would require soil and erosion control mechanisms. Table 16-38 includes potential mitigation measures that lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement to reduce potentially significant impacts on geologic resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the need to comply with existing storm water pollution and control regulations and the relatively small area of disturbance. • The construction and operation of new agricultural or municipal groundwater wells would not involve constructing or operating septic tanks and, therefore, septic tanks would not be affected by soils incapable of supporting the use of them or other alternative wastewater disposal systems. Impacts would not occur.
Greenhouse Gas Emissions	• Construction of new agricultural and municipal groundwater wells would result in increased GHG emissions because heavy equipment would be used. Similarly, operation of new agricultural and municipal groundwater wells would result in increased use of electricity and fossil fuels for pumping groundwater and for the routine transport of chemicals for those wells requiring a disinfection system (i.e., municipal wells), and, therefore, operations would result in an increase in GHG emissions. The potential increase in GHG emissions could be potentially offset by reductions in surface water diversions that often require the use of electric or fuel pumps to lift water into canals. MCAPCD has established a threshold of significance for carbon dioxide (CO_2) and methane (CH_4) at 500 tons per year. These thresholds of significance are for the operational phase only, as no construction-period thresholds have

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	been established. Although the *Tuolumne County Regional Blueprint Greenhouse Gas Study* (Tuolumne County 2012) identified a project-level greenhouse gas (GHG) emissions threshold of 4.6 metric ton carbon dioxide equivalent (MT CO_2e) per service population (the sum of the number of jobs and the number of residents provided by a project), the threshold is not applicable to the LSJR alternatives because they are not typical of a land use project with associated jobs and residents. Although the SJVAPCD has not established construction-related GHG thresholds, they have identified a level of GHG emissions per year (230 MT CO_2e) below which project-specific increases in GHG emissions would be considered equivalent to zero for CEQA purposes. This amount, known as a zero equivalency level (ZEL), can be used to evaluate construction emissions when they are amortized over a project's anticipated operational lifespan. A project using a 30-year operational lifespan would be considered significant if total construction emissions would exceed 6,900 MT CO_2e (230 MT CO_2e/year* 30 years = 6,900 MT CO_2e), while a project using a 50-year operational lifespan would be considered significant if total construction emissions would exceed 11,500 MT CO_2e (230 MT CO_2e/year * 50 years = 11,500 MT CO_2e). If wellhead treatment was required and depending on the type of treatment and what the water is being treated for, additional energy may be required beyond just pumping requirements. It is possible that substituting surface water with groundwater could result in a potentially significant GHG impact beyond the SJVAPCD ZEL, although the extent to which is unknown. For air districts in which there is no adopted GHG threshold (e.g., CCAPCD), the ZEL for SJVAPCD could be applied. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipal water purveyors) can and should implement to reduce potentially significant impacts related to construction and operation activities and GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted Assembly Bill 32, the California Global Warming Solutions Act of 2006 (AB 32). AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the California Air Resources Board (ARB) is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs • AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions

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	associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Hazards and Hazardous Materials	• Construction activities associated with installing agricultural or municipal groundwater wells would be short term in nature and may involve limited transport, storage, use, and disposal of small quantities of hazardous materials such as fuel and lubricating grease for motorized heavy equipment. Some examples of typical hazardous materials handling are fueling and servicing construction equipment on the site, and transporting fuels, lubricating fluids, solvents, and bonding adhesives. These types of materials are not acutely hazardous, and storage, handling, and disposal of these materials are regulated by local, county, and state laws. Further, the quantities of these materials used during construction would be limited (e.g., less than 100 gallons) because of the short construction timeline. If a hazardous material spill occurred, it could be contained. Table 16-38 lists potential mitigation measures that lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement to reduce potentially significant impacts related to construction activities and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the relatively amount of materials to be used, handled or transported and the short duration of use over the course of construction. • The location of where new agricultural and municipal groundwater wells would be sited is not yet known; however, construction could be located within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. As such, if a school existed within close proximity to construction of new agricultural and municipal groundwater wells, those mitigation measures identified table 16-38 applied to project-specific construction needs would reduce potentially significant impacts during construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • Lists of hazardous materials site are compiled by different state agencies under Government Code, § 65962. These sites are also known as Cortese Sites. There were no sites identified on the Hazardous Waste and Substance Site List compiled into the EnviroStor online database managed by the Department of Toxic Substances Control (DTSC) for Alpine, Calaveras, Tuolumne, or Mariposa Counties (CalEPA 2016). There were a total of 19 sites identified for Madera, Merced, San Joaquin, and Stanislaus Counties. In addition to these sites identified by the EnviroStor database, CalEPA also identifies leaking underground storage tank sites, sites that have received cease and desist

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	orders (CDOs) or clean up abatement orders (CAOs), and hazardous waste facilities where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action for these counties (CalEPA 2016). There are approximately 520 leaking underground storage tanks designated as open in these counties (CalEPA 2016). There are approximately 60 facilities in these counties that have received CDOs/CAOs not identified as non-hazardous wastes, domestic wastewater, or domestic sewage (CalEPA 2016). The active and open leaking underground storage tank cases and the CDO/CAO facilities are located throughout these counties. Although it is not yet known where the new agricultural and municipal groundwater wells would be constructed, it is reasonable to assume that groundwater and soil would be tested prior to drilling, given the groundwater would ultimately be used. Thus if soil or groundwater contamination was present the well site would be relocated or modified (i.e., potential wellhead treatment). It is also reasonable to assume these Cortese List sites would not be selected as project sites given that drilling and excavation would be required for well installation and that groundwater could potentially be contaminated. However, if a new agricultural or municipal groundwater well were constructed and operated on a Cortese Site there would be potential for release of existing soil contaminants into soil or groundwater and surface water depending on the type of contaminant and its location, and to other proximal land areas due to ground disturbance during construction, and to water use during operation, of the wells. Were this to occur, impacts would be significant. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. Operation of new agricultural wells would likely not use hazardous materials because agricultural well water does not need to be treated or meet drinking water quality standards. Impacts would not occur. • Operation of new municipal groundwater wells could use a disinfection system, which could require the routine transport, use, storage, and disposal of hazardous materials, such as chlorine gas, sodium hypochlorite, or ammonia. Depending on the location of the new municipal groundwater wells, these materials could be used within 1/4 mile of a school because municipal groundwater wells would likely be within urban and suburban areas to serve existing water users. These materials are commonly used by water purveyors to disinfect groundwater prior to release in the distribution system and comply with safe drinking water standards. Chlorine gas is a non-flammable, non-explosive, and non-combustible gas. However, chlorine gas can form explosive compounds with other chemicals such as ammonia. Chlorine gas exposure can cause severe skin, eye, and lung tissue burns (ATSDR 2016). Sodium hypochlorite (solution of 12.5 percent) is a non-flammable, non-explosive, and non-combustible liquid that can cause skin and eye irritation or burns (HASA MSDS 2011). It is unlikely to be inhaled and is not typically anticipated to be ingested; however, vapor may cause irritation to the upper respiratory tract if inhaled (HASA MSDS 2011). It is not listed by the Occupational Safety and Health Administration (OSHA) as a carcinogen (HASA MSDS 2011). Ammonia (solution of 29 percent) is a non-combustible, non-explosive, and non-flammable liquid (MSDS 2011).

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However, ammonia vapors are released if the chemical is heated (MSDS 2011). Primary potential routes of entry to humans are dermal (skin) contact and respiratory (breathing). Ammonia vapors are known to be a strong irritant to the eyes, skin, and respiratory tract (MSDS 2011). Generally, municipal wells that use these types of chemicals (i.e., sodium hypochlorite and ammonia) have double containment systems and are located in a spill containment area as required by local fire departments for the management and handling of these types of chemicals. Chlorine gas would be used and stored in accordance with applicable local, county, and state regulations and laws. Further, they would likely be in a locked building, and the water purveyors would be expected to conduct regularly scheduled inspection and maintenance of disinfection systems as they currently do on other municipal wells. Because of these precautionary design features, it is highly unlikely a spill of the sodium hypochlorite or ammonia would occur. However, in the unlikely event of a spill, the primary hazard to humans would be direct contact with skin and respiratory irritation as it currently is with the existing disinfection system. Operation of a new municipal groundwater well could also require onsite treatment and removal of water pollutants (e.g., arsenic), which could also require transportation and potentially disposal of hazardous waste. Disposal of any hazardous waste would be in accordance with applicable federal, state, and local laws and regulations at approved facilities. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipal water purveyors) can and should implement to reduce potentially significant impacts related to operational activities and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.

- The U.S. Department of Transportation (USDOT), the Federal Highway Administration, and the Federal Railroad Administration are the three entities that regulate the transport of hazardous materials at the federal level. The Hazardous Materials Transportation Act governs the transportation of hazardous materials. The regulations under this act are promulgated by the USDOT and enforced by the U.S. Environmental Protection Agency (USEPA). Therefore, all hazardous material deliveries would be tracked, and vehicles would be required to use roadways approved for the transportation of hazardous materials. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipal water purveyors) can and should implement to reduce potentially significant impacts related to operational activities and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.
- As specified in California Code of Regulations, title 19, division 2, chapter 4.5 (California Accidental Release Prevention [CalARP] Program Detailed Analysis), all businesses that handle specific quantities of hazardous materials are required to prepare a California Accidental Release Prevention Program Risk Management Plan (CalARP RMP). The CalARP RMP is the state equivalent of the federal RMP. CalARP RMPs include the preparation of an offsite consequence analysis of worst-case release of the stored chemicals and the preparation of emergency response plans, including coordination with local emergency response agencies. CalARP RMPs are required to be updated at least every 5 years and when there are significant changes to the stored chemicals. Additionally, water

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	purveyors using these types of chemicals for their disinfection systems would be subject to the Hazardous Materials Release Response Plans and Inventory Act (also known as the Business Plan Act), which requires an entity or business using hazardous materials to prepare a business plan describing the facility, inventory, emergency response plans, and training programs. These plans must be submitted to the local Certified Unified Program Agency (CUPA) (e.g., San Joaquin County, Stanislaus County, Merced County, or local fire departments). Water purveyors must also comply with the CalARP Program and prepare an RMP, if required. The RMP is a detailed analysis of the potential accident factors and mitigation measures that can be implemented to reduce accident potential. The RMP may include items such as safety information, hazard review, operating procedures, emergency response plan, training requirements, and compliance audits. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipal water purveyors) can and should implement to reduce potentially significant impacts related to operational activities and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • It is unlikely that a well for potable water purposes would be drilled on a hazardous materials site. Prior to drilling the well, the lead agency (e.g., municipal water purveyors) would need to conduct subsurface studies to determine the site suitability and test the soil and groundwater for contamination. Impacts would be less than significant. • Construction and operation of new agricultural or municipal groundwater wells would not be a hazard or cause safety concerns to public or public use airports or private airstrips due to the low profile of the wells. As such, construction and operation of new agricultural or municipal groundwater wells would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Construction and operation of new agricultural or municipal groundwater wells would not physically interfere with an adopted emergency response plan or emergency evacuation plan because they would not be located within roadways. Impacts would not occur. • Construction and operation of new agricultural or municipal groundwater wells would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur.
Hydrology and Water Quality	• Construction of agricultural or municipal groundwater wells could result in temporary changes to storm water drainage, the existing drainage pattern of the site, erosion, or runoff associated with typical construction activities, such as grading or preparation of land. Operation of new agricultural or municipal groundwater wells would likely not create or contribute runoff water that would increase the capacity of existing or planned storm water drainage systems, modify existing drainage patterns, increase erosion, or increase runoff because the wells would likely not result in substantial increases in impervious surfaces (e.g., concrete pads), which are typically associated with modification of drainages, erosion, and runoff. As discussed in the Geology and Soils section of this table, water purveyors would be required to prepare and implement a SWPPP for disturbed areas of over 1 acre. In addition, as discussed in this table for Hazards and Hazardous Materials, construction of new agricultural

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	and municipal groundwater wells may involve the limited transport, storage, use, and disposal of hazardous materials, which, if spilled, could have adverse effects on water quality depending on the location and magnitude of the spill. However, storage, handling, and disposal of these materials is regulated by local, county, and state laws, and the quantities of these materials used during construction would be small (e.g., less than 100 gallons) and construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained and, as such, violations of water quality standards are not expected to occur. Table 16-38 lists potential mitigation measures that lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the relatively small area of disturbance and the short duration of construction. • The location of all new agricultural and municipal groundwater wells are as yet unknown. However, if the wells were located within a 100-year flood hazard area, the wells and any structure protecting the wells would have a low potential to impede or redirect flood flows given that these structures would be relatively low profile. Further, construction and operation of new agricultural and municipal wells would not affect housing and therefore would not place housing within a 100-year flood hazard area. Construction of agricultural and municipal wells would not result in flooding or otherwise cause flooding. Impacts would not occur. • New agricultural and municipal wells would not substantially increase the number of people exposed to the risk of flooding because they would not draw people to flood hazard locations. As such, construction and operation of new wells would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Well construction is regulated by DWR (DWR 2012). The legislature authorized the establishment of well standards (DWR Bulletins 74–81 and 74–90) and regulations pertaining to the construction, alteration, and destruction of wells. Water Code Section 13750.5 requires that those responsible for the construction, alteration, or destruction of water wells, cathodic protection wells, groundwater monitoring wells, or geothermal heat exchange wells possess a C-57 Water Well Contractor's License. This license is issued by the Contractors State License Board. Water Code Section 13751 requires that anyone who constructs, alters, or destroys a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well must file with DWR a report of completion within 60 days of the completion of the work. Further, most counties and some cities have adopted ordinances to protect groundwater quality (e.g., where groundwater wells would likely be drilled in San Joaquin, Stanislaus, and Merced Counties). These ordinances require permits to be issued before a well can be drilled or modified. Thus, adequate well drilling procedures are established to avoid cross connections between aquifers. Avoiding aquifer cross connection ensures the wells and the aquifers are appropriately protected and do not result in groundwater contamination. Impacts would be less than significant.

Potential Environmental Effects of Substituting Surface Water with Groundwater	
Resource	Discussion
	• Construction new agricultural and municipal groundwater wells would not result in a substantial depletion of groundwater supply because construction activities would not use substantial amounts of water. Impacts would not occur. • Construction of a single well only requires the water used by the drilling equipment and the water to test the well and pump prior to operation (DWR 2012). Impacts would be less than significant. • The State Water Board's Division of Drinking Water (DDW) regulates drinking water supplies in the state of California, including municipal groundwater wells. Drinking water related statutes are from the Education Code, Food and Agricultural Code, Government Code, Health and Safety Code, Public Resources Code, and Water Code. Regulations are from Title 17 and Title 22 of the California Code of Regulations. The DDW permits all water purveyors in the state with water supply permits. Therefore, municipal wells are not expected to result in a reduction or change in water quality, and would not violate water quality standards. Impacts would be less than significant. • Groundwater wells are not typically located on the side of steep slopes. New agricultural or municipal groundwater wells would likely be located in flat areas. Therefore, the locations would not support mudflows, which typically need steep slopes and large amounts of precipitation to occur. Additionally, the wells would not be adjacent to the ocean and would not be affected by tsunamis. Impacts would be less than significant. • Increases in localized groundwater pumping could occur if municipal or agricultural providers pump groundwater instead of performing some other indirect action (e.g., developing recycled water sources or reducing demand). However, increases in localized groundwater pumping could result in similar impacts on groundwater and geologic resources to those broadly discussed by groundwater subbasin in Chapter 9, *Groundwater Resources*. Table 16-38 lists potential mitigation measures that lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Operation of new agricultural and municipal groundwater wells would not need the construction of additional storm water drains because the amount of impervious surfaces that could generate storm water runoff is anticipated to be very small. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction of new agricultural and municipal groundwater wells is not expected to occur in close proximity to a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of new agricultural or municipal groundwater wells could result in a substantial degradation of water quality.

Potential Environmental Effects of Substituting Surface Water with Groundwater	
Resource	Discussion
Land Use and Planning	• Construction and operation of new agricultural or municipal groundwater wells would not physically divide an established community because wells and well fields are generally relatively small in scale (e.g., less than 1 acre) and would likely be located in existing available and open land (e.g., existing agricultural lands or land not being used for homes). Impacts would be less than significant. • Agricultural and municipal infrastructure, such as groundwater wells, are typically allowed in different land use designations (e.g., public facilities, residential, industrial) and different zoning designations. If the groundwater wells were inconsistent with applicable land use plans, policies, or regulations, an amendment or variant from the local jurisdiction approving the discretionary action associated with the groundwater wells would be required prior to approval and construction of the well. If no discretionary actions occur as a result of the construction or operation of new groundwater wells, then it is assumed those wells would not result in a conflict with local land use plans, policies, or regulations. Impacts would be less than significant. • Potential conflicts with applicable habitat conservation plans or natural community conservation plans, or other plans, policies and regulations protecting biological species and resources are evaluated in the Biological Resources section of this table.
Mineral Resources	• Construction and operation of new agricultural or municipal groundwater wells would have a very low potential to result in the removal or inability to access state or locally designated mineral resource areas in the plan area and extended plan area. This is because the groundwater well sites would be relatively small, and they are expected to be located either within or in close proximity to agricultural lands or within urban and suburban areas. If the groundwater wells are located within a state or locally designated mineral resource area, the drilling and operation of a groundwater well would not permanently remove access to a mineral resource as there would be other locations around the groundwater well that could provide access to the mineral resource.
Noise	• Construction of agricultural groundwater wells could generate temporary noise. There is low probability that sensitive receptors (e.g., residential homes, hospitals, schools) would be located within close proximity to experience the temporary noise generated by the drilling of a groundwater well because these wells would be constructed either within agricultural lands or immediately adjacent to the lands. Construction of these wells would not result in ground-borne vibrations because vibrations are typically associated with pile driving or heavy industrial processes, and construction of groundwater wells do not require these types of activities. Impacts would be less than significant. • Construction of municipal groundwater wells could generate temporary noise. It is likely new municipal wells would be drilled in areas with suitable land use designations and zoning for infrastructure (e.g., agriculture or public facilities). However, the location of any new well would be speculative and sensitive receptors to noise (e.g., residential homes, hospitals) maybe located within proximity. As such, construction activities could temporarily expose people to noise levels in excess of standards established the local general plan, noise ordinance, or applicable standards of other agencies. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipal water purveyors) can and should implement to reduce potentially significant impacts related to noise during construction. Until such time that these potential mitigation measures are implemented, the impacts would

Potential Environmental Effects of Substituting Surface Water with Groundwater	
Resource	Discussion
	remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, depending on the location of potential sensitive receptors because of the relatively short duration of construction. • The operation of agricultural or municipal groundwater wells may generate temporary noise when the groundwater well is pumping. However, the wells do not pump continuously. It is anticipated there would be low probability that sensitive receptors (e.g., residential homes, hospitals, schools) would be located within close proximity to experience the temporary operating noise generated. Municipal groundwater wells are often enclosed in some type of small low-profile structure or enclosed by a fence that would reduce the temporary operating noise of the well. However, the location of any new agricultural or municipal well would be speculative and it may be located near receptors sensitive to noise (e.g., residential homes, hospitals, schools, parks). Table 16-38 lists potential mitigation measures that lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement to reduce potentially significant impacts related to noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented during operation depending on the potential location of possible sensitive receptors. • The construction and operation of new agricultural or municipal groundwater wells would not bring people within close proximity to an airport or expose people to airport noise. Impacts would not occur.
Population and Housing	• The construction and operation of new agricultural or municipal groundwater wells would not involve the construction of new homes or businesses, extension of roads, or other actions that may induce substantial property growth in an area. Construction and operation of new agricultural or municipal groundwater wells would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people to the plan area and extended plan area. Finally, new groundwater wells would be constructed and operated to replace a water source that was reduced (e.g., surface water) rather than increasing capacity to serve new water supply users. Impacts would be less than significant. • The construction and operation of new agricultural or municipal groundwater wells would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere because the wells would be located in relatively small, isolated areas. New groundwater wells are likely be located on existing vacant land (e.g., within or in close proximity to agricultural lands or within or adjacent to existing drinking water supply infrastructure). Impacts would be less than significant.

Potential Environmental Effects of Substituting Surface Water with Groundwater	
Resource	Discussion
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, the construction and operation of new agricultural or municipal groundwater wells would not involve an increase in population or housing in the plan area and extended plan area. In addition, new agricultural or municipal groundwater well projects would not include proposals for new housing or increase demands for school services or facilities. Impacts would not occur.
Recreation	• Recreational facilities are not typically located in agricultural fields, and the construction and operation of an agricultural groundwater well would not result in impacts on recreational facilities. In addition, construction and operation of new agricultural wells would not lead to the construction or expansion of recreational facilities in the plan area and extended plan area, which might have an adverse physical effect on the environment. Impacts would not occur. • New municipal groundwater wells would likely be located within close proximity to existing municipal wells or existing municipal distribution systems so that potable water can be distributed. If recreational facilities were located within very close proximity to the construction location, construction of municipal wells may affect the recreational facilities (e.g., construction noise, dust). However, it is expected that construction would be limited in duration (e.g., less than 3 months) and space because municipal wells typically have small dimensions. Construction and operation of new municipal groundwater wells would not increase the use of existing parks or recreational facilities in the plan area and extended plan area, and would not result in the construction of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Construction of new agricultural or municipal groundwater wells could result in additional trips associated with construction workers. Agricultural groundwater wells would likely be located within or adjacent to agricultural lands and generally these areas do not experience traffic congestion. New municipal groundwater wells may be located in urban and suburban areas within the plan area and extended plan area that could already experience some traffic congestion. However, the temporary increased traffic during construction would have a low potential of exceeding level of service standards on roadways because of the relatively few trips anticipated and the relatively short construction time. Table 16-38 lists potential mitigation measures that lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement to reduce potentially significant transportation and traffic impacts related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented during construction given the temporary nature of construction and the low potential for exceeding level of service standards. • Construction and operation of new agricultural or municipal groundwater wells would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.

Potential Environmental Effects of Substituting Surface Water with Groundwater	
Resource	Discussion
	• Operation of new agricultural groundwater wells would not generate additional trips beyond those required to maintain and farm the active agricultural lands. Municipal groundwater wells may generate maintenance trips, but it is likely they would not be a substantial addition to the trips already being incurred by the road system by water purveyors who maintain existing wells. Impacts would be less than significant.
Utilities and Service Systems	• Construction and operation of new agricultural or municipal groundwater wells in the plan area and extended plan area would not affect the ability to meet the wastewater treatment requirements of the Central Valley Water Board because the wells would not involve the discharge of recycled water from a wastewater treatment plant (WWTP). Additionally, because a well does not generate wastewater, it would not affect the treatment capacity of an existing WWTP. Impacts would not occur. • Construction and operation of new agricultural or municipal groundwater wells could involve the construction of water treatment facilities in the form of wellhead treatment at municipal wells. Environmental effects associated with onsite treatment facilities are discussed in this table for all resources (i.e., Aesthetics through Transportation and Traffic). Table 16-38 lists potential mitigation measures that lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement to reduce potentially significant construction or operation impacts on all environmental resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Construction and operation of new agricultural or municipal groundwater wells would not need the construction of additional storm water drains because the amount of impervious surfaces that could generate storm water runoff is anticipated to be very small. Impacts would be less than significant. • Construction and operation of new agricultural or municipal groundwater wells would not need new entitlements for water supply. Impacts would not occur. • The construction and operation of new agricultural or municipal groundwater wells in the plan area and extended plan area is not expected to generate substantial volumes of solid waste and would be required comply with all state requirements regulating solid waste. Impacts would be less than significant.

16.2.3 Aquifer Storage and Recovery

Reductions in surface water diversions are expected as a result of approving an LSJR alternative and the program of implementation. A reasonably foreseeable method to augment a water supply system is to store water in an aquifer for later use. Aquifer storage and recovery is the process of storing surface water in a groundwater basin so it is available later for extraction and beneficial use. This process augments groundwater basins by allowing storage of any excess available surface water so it can be used later when it would otherwise be unavailable. Typical storage components are gravity recharge basins or injection wells that move water under pressure from the surface to an underground aquifer. Typical water extraction components are wells that pump groundwater from the aquifer and send the water to an existing treatment plant or directly into a distribution system for beneficial use. Aquifer storage and recovery may also be a source of water for underground storage and surface water diverted under a specific basis of right. The costs and potential environmental impacts associated with obtaining more water from aquifer storage and recovery are evaluated below.

Cost Evaluation

Table 16-8, *Groundwater Recharge Projects Funded by the California Department of Water Resources Integrated Regional Water Management Implementation Grant Program, Phase 1*, identifies recently funded groundwater recharge projects. These projects are from the IRWM. The costs identified in Table 16-8 include planning, design, permitting, land acquisition/rights of way, construction, and administrative costs in 2009 dollars for the Consolidated Irrigation District's South and Highland Basin Project (DWR n.d.).

Table 16-8. Groundwater Recharge Projects Funded by the California Department of Water Resources Integrated Regional Water Management Implementation Grant Program, Phase 1

Applicant	Project	Project Cost	Operations & Maintenance Budget ($/year)	Production (AF/y)	20-Year Amortized Cost ($/AF/y)
Joshua Basin Water District	Joshua Basin Water District Recharge Basin and Pipeline	$8,028,000	$75,000	2,000	$238
Consolidated Irrigation District	South and Highland Basin Project	$4,627,000	$164,500	2,500	$158

Sources: Mojave Water Agency 2010; DWR n.d.

AF/y = acre-feet per year.

Environmental Evaluation

Summary of Potential Action

A standard aquifer storage and recovery approach could utilize existing irrigation canals and existing agricultural fields (primarily during the off-irrigation season of October–March, when the canals and fields have capacity) to release an unspecified volume of water such that it would percolate through the unlined canals and soil in the fields to recharge the groundwater. It is expected there would be no construction associated with this type of aquifer storage approach because existing canals and agricultural fields are suitable for allowing water to percolate into the ground and existing groundwater wells would be suitable for extraction. Excess surface water would be used to recharge the aquifer in certain months or water year types. It is anticipated that this type of standard aquifer storage and recovery approach could be instituted by agreements between irrigation districts and their members who privately own agricultural land or irrigation districts, members who own agricultural land, and local governments, local water purveyors, or groundwater management districts. Depending on the water users, their agreements, the surface water that is diverted, a particular users' right to store water would influence their ability to do so.

Another aquifer storage and recovery approach also could be established using active groundwater recharge with storage components, such as wells that move water under pressure from the surface to an underground aquifer, and extraction components, such as wells that pump groundwater from the aquifer and send the water to an existing treatment plant or directly into a distribution system for beneficial use. Assuming active groundwater recharge is used, the activities and infrastructure associated with an aquifer storage and recovery program would be similar to the activities described in Section 16.2.2, *Substitution of Surface Water with Groundwater*. Although aquifer storage projects sometimes include infiltration basins specifically designed and constructed to facilitate rapid infiltration to underground storage, constructing infiltration basins would likely remove agricultural land from production. Therefore, this is not anticipated to occur and the environmental effects of constructing infiltration basins are not analyzed.

Summary of Potential Environmental Effects

Development of a more standard aquifer storage and recovery program would reduce changes in groundwater levels and new facilities required to recover the stored water are not anticipated. Potential environmental effects associated with the development of a standard aquifer storage and recovery approach in the plan area and extended plan area are described in Table 16-9, *Potential Environmental Effects of Aquifer Storage and Recovery*. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, at the end of this chapter, lists potential mitigation measures associated with the development of this action and is referenced in Table 16-9 below where appropriate.

Development of an active groundwater recharge approach would result in impacts similar to those identified in Section 16.2.2, *Substitution of Surface Water with Groundwater*, and Table 16-7, *Potential Environmental Effects of Substituting Surface Water with Groundwater*. This is because active groundwater recharge could require the construction and operation of groundwater wells and distribution pipeline, resulting in similar environmental effects as those described in Table 16-7 for the construction and operation of municipal groundwater wells. Impacts associated with developing wells to facilitate aquifer storage and recovery are identified in Table 16-7 and are not incorporated into Table 16-9, *Potential Environmental Effects of Aquifer Storage and Recovery*.

Table 16-9. Potential Environmental Effects of Aquifer Storage and Recovery

Potential Environmental Effects of Aquifer Storage and Recovery	
Resource	Discussion
Aesthetics	• Aquifer storage would not necessarily involve physical alteration of existing agricultural lands or canals in the plan area and extended plan area. Aquifer storage could change the volume of water in canals and on agricultural lands during the winter season. This would not represent a substantial degradation to the visual character or quality of agricultural lands because viewers are frequently subjected to change under active agricultural practices. Aquifer storage and recovery is not anticipated to involve lights or glare. Impacts would not occur.
Agriculture and Forestry Resources	• Aquifer storage would involve adding water to canals or flooding agricultural lands (potentially including Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) in the plan area in the winter months. There are limited agricultural resources in the extended plan area and no designated Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The agricultural lands are already used for agricultural purposes. Using agricultural lands for groundwater recharge during the winter would not modify its agricultural purpose during the irrigation season (generally April–September). Additionally, the groundwater recharge would support agricultural use because stored water could be pumped from the aquifer to irrigate agricultural fields. Impacts would be less than significant. • Aquifer storage would likely occur on agricultural lands and not on land zoned for forest land or timberland, because those lands wouldn't be particularly suited to support aquifer storage and recovery. Therefore, aquifer storage would not be expected to result in conflicts with existing zoning for, or cause rezoning of, forest land or timberland, or result in the loss of forest land or conversion of forest land to non-forest use. Impacts would not occur.
Air Quality	• Aquifer storage and recovery is not expected to affect air quality because aquifer storage would not include activities (e.g., construction activities) that generate air quality emissions. Changing the timing and/or volume of water in existing canals and agricultural fields would not have the potential to generate air quality emissions. While there may be some energy required as part of lift pumps and stations, the additional energy would not be beyond what is currently experienced when operating the canals. Impacts would be less than significant. • The various APCDs have determined some common types of facilities that have been known to produce odors in the region. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants. Construction and operation of an aquifer storage and recovery project would not involve the type of facility identified by, for example, SJVAPCD, as a known odor source (SJVAPCD 2002). Consequently, it is expected aquifer storage and recovery would not create objectionable odors affecting a substantial number of people. Impacts would not occur. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean aquifer storage and recovery would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions

Potential Environmental Effects of Aquifer Storage and Recovery	
Resource	Discussion
	budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. Aquifer storage and recovery would not result in growth because it would be operated to replace a water source that was reduced (e.g., surface water) rather than to increase capacity to serve new water supply users. Aquifer storage and recovery would not result in population or employment growth that would result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Accordingly, this impact is less than significant.
Biological Resources	• Aquifer storage would likely occur during wet years when there is extra water and during the winter when fish spawning is generally not occurring. Therefore, aquifer storage is not anticipated to affect special-status fish species or their habitat or the migration of such species. Aquifer storage is not anticipated to conflict with local policies or ordinances in the plan area and extended plan area protecting special-status fish species, adopted habitat conservation plans, or natural community conservation plans. Impacts would be less than significant.
	• An aquifer storage and recovery project is expected to flood agricultural lands in the plan area and extended plan area that might not otherwise be flooded during certain times of year (e.g., nonagricultural seasons, such as winter). Additionally, it could use existing canals that have additional capacity during the irrigation season, typically April–September. Agricultural lands generally have a low potential for special-status plant species, animal species, and habitat (including federally protected wetlands) because they are actively managed and are modified and disturbed regularly by agricultural activities. Further, flooding agricultural fields during the nonagricultural seasons may provide habitat to bird species migrating during this time period. Therefore, aquifer storage is not anticipated to conflict with local policies or ordinances protecting biological resources or conflict with an adopted habitat conservation plan or natural community conservation plan. Impacts would be less than significant.
Cultural Resources	• Aquifer storage and recovery would require no construction or ground disturbance. Aquifer storage and recovery would use existing canals and fields to allow surface water to percolate into the ground and recharge existing groundwater basins. This recharge method is expected to change the volume of water in existing irrigation canals and fields. There is a low potential for cultural resources (significant historical, archeological, or paleontological resources) to exist in these locations due to excessive and regular disturbance of land in the agricultural fields and due to the primary use of the canals to convey irrigation water. Impacts would be less than significant. • Since aquifer storage and recovery would have no ground-disturbing activities, it would not result in disturbance of unknown or known human remains. Impacts would not occur.

Potential Environmental Effects of Aquifer Storage and Recovery	
Resource	Discussion
Geology and Soils	• Changing the volume of water in a canal or on agricultural land in the plan area and extended plan area would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, unstable geologic units, expansive soils, or landslides. Additionally, changing the volume of water in a canal or on agricultural land would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur. • To allow surface water to percolate into the aquifer, the additional water must be kept in the canals and agricultural fields. Surface water flows that could result in soil erosion would not be released into the canals or agricultural fields, and the water released would be of an appropriate volume and timing to allow for groundwater recharge. Therefore, water erosion and runoff is unlikely to occur. Impacts would not occur. • Aquifer storage and recovery would not involve constructing or operating septic tanks. Further, aquifer storage and recovery projects would be planned away from existing septic tanks so that they would not be affected by soils incapable of supporting their use or other alternative wastewater disposal systems. Impacts would not occur.
Greenhouse Gas Emissions	• It is not expected that aquifer storage and recovery would generate GHG emissions because it would not involve physical changes (i.e., construction) and is not expected to result in activities that would generate GHGs. While there may be some energy required as part of lift pumps and stations, the additional energy would not be beyond what is currently required when operating the canals. Impacts would be less than significant.
Hazards and Hazardous Materials	• Aquifer storage and recovery would not involve transporting, using, or disposing of hazardous materials nor would it emit hazardous emissions because water and changing the volume of water in different areas is not considered hazardous. In addition, aquifer storage would not result in the reasonably foreseeable upset or accident conditions associated with hazardous materials. Impacts would not occur. • Aquifer storage and recovery has no potential to affect public or public use airports or private airstrips, or airport safety because it would not result in building structures near airports. Accordingly, aquifer storage and recovery would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Because hazardous materials, substances or waste would not be handled for implementation of aquifer storage and recovery, there would be no related impact on schools within one-quarter mile of where aquifer storage and recovery would occur. Impacts would not occur. • An aquifer storage and recovery project is expected to flood agricultural lands in the plan area and extended plan area. As such, given the location these projects would not occur on a hazardous materials site list compiled under Government Code Section 65962 (i.e., Cortese Site List). Impacts would not occur. • Aquifer storage and recovery would not involve building structures, construction of housing or an increase in population Therefore, there would be no wildland fire threat to people or structures from aquifer storage and recovery implementation.

Potential Environmental Effects of Aquifer Storage and Recovery	
Resource	Discussion
	• Canals and agricultural fields are located in areas that typically do not have emergency response plans or emergency evacuation plans. Therefore, aquifer storage and recovery would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Impacts would not occur.
Hydrology and Water Quality	• While aquifer storage could result in a change in drainage such that inundation of agricultural lands may occur more frequently, aquifer storage would likely not generate more runoff relative to existing conditions. Therefore this action would not result in the capacity of existing or planned storm water drainage systems being exceeded. Holding water for infiltration is designed such that agricultural lands hold the water so it can percolate into the groundwater basin. Water flow in canals and water volume in agricultural fields would be controlled to prevent runoff. Water quality standards would be maintained because any discharge would have to comply with the Central Valley Water Board's water quality requirements. Impacts would be less than significant. • Aquifer storage and recovery would not involve the construction or operation of new structures. Existing infrastructure would be used to release surface water during wet years into agricultural lands and canals. Surface water would be used to inundate agricultural lands otherwise unused and allowed to percolate without flooding other areas. Therefore, aquifer storage is not expected to result in flooding or result in a flood risk to people or structures. Impacts would be less than significant. • Aquifer storage and recover would not substantially increase the number of people exposed to the risk of flooding because they would not draw people to flood hazard locations. As such, aquifer storage and recovery would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Because aquifer storage and recovery would not involve the construction or operation of new structures, flood flows would not be impeded or redirected even if this action were to take place within a 100-year flood hazard area. In addition, aquifer storage and recovery would not affect housing and therefore would not place housing within a 100-year flood hazard area. Impacts would not occur. • Aquifer storage is intended to augment the water supply, and would result in an increase in groundwater recharge, which would be beneficial. Aquifer storage and recovery is not expected to result in increased groundwater pumping beyond the volume of water stored as a result of recharge. Impacts would be less than significant. • Aquifer storage would be located in areas of flat relief because active agricultural lands and canals are typically not located on the side of steep slopes. The locations would not be expected to support mudflows, which typically need very steep slopes and large amounts of precipitation to occur. Also, these areas would not be adjacent to the ocean or affected by tsunamis. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Aquifer storage and recovery is not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which aquifer storage and recovery could result in a substantial degradation of water quality.

Potential Environmental Effects of Aquifer Storage and Recovery	
Resource	Discussion
Land Use and Planning	• Aquifer storage and recovery is not expected to physically divide an established community because the canals and agricultural lands already exist. It is anticipated that aquifer storage and recovery would support agricultural land use and zoning designations as it would not remove agricultural land from production. If aquifer storage and recovery was inconsistent with local land use plans, policies, or regulations, and required a discretionary action by a local government agency, it would require an amendment or variant from the local jurisdiction prior to operation. Impacts would be less than significant. • Potential conflicts with applicable habitat conservation plans and natural community conservation plans, or other plans, policies and regulations protecting biological species and resources are evaluated in the Biological Resources section of this table.
Mineral Resources	• Aquifer storage would not result in the removal or inability to access state or locally designated mineral resource areas because aquifer storage would be located within existing canals and agricultural use areas. If existing canals and agricultural uses are located in a mineral resource area, the periodic flooding of agricultural lands would not permanently remove access to a mineral resource as there would be other locations and times of year that could provide access to the mineral resource. Impacts would be less than significant.
Noise	• Aquifer storage would require releasing surface water into existing canals to flood agricultural lands during the winter. This activity would not generate temporary or permanent noise or ground-borne vibrations. This activity would not bring people within close proximity to an airport or expose people to airport noise. Impacts would not occur.
Population and Housing	• Aquifer storage and recovery would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property growth in an area. Further, it would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people to the plan area and extended plan area. Finally, it would be operated to replace a water source that was reduced (e.g., surface water) rather than increasing capacity to serve new water supply users. Impacts would not occur. • Aquifer storage and recovery would not displace substantial numbers of people or existing housing or necessitate construction of replacement housing elsewhere because the change in volume of water (and timing of water release) would occur in existing canals and agricultural lands and not where people currently reside. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As population increases, the need for additional or new public services and public service facilities generally increases. Aquifer storage and recovery would not involve an increase in population or housing in the plan area and extended plan area. In addition, aquifer storage and recovery would not include proposals for new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.

Potential Environmental Effects of Aquifer Storage and Recovery	
Resource	Discussion
Recreation	• Recreational facilities are not typically located in agricultural fields. Aquifer storage under agricultural lands in the plan area and extended plan area would not result in impacts on recreational facilities. In addition, aquifer storage and recovery would not lead to the construction or expansion of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Aquifer storage and recovery would not require construction so the actions would not generate construction trips. Aquifer storage and recovery would also not require substantial number of operation and maintenance trips beyond those that may be currently conducted because existing canals and agricultural lands would be used. Impacts would be less than significant. • Aquifer storage and recovery would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Aquifer storage and recovery would not involve the need for utilities or service systems because it would not require the construction or operation of wastewater or water supply facilities. It would not result in the generation of solid waste and would not require a new water supply. Impacts would not occur.

16.2.4 Recycled Water Sources for Water Supply

Reductions in surface water diversions are expected as a result of approving an LSJR alternative and the respective program of implementation. To overcome potentially reduced water supplies, recycled water may be used by surface water users. Recycled water is wastewater treated to an acceptable water quality standard at a WWTP and then distributed for use. Typically, recycled water costs less than potable water because it does not need to be treated to the same water quality standards. For example, a farmer can purchase recycled water at a discount to irrigate alfalfa for a dairy instead of purchasing potable water or pumping groundwater. Thus less potable water would be used for irrigation and could be available for other beneficial uses (e.g., municipal uses). The costs and potential environmental impacts associated with obtaining water from recycled water sources are evaluated below.

Cost Evaluation

The complexity and cost of a recycled water project depends on many factors, such as the level of treatment at the WWTP, the desired water quality for the second beneficial use, the volume of recycled water needed, and the distance from where recycled water is treated to where recycled water is used. Some categories of recycled water projects are listed in detail below.

Landscape Irrigation

Recycled water could be used to offset potable water used to irrigate parks, commercial campus landscapes, ornamental ponds, golf courses, recreational sports fields, botanical gardens, and other spaces where humans will not have direct contact with recycled water. To construct a landscape irrigation project, a wastewater treatment agency would likely need to determine potential recycled water users, determine the required water quality to meet recycled water demand, determine the volume of recycled water needed, secure agreements with potential recycled water users, make improvements to increase treatment at the WWTP, and construct a recycled water distribution system (with pumps). Landscape irrigation recycled water projects typically cost between $400 and $2,100 per AF, including capital, operations, and maintenance (WRF 2011).

Agricultural Irrigation

Similar to landscape irrigation, recycled water could be used to offset potable water used to grow crops. Due to permitting requirements, most recycled water used for agricultural irrigation is for nonhuman consumptive crops (e.g., alfalfa grown for livestock). Recycled water used for human consumptive crops is required to be treated to a higher water quality than recycled water used on nonhuman consumptive crops. The process to construct an agricultural irrigation recycled water project is similar to a landscape irrigation recycled water project and typical costs assume similar project components.

Direct Potable Reuse

Recycled water could be used to replace potable water for domestic use. Technology is available to treat WWTP effluent to drinking water standards. Direct potable reuse is practiced in areas where water supply is extremely scarce, such as Singapore, Namibia, and remote communities in the American West (WRF 2011). Major concerns for direct potable reuse are: public perception, balancing water chemistry, engineered storage buffers, blending with other water sources, and multiple barriers to ensure public safety (WRF 2011). Direct potable reuse projects typically cost $700–$1,200/AF, including capital, operations, and maintenance (WRF 2011).

Process Water

Recycled water could be used by the commercial, institutional, or industrial (CII) sector as process water. Some processes, such as water used in cooling towers at power plants, could use recycled water to offset their need for potable water. Water quality is a concern for CII users because the recycled water is likely used in systems designed for use with potable water, or highly treated potable water. Use of water of less quality may damage CII process equipment, reducing the economic feasibility of using recycled water. Constructing a process water recycled water project is the same as explained above under *Landscape Irrigation*, but more treatment is likely needed at the WWTP. Process water recycling projects typically cost the same as direct potable reuse projects due to the need for higher water quality.

Environmental Evaluation

Summary of Potential Action

The location, timing of construction, and details of the modifications to existing WWTPs and respective distribution systems to support the development of recycled water sources, are unknown at this time. It is assumed these modifications may be carried out by the municipalities and wastewater treatment service providers in the plan area that would have their surface water sources reduced. Municipalities and wastewater treatment service providers include, but are not limited to: City of Merced, City of Manteca, City of Modesto, City of Tracy, Lake Don Pedro CSD, and City of Stockton. Whether the WWTPs are modified or not depends on a number of variables, such as market availability for recycled water use, future agreements reached between wastewater treatment service providers and potential end users water districts (if they are the end users), and funding availability.

For purposes of this discussion, it is assumed construction and operation would occur within the footprint of an existing WWTP or within very close proximity to one because wastewater recycling needs to be integrated into the existing wastewater treatment. It is also assumed WWTPs are located within close proximity to receiving waters (e.g., creeks or rivers) because WWTPs typically discharge treated effluent into receiving waters. Finally, it is assumed WWTPs are located in more urbanized areas adjacent to industrial and urban uses because (1) they must be located in an area to serve their existing municipal customers, and (2) they are typically considered public facilities that are generally located on lands designated and zoned for public facilities and industrial uses. The distribution system for recycled wastewater distribution would likely be constructed and operated within existing rights of way of roads and would be located below ground surface adjacent to existing utility lines at depths of 3–8 ft. The new lines would likely be in municipal service district areas and generally within urban areas.

Modifications required for existing WWTPs cannot be known at this time because they would depend on the type of wastewater treatment currently conducted at a WWTP, the availability of resources (e.g., funding and space), and the management of the WWTP by the local wastewater treatment special district or municipality. However, for the purposes of this discussion, it is assumed the operation of a modified WWTP to produce recycled water would be similar to the existing normal operation of a WWTP and would not result in a substantial increase in the volume of treated effluent discharged because the effluent would be distributed to recycled water users. Furthermore, it is anticipated that the operation of the recycled water facilities within the WWTP would be conducted by the existing employees at the WWTP.

Potential Environmental Effects

Construction of any recycled water facilities would likely result in temporary, and localized effects typically associated with similar activities including air quality effects and ground disturbance. Increased use of recycled water (e.g., landscape irrigation) may result in some runoff into local waterways; however, the quality of recycled water for such uses is highly regulated and approaches potable quality. In addition, increased use of recycled water will result in an equivalent decrease in discharge of lower quality treated effluent, thereby resulting in no negative impacts related to water quality of local waterways.

Recycled water treatment facilities are typically relatively energy intensive; however, the overall increased electrical demand would be small compared to the existing electrical demand of the service area. Therefore, it is unlikely to require the construction of major new power generation or transmission facilities. The operation of recycled water facilities may require a slight increase in chemical transport and storage, but as the treatment facilities would likely be constructed within or adjacent to existing WWTPs, the increase would be negligible compared to existing chemical use and transport at these locations.

It is likely that recycled water facilities would be constructed in areas that are already disturbed by urban development, and most facilities would be located within existing facility footprints and rights-of-way. In addition, any new recycled water projects would undergo CEQA review and other required regulatory compliance at the time they are proposed.

Table 16-10, *Potential Environmental Effects of Developing Recycled Water Sources*, summarizes the potential environmental effects associated with developing recycled water sources. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of this action and is referenced in Table 16-10 where appropriate.

Table 16-10. Potential Environmental Effects of Developing Recycled Water Sources

Potential Environmental Effects of Developing Recycled Water Sources	
Resource	Discussion
Aesthetics	• Construction and operation of recycled water facilities would not be expected to significantly affect the visual character or quality of areas because they would be located within the existing footprint of WWTPs or within close proximity and would be similar in size and scale as the existing WWTP facilities. Construction of the recycled water distribution system would include installing pipeline generally along the rights-of-way of existing roads. Construction of the distribution system could result in temporary impacts on the visual character or quality of chosen sites and surroundings due to ground disturbance. Ground-disturbing construction activities would have the potential to disturb or remove mature vegetation (i.e., landscaping) and create dust clouds, which could affect views. Impacts would depend on the location of sensitive receptors relative to these construction sites. At this time, however, no specific projects have been proposed, and future distribution system alignments are unknown. Construction and operation of recycled water facilities may have operational and safety lights. Impacts would depend on the location of sensitive receptors to potential lighting. However, lights would be expected to follow lighting guidelines and lighting plans of local jurisdictions approving the construction and operation of the recycled water facilities. In addition, the recycled water facilities would likely be located adjacent to wastewater treatment facilities and infrastructure that may already have operational and safety lighting. Table 16-38 identifies potential mitigation measures lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant environmental effects associated with lighting and removal of mature landscaping vegetation. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, depending on the potential location of possible sensitive receptors and the ability to reduce light and glare.
Agriculture and Forestry Resources	• Recycled water treatment facilities would not be expected to be constructed on agricultural land (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) but rather within the footprint of an existing WWTP or within very close proximity to one. Construction of a recycled water distribution system would include installing pipeline generally along the rights-of-way of existing roads, and therefore it is unlikely that agricultural land would be affected. However, if any portions of distribution pipelines were installed on agricultural land, agricultural use of that land would be temporarily precluded during construction. Construction on agricultural land would be avoided to the extent feasible and could potentially occur outside of the agricultural production season, depending on the crop and location. Construction in agricultural fields may also require removal of crops, depending on the crop and time of year. Table 16-38, identifies potential mitigation measures lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant environmental effects on agricultural resources. At this time, no specific projects have been proposed, and the actual future distribution system alignments are unknown. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of potential disturbance of agricultural lands during construction. It is also expected that recycled water would

Potential Environmental Effects of Developing Recycled Water Sources	
Resource	Discussion
	partially replace surface water diversions for agricultural irrigation, which could potentially offset impacts on agricultural land affected by the recycled water facilities. • Limited forestry resources occur in the plan area. Although extensive forestry resources occur in the extended plan area (e.g., Stanislaus National Forest), because recycled water treatment facilities would be expected to be sited within the footprint of an existing WWTP or within close proximity to one, construction and operation of the facilities would likely not conflict with existing zoning for, or cause rezoning of, forest land or timberland, or result in the loss of those zoned lands. Impacts would be less than significant.
Air Quality	• The plan area is located in the SJVAB and partially located in the MCAB. The extended plan area is also partially located in the SJVAB, MCAB and the GBVAB. The recycled water sources could be located in any or all of these air basins, which generally cover San Joaquin, Stanislaus, Merced, Mariposa, Tuolumne, Calaveras, Alpine, and Madera Counties, because the water supplied by the wells could support agricultural or municipal uses in these areas. The plan area and extended plan area occur within the jurisdictions of the SJVAPCD, CCAPCD, the GBUAPCD, MCAPCD, and TCAPCD. Recycled water facilities would likely be located in the SJVAB, which generally covers San Joaquin, Stanislaus, Merced, and Madera Counties. SJVAPCD's published guidelines, *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002) do not require the quantification of construction emissions. Rather, the guidelines require implementation of effective, comprehensive, and feasible control measures to reduce PM10 emissions (SJVAPCD 2002). SJVAPCD considers PM10 emissions to be the greatest pollutant of concern when assessing construction-related air quality impacts and has determined that compliance with its Regulation VIII, including implementation of all feasible control measures specified in its *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002), constitutes sufficient mitigation to reduce construction-related PM10 emissions to less-than-significant levels and minimize adverse air quality effects. All construction projects must abide by Regulation VIII. Since the publication of the district's guidance manual, the district has revised some of the rules comprising Regulation VIII. Guidance from district staff indicates that implementation of a Dust Control Plan would satisfy all of the requirements of SJVAPCD Regulation VIII (Siong pers. comm.). Further consultation with SJVAPCD staff indicates that, though explicit thresholds for construction-related emissions of ozone precursors are not enumerated in the *Guide for Assessing and Mitigating Air Quality Impacts*, SJVAPCD considers it a significant impact when construction or operational emissions of ROG or NO_X exceed 10 tons per year or if PM10 or PM2.5 emissions exceed 15 tons per year (Siong pers. comm.). For projects within CCAPCD jurisdiction a significant impact would occur if project emissions are greater than 150 pounds per day for ROG, NO_X, or PM10 in either the construction or operational periods. No thresholds for other criteria pollutants or their precursors have been established by the CCAPCD. The GBUAPCD does not have adopted quantitative thresholds of significance for criteria pollutants for proposed projects for the purposes of CEQA, although thresholds from neighboring air districts (e.g., CCAPCD, TCAPCD, SJVAPCD) may be used to evaluate impacts within the GBUAPCD. For construction impacts, the GBUAPCD requires that project proponents adopt comprehensive mitigation measures to mitigate fugitive dust impacts. For emissions associated with the operation of stationary sources, the GBUAPCD considers stationary emissions to be less than significant if they are exempt from Rule 202 pursuant to Rule 209-A(B)(2). Rule 209-A identifies emission limits of 250 pounds per day for ROG, NO_X, SO_X, and particulate matter. For projects within MCAPCD jurisdiction a significant impact would occur if project operational emissions are greater than 100 tons per year for ROG, NO_X, CO, SO_X,

Potential Environmental Effects of Developing Recycled Water Sources

Resource	Discussion
	PM10, and PM2.5 (County of Mariposa 2006). For projects within TCAPCD jurisdiction a significant impact would occur if project emissions are greater than 100 tons per year or 1,000 pounds per day for ROG, NO_X, CO, and PM10. • Construction of recycled water treatment facilities and distribution pipelines would likely result in emissions associated with construction equipment and construction worker vehicle trips, as well as fugitive dust emissions from ground disturbance. The quantity, duration, and the intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Depending on the level of activities and amount of infrastructure built, construction of recycled water facilities could exceed air quality thresholds established by the applicable APCDs and project proponents would be required to implement measures to help reduce or minimize construction-related emissions. Lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on air quality associated with construction emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the regulatory requirement to implement all required feasible measures to reduce emissions during construction and the potential for the duration and frequency of activities during construction to reduce overall emissions (e.g., diluting emissions over time). • Prior to constructing a project dealing with a stationary source of emissions (such as a WWTP), project proponents must obtain permits from their respective air districts to ensure the permitted facility will not cause a new violation, or contribute to an existing violation, of national ambient air quality standard. For example, an Authority to Construct (ATC) would be required from SJVAPCD if a facility were constructed within the SJVAB. The project would be subject to the requirements of SJVAPD Rule 2201. As stated under Sections 1.1 and 1.2 of Rule 2201[12]: *The purpose of this rule is to provide for the following:* *1.1 The review of new and modified Stationary Sources of air pollution and to provide mechanisms including emission trade-offs by which Authorities to Construct such sources may be granted, without interfering with the attainment or maintenance of Ambient Air Quality Standards;*

[12] Sources whose primary function is permitted by the SJVAPCD through Rules 2010 and 2201 are not subject to SJVAPCD Rule 9510 (Indirect Source Review). Projects subject to Rule 9510 are required to quantify and reduce indirect (i.e., mobile source emissions), area-source (e.g., space heating, landscaping, and maintenance), and construction exhaust emissions.

Potential Environmental Effects of Developing Recycled Water Sources	
Resource	Discussion
	1.2 No net increase in emissions above specified thresholds from new and modified Stationary Sources of all nonattainment pollutants and their precursors. Rule 2201 applies to new stationary sources and all modifications to existing stationary sources that are subject to permit requirements and after construction may emit one or more affected pollutant.[13] The requirements of this rule go in effect on the date the application is determined to be complete by the SJVAPD's Air Pollution Control Officer. • Operation of recycled water treatment facilities would likely use electricity because of their expected locations in urban and suburban areas in close proximity to existing wastewater treatment infrastructure. They may use nonelectric backup generators for intermittent emergency circumstances. Operations could include facility inspection and maintenance activities. The need for additional energy could result in increased criteria pollutant emissions at power generation facilities. However, the power facilities that would compensate for the additional demand are already built and permitted by the applicable local air district to emit a maximum amount of criteria pollutants. As part of the permitting process, these facilities are required to offset additional power generation by the use of emission reduction credits as required by applicable local air district New Source Review programs. Therefore, if additional emissions are generated, they would be generated by regulated facilities. Lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects associated with operational emissions and air quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The various APCDs have identified common types of facilities that are known to produce odors in the region. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants. Construction and operation of recycled water facilities would not involve the type of facility identified by, for example, SJVAPCD, as a known odor source (SJVAPCD 2002). The recycled water facilities would be located at the wastewater treatment facility but would not produce additional odors beyond what currently may be produced. This is because the recycled water process typically uses the existing volume of wastewater that is already treated in accordance with Clean Water Act permit requirements. The recycled water process further treats the wastewater to meet recycled water quality standards. Therefore, the additional processing of the treated wastewater does not produce any additional odors because the odors are typically generated

[13] Affected pollutants are those pollutants for which an Ambient Air Quality Standard has been established by the USEPA or by the ARB, and the precursors to such pollutants and those pollutants regulated by the USEPA under the federal Clean Air Act or by the ARB under the Health and Safety Code including, but not limited to, VOC, NOx, SOx, PM2.5, PM10, CO, and those pollutants which the USEPA, after due process, or the ARB or the Air Pollution Control Officer, after public hearing, determine may have a significant adverse effect on the environment, the public health, or the public welfare.

Potential Environmental Effects of Developing Recycled Water Sources

Resource	Discussion
	during pre-treatment, primary treatment, and biosolids removal. Consequently, it is expected that recycled water facilities would not create objectionable odors affecting a substantial number of people. Impacts would be less than significant. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction and operation of recycled water treatment facilities would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. Construction and operation of recycled water treatment facilities would not result in growth because the facilities would be constructed and operated to replace a water source that was reduced (i.e., surface water) rather than to increase capacity to serve new users. Construction and operation of recycled water treatment facilities would not result in population or employment growth that would result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Accordingly, this impact is less than significant.
Biological Resources	• Construction and operation of recycled water treatment facilities in the plan area and extended plan area is expected to be in urban and suburban areas within the footprint of existing WWTPs. These areas are expected to have a very low potential for special-status plant species, animal species, and habitat (including federally protected wetlands), and are unlikely to support special-status biological resources because they are typically industrial facilities with buildings and primarily impervious surfaces. Construction of the recycled water distribution system would include installing pipeline generally along the rights-of-way of existing roads, and potentially in agricultural fields and other areas (e.g., parks, commercial campus landscapes, golf courses). With the exception of agricultural fields, these other areas are expected to have a very low potential for special-status plant species, animal species, and habitat, because they are typically located in developed, urban areas. Some agricultural fields can provide suitable foraging habitat for special-status raptor species such as Swainson's hawk and white-tailed kite; however, given the temporary nature of construction activities associated with installing recycled water distribution pipelines and that activities typically could be scheduled to avoid active periods of these types of species, there is a low potential for effects. Further, there is also a low potential for special-status plant species, animal species, and habitat to be affected, it is not expected that construction and operation would conflict with local policies protecting biological resources or conflict with provisions of an adopted habitat conservation plan or natural community conservation plan. Depending on the actual location and the season of construction, Table 16-38 lists potential mitigation measures lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant environmental effects of construction and operations on special-status biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that construction

Potential Environmental Effects of Developing Recycled Water Sources

Resource	Discussion
	impacts could be mitigated to less than significant once mitigation measures were implemented, given the need to comply with regulatory seasonal restrictions. • It is expected that operation of recycled water facilities would not result in an increased volume of treated wastewater effluent discharged or change the quality of the treated wastewater effluent discharged, because it would be distributed to the end user for use on landscaping, potable use, or agricultural fields. As such, it is not expected to adversely affect special-status fish species. It is expected that recycled water production would meet all appropriate treated wastewater effluent limitations and standards and would not affect special-status fish species or the migration of such species. Impacts would be less than significant. • Use of recycled water by consumers (e.g., golf courses or industrial processes) could result in runoff entering receiving water and potentially affecting aquatic resources. However, consumers are required to have management plans to control runoff and reduce receiving water inflow. Specifically the applicable regional water quality control board is required by California Code of Regulations, title 22, division 4, to issue a Master Water Recycling Permit that includes specific requirements for the use of recycled water (SDRWQCB 2009). Further, the quality of recycled water for such uses is highly regulated by the regional water quality control boards and the California Department of Public Health by regulations or laws such as the Health and Safety Code (Division 104, Part 12, Chapter 4, Article 7, § 116551) and approaches potable water quality (CDPH 2011). Impacts would be less than significant.
Cultural Resources	• Construction and operation of recycled water treatment facilities would likely occur in urban and suburban areas adjacent or within close proximity to existing wastewater treatment facilities and infrastructure. While it is unknown if cultural resources (significant historical, archeological, or paleontological resources) exist in these locations, these areas likely would have been previously disturbed during the construction of the existing wastewater treatment facilities, reducing the potential for significant unknown cultural resources to exist. Operation of recycled water facilities would have a very low potential to affect cultural resources because operation would consist of recycled water treatment within previously constructed facilities. Impacts would be less than significant. • Construction and operation of the recycled water distribution system would include installing pipeline generally along the rights-of-way of existing roads. Construction of the distribution system has the potential to encounter significant unknown buried cultural resources because it cannot be predicted with certainty whether significant unknown buried cultural remains are currently present or absent. No specific projects have been proposed at this time, and the actual future distribution system alignments are unknown. However, given that most of the construction would occur within highly developed public rights-of-way where much of the sediments have been previously disturbed, the potential to encounter significant buried cultural resources is greatly reduced. In addition, due to the shallow depth of disturbance cultural resources have likely been previously disturbed. Therefore, there is a very low potential for unknown cultural resources to be located in these areas. Lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on cultural resources associated with construction of recycled water treatment and distribution facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable,

Potential Environmental Effects of Developing Recycled Water Sources	
Resource	**Discussion**
	consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the depth of disturbance and the low potential for resources to exist. • As described above, it is expected the wastewater treatment sites and public-rights-of ways would be previously disturbed. Therefore, it is highly unlikely that human remains, typically buried at depths of 6 ft, would be encountered or disturbed during construction. However, if human remains are uncovered during construction, compliance with the State Health and Safety Code would be required. As specified by Section 7050.5 of the Health and Safety Code, and described in Table 16-38, no further disturbance would occur until the county coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If such a discovery occurs, excavation or construction would halt in the area of the discovery, the area would be protected, and consultation and treatment would occur as prescribed by law. If the coroner recognizes the remains to be Native American, he or she would contact the NAHC, who shall appoint the Most Likely Descendent. Additionally, if the human remains are determined to be Native American, a plan would be developed regarding the treatment of human remains and associated burial objects, and the plan shall be implemented under the direction of the Most Likely Descendent. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.
Geology and Soils	• The locations of any new recycled water facilities could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, recycled water facilities would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, soil erosion, loss of topsoil, or landslides. Any new facilities would be constructed using the latest geotechnical information for the site-specific conditions. Finally, recycled water facilities would not bring people to the risk of earthquakes or geologic hazards, meaning the operation of the recycled water facilities would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts related to geology and soils associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the temporary disturbance of soils during construction and the need to follow existing building code requirements. • The construction and operation of recycled water facilities would not involve constructing or operating septic tanks. Therefore, septic tanks would not be affected by soils incapable of supporting the use of them or other alternative wastewater disposal systems. Impacts would not occur.

Potential Environmental Effects of Developing Recycled Water Sources	
Resource	Discussion
	• Construction of recycled water treatment facilities and distribution systems would result in limited ground-disturbing activities that could cause soil erosion or loss of topsoil; however, ground-disturbing activities would be limited in duration and geography. Furthermore, ground-disturbing activities of 1 acre or greater would require preparation and implementation of a SWPPP, as required by the Central Valley Water Board. The SWPPP would require soil and erosion control mechanisms. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts related to soil erosion and storm water runoff and erosion associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given that construction would be temporary and the need to comply with existing storm water pollution and control regulations. • Increases in groundwater pumping are not expected to occur under the construction of recycled water treatment facilities or the distribution system. Operation of recycled water facilities may result in replenishment of groundwater resources or a reduction of the groundwater pumping because the recycled water would be used as an alternative source of water. Impacts would be less than significant.
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-7, because construction and operation of recycled water treatment facilities and distribution systems would result in increased use of electricity and fuels, and therefore there would be an increase in GHG emissions. Depending on the level of construction activities, construction-related GHG emissions could exceed the SJVAPCD ZEL and result in a potentially significant impact. For air districts in which there is no adopted GHG threshold (e.g., CCAPCD), the ZEL for SJVAPCD could be applied. The recycled water treatment and distribution process is an energy-intensive process (e.g., brackish water reverse osmosis energy use will vary depending upon the salinity and temperature of the source water; the higher the salinity or the colder the water temperature, the more energy it takes to remove the salt to meet water quality standards [Kennedy/Jenks Consultants 2013]). However, the overall increased electrical load due to operation of a recycled water treatment facility would be extremely small compared to the existing local electrical demand and it is unlikely to require the construction of new major power generation or transmission facilities. However, these increased electricity-related GHG emissions could potentially exceed the applicable SJVAPCD ZEL threshold and result in a significant impact. For air districts in which there is no adopted GHG threshold (e.g., CCAPCD), the ZEL for SJVAPCD could be applied. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts due to GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs.

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	○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Hazards and Hazardous Materials	• Construction of recycled water treatment facilities and the distribution systems would be short term and may involve the transport, storage, use, and disposal of hazardous materials such as fuel and lubricating grease for motorized heavy equipment. Some examples of typical hazardous materials handling are fueling and servicing construction equipment onsite and transporting fuels, lubricating fluids, solvents, and bonding adhesives. These types of materials are not acutely hazardous, and storage, handling, and disposal of these materials are regulated by local, county, and state laws. Furthermore, due to the limited construction period, the quantities of these materials used during construction is also anticipated to be small (e.g., less than 100 gallons). If a spill occurred, it could be readily and easily contained. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given construction would be temporary. • The location of where recycled water treatment facilities and distribution systems would be constructed is not yet known; however, these facilities could be constructed within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Additionally, depending on the location of construction, remediation may be needed to address soil contamination during excavation activities. As such, if a school existed within close proximity to construction of recycled water treatment facilities and distribution systems, those mitigation measures identified table 16-38 applied to project-specific construction needs would reduce potentially significant impacts during construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g.,

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	municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • Lists of hazardous materials site are compiled by different state agencies under Government Code, § 65962, these sites are also known as Cortese Sites. There were no sites identified on the Hazardous Waste and Substance Site List compiled into the EnviroStor online database managed by the DTSC for Alpine, Calaveras, Tuolumne, or Mariposa Counties (CalEPA 2016). There were a total of 19 sites identified for Madera, Merced, San Joaquin, and Stanislaus Counties. None of these sites are identified as a WWTPs. In addition to these sites identified by the EnviroStor database, CalEPA also identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facilities where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action for these counties (CalEPA 2016). There are approximately 520 leaking underground storage tanks designated as open in these counties (CalEPA 2016). There are approximately 60 facilities in these counties that have received CDOs/CAOs not identified as non-hazardous wastes, domestic wastewater, or domestic sewage (CalEPA 2016). There are approximately 13 facilities identified as WWTPs in these counties as having non-hazardous active CDOs/CAOs (CalEPA 2016). The active and open leaking underground storage tank cases and the CDO/CAO facilities are located throughout these counties and although some of them are identified as non-hazardous, they are identified on a Cortese List. Construction and operation of recycled water treatment facilities would likely occur in urban and suburban areas adjacent or within close proximity to existing wastewater treatment facilities and infrastructure. It is not yet known precisely where recycled water treatment facilities would be constructed, and which WWTPs may choose to construct recycled water treatment facilities. If a recycled water treatment facility were constructed on a Cortese Site because construction of these facilities would likely entail some ground disturbing activities, there would be potential for release of existing soil or groundwater contaminants depending on the known or unknown existing or historical contamination at the site. Were this to occur, impacts could be significant. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • Construction and operation of recycled water treatment facilities would likely occur within close proximity to existing wastewater treatment facilities and infrastructure and therefore would not physically interfere with an adopted emergency response plans or emergency evacuation plans because construction and operation activities would not prohibit the mobility of people to escape potential emergencies. Standard practices and protocols with respect to emergencies that are currently implemented by wastewater treatment facilities would apply and recycled water treatment

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	facilities would be incorporated into the standard practices and protocols. Furthermore, construction and operation of these facilities would not involve an increase in population that would necessitate reconsideration of how to evacuate people in an emergency. Impacts would not occur. • Operation of recycled water treatment facilities could use chemicals during the wastewater treatment process, which could require the routine transport, use, storage, and disposal of hazardous materials, such as chlorine gas, sulfur dioxide, and aqueous ammonia. These materials are commonly used by WWTPs during their treatment process to comply with effluent discharge standards set by the Central Valley Water Board. These chemicals are considered corrosive and represent inhalation, ingestion, and contact hazards. WWTPs are required to have hazardous materials inventory (HMI) statements and a consolidated contingency plan, as well as a federal RMP and a CalARP RMP, to properly manage and control these hazardous materials per federal RMP regulations (40 CFR Part 68) and the federal OSHA's Process Safety Management regulations (29 CFR Part 1910.119). The RMPs include the preparation of an offsite consequence analysis of worst-case release of the stored chemicals, and preparation of emergency response plans, including coordination with local emergency response agencies. The RMPs are required to be updated at least every 5 years and when there are significant changes to the quantities of stored chemicals. In addition, the Hazardous Materials Release Response Plans and Inventory Act (also known as the Business Plan Act) requires a business using hazardous materials to prepare a Business Plan describing the facility, inventory, emergency response plans, and training programs. The local CUPA (e.g., San Joaquin County, Stanislaus County, or Merced County, or local fire departments) and USEPA have authority over the management of hazardous materials at WWTPs. WWTPs would likely be within urban and suburban service areas, potentially storing these hazardous materials within 1/4 mile of a school. Per existing regulations, the CalARP RMP would be updated accordingly to reflect the additional volume of chemicals that might be transported, used, or disposed of as a result of including recycled water facilities. Added transport, use, or disposal of chemicals would also require implementation of a revised CalARP RMP. As part of revising the CalARP RMP, the wastewater treatment facilities would evaluate if current containment systems would be adequate for the additional truck deliveries and make any necessary modifications. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during operation. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the need to comply with state and federal regulations in order to operate the recycled water facility. • Recycled water is not considered a hazardous waste (e.g., material that is corrosive, flammable, reactive). There are many regulations controlling the release, use, and management of recycled water to protect public health and the environment. For example, purple pipe systems are required for new recycled water distribution systems so that the systems are appropriately connected to the end use (e.g., landscaping), and minimize potential cross connection with potable water systems. Therefore, people would not be exposed to hazards or hazardous materials as a result of the use of recycled water. Impacts would be less than significant.

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	• Construction and operation of recycled water treatment facilities and the distribution system would not be a hazard or cause safety concerns to public or public use airports or private airstrips because recycled water facilities would be constructed and operated within the existing footprint of wastewater treatment facilities or within close proximity and distribution systems would be underground. As such, construction and operation of recycled water treatment facilities and the distribution system would not result in a safety hazard for people residing or working in or near the project area. Impacts would be less than significant. • Construction and operation of recycled water treatment facilities and distribution systems would not physically interfere with an adopted emergency response plan or emergency evacuation plan since they would be located within existing facilities and the existing rights-of-way of roads. During construction of the distribution systems, road shoulders or lanes may be closed, but typical traffic control methods would be employed to direct and control traffic and minimize traffic impacts. Impacts would be less than significant. • Construction and operation of recycled water treatment facilities and distribution systems would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur.
Hydrology and Water Quality	• Construction of recycled water treatment facilities and distribution systems could result in temporary changes to existing drainage patterns, erosion, or runoff associated with typical construction activities, such as grading or preparation of land. As discussed earlier in this table (Geology and Soils), soil disturbance of over 1 acre would require wastewater treatment special districts or municipalities to prepare and implement a SWPPP. Water quality measures such as monitoring turbidity during construction to ensure compliance with the applicable water quality objectives (e.g., Water Quality Control Plan for the Sacramento River and SJR Basins) and construction BMPs would be implemented as either mitigation measures under CEQA or permit requirements and conditions to ensure water quality standards are not exceeded. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given construction would be temporary. • Because construction and operation of recycled water facilities would not substantially alter the existing drainage pattern of the site, or substantially increase the rate or amount of surface runoff, new recycled water facilities would not result in flooding or otherwise cause flooding on- or off-site, or exceed the capacity of existing or planned storm water drainage systems. Impacts would be less than significant. • It is likely that the recycled water facilities would be located in a flood hazard area because wastewater treatment facilities are typically located adjacent to rivers and streams so they can discharge treated effluent into receiving waters. However, because the recycled waste facilities would be located within the existing WWTP footprint, the addition of the recycled water facilities would not substantially add to the existing structures such that flood flows in a 100-year flood hazard area

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	would be impeded or redirected. Further, the recycled water facilities would not substantially increase the number of people exposed to the risk of flooding because they would not draw people to flood hazard locations or place housing within a 100-year flood hazard area. As such, construction and operation of recycled water facilities would not expose people to significant loss, injury, or death related to flooding. Impacts would be less than significant. • Operation of recycled water treatment facilities would have to comply with all regulations pertaining to water quality standards and regulations to prevent degradation of water quality in receiving waters. It is not anticipated that the recycled water facility would discharge recycled water into receiving waters because the water would be distributed to users in the service area. The users of recycled water (e.g., golf courses) would have to prepare plans and undergo inspections by the municipality operating the WWTP and prepare management plans to limit and control runoff into receiving waters. Impacts would be less than significant. • Construction of recycled water treatment facilities and distribution systems would not result in a substantial depletion of groundwater or interfere with groundwater recharge because construction would generally take place within existing facility footprints and would not need substantial volumes of water. Operation of recycled water facilities could increase actual groundwater recharge if it is used to augment groundwater basins. Users of recycled water (e.g., golf courses) may reduce their use of groundwater because they would have an alternative source of water by using the recycled water. Impacts would be less than significant. • Construction and operation of recycled water treatment facilities and the distribution systems would be located in areas of flat relief because these types of facilities are typically not located on the side of steep slopes. The locations would not support mudflows, which typically need very steep slopes and large amounts of precipitation to occur. Further, these areas would not be adjacent to the ocean and would not be affected by tsunamis. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction recycled water treatment facilities is not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of recycled water treatment facilities could result in a substantial degradation of water quality.
Land Use and Planning	• Construction and operation of recycled water facilities would not physically divide an established community because the facilities would likely be located in the existing footprint of the wastewater facility. Construction of the recycled water distribution system would include installing pipeline generally along the rights-of-way of existing roads, and potentially in agricultural fields and other areas (e.g., parks, commercial campus landscapes, golf courses). Construction activities would be temporary and pipelines would be below grade and therefore would not create an obstruction or barrier that would divide an established community. Impacts would be less than significant. • Construction and operation of recycled water facilities would take place within the footprint of an existing WWTP or within close proximity and would not conflict with land use designations or zoning because WWTPs are typically located in areas that are for public facilities or industrial uses. If the recycled water facilities or distribution systems were

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	inconsistent with applicable land use plans, policies, and regulations, an amendment or variant from the local jurisdiction approving the discretionary action associated with the recycled water facilities would be required by the project proponent prior to project approval and construction. If no discretionary action were to occur as a result of the construction or operation of the recycled water facilities or distribution systems, it is assumed it would not result in a conflict with local land use plans, policies, and regulations. Impacts would be less than significant. • Potential conflicts with applicable habitat conservation plans and natural community conservation plans are evaluated in the Biological Resources section of this table.
Mineral Resources	• Construction and operation of recycled water facilities would have a very low potential to result in the removal or inability to access state or locally designated mineral resource areas. This is because recycled water facility sites would be within the footprint of existing WWTPs. If the recycled water facilities or distribution systems are located within a state or local designated mineral resource area, construction and operation of the recycled water facilities would not permanently remove access to a mineral resource as there would be other locations around the facilities that could provide access to the mineral resource. Impacts would be less than significant.
Noise	• Construction of recycled water facilities could temporarily generate noise or ground-borne vibrations if pile driving is used. It is likely that recycled water facilities would be constructed in areas with suitable land use designations and zoning for infrastructure (e.g., public facilities or industrial) or within the footprint of existing facilities. It would be unlikely to have sensitive receptors (e.g., residential homes, hospitals, schools) to noise within close proximity to construction activities. If sensitive receptors were adjacent to construction activities and experienced construction noise, construction would be temporary and would be required to follow existing local noise ordinances limiting the timing of construction (e.g., generally Mondays– Fridays, 7am–6pm). Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts related to noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, depending on the location of potential sensitive receptors and the duration of the particular noise generating activities. • Wastewater treatment facilities do not generally run continuously because there are peak hours during the day (e.g., early in the morning and the evening) when wastewater is primarily generated. The operation of recycled water facilities would run accordingly and would likely not add substantial noise to existing WWTP operations. Additionally, the existing WWTPs already generate intermittent noise (e.g., from alarm bells, pumps, and generators). It is anticipated there would be a very low probability that sensitive receptors (e.g., residential homes, hospitals, schools) would be located within close proximity to experience the operating noise generated because it is anticipated that the WWTPs would be located in areas with similar land uses (e.g., other public facilities or industrial facilities). Finally, most of the wastewater treatment facilities are enclosed within buildings that reduce the operating noise. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts related to noise. Until such time that these potential mitigation measures are implemented, the impacts

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	would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented depending on the potential location of possible sensitive receptors and given the need to have equipment located within buildings. • Construction of the distribution system would likely exceed noise standards established in local general plans or noise ordinances. This construction would generally occur within road rights-of-way. However, it is not known where distribution lines would be located; they could be located in residential neighborhoods or within immediate proximity to other sensitive receptors (e.g., hospitals, schools, parks). Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts related to noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Once operational, the distribution system would be underground and would transport recycled water to end users. Because new pumping stations would be needed as part of the new recycled water distribution system, operation of these pumping stations could introduce a new noise source, but would generally be enclosed or fenced as to protect it and prevent the public from accessing it. These enclosures would serve to reduce noise and any noise generated would be intermittent throughout the day. As such, the operation of the distribution system is not expected to exceed standards established by a local general plan or noise ordinance. Impacts would be less than significant. • The construction and operation of recycled water facilities would not bring people within close proximity to an airport or expose people to airport noise.
Population and Housing	• The construction and operation of recycled water treatment facilities and distribution systems would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Furthermore, it would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people to the plan area and extended plan area. Finally, the facilities would be constructed and operated to replace a water source that was reduced (i.e., surface water) rather than increasing capacity to serve new users. Impacts would not occur. • The construction and operation of recycled water treatment facilities and distribution systems would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere because the facilities would be expected to be located within the footprint of existing WWTPs, and the distribution system would be located in the rights-of-way of existing roads. No homes or people would be displaced. Impacts would not occur.

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Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, the construction and operation of recycled water treatment facilities and distribution systems in the plan area and extended plan area would not involve an increase in population or housing. In addition, these actions would not include proposals for new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.
Recreation	• Construction of recycled water facilities in the plan area and extended plan area would likely occur within the footprint or immediately adjacent to existing wastewater treatment facilities. These facilities are typically located adjacent to receiving waters and in industrial or urban areas to provide wastewater service to the urban, suburban, and industrial users. It is unlikely that recreational facilities would be located in areas near where wastewater treatment facilities currently exist. However, if recreational facilities were located within very close proximity, construction of water recycling facilities may affect them. Construction of the recycled water distribution system would include installing pipeline below grade generally along the rights-of-way of existing roads, and potentially in agricultural fields and other areas (e.g., parks, commercial campus landscapes, golf courses). If installation of pipelines is done in parks or golf courses, use of these areas may be disrupted during construction. However, it is unlikely that there would be significant effects on recreational facilities due to construction of the recycled water treatment facilities and distribution systems because construction would be temporary and limited. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant indirect impacts on recreational resources related to construction activities (noise, air quality, etc.). Impacts would be less than significant. • Construction and operation of recycled water treatment facilities and distribution systems would not require the construction or expansion of recreational facilities. Therefore, potential environmental impacts associated with such construction or expansion would not occur.
Transportation and Traffic	• Construction of recycled water treatment facilities and distribution systems could result in some additional trips associated with construction workers. Wastewater treatment facilities may be located in urban and suburban areas that could already experience some congestion. Similarly, distribution pipelines could be installed in urban and suburban areas for landscape irrigation (e.g., parks, golf courses) where additional trips associated with construction workers may increase existing traffic. The temporary increased traffic during construction could exceed local or regional road trip thresholds. However, the number of construction trips that might be needed is unknown. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant transportation and traffic impacts related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.

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	• Operation of recycled water treatment facilities and distribution systems would not generate additional trips beyond those required for existing WWTP maintenance. It is unlikely that operation of the new water recycling facilities would result in a substantial increase in the number of WWTP employees, the amount of traffic generated on a daily basis is not expected to increase. Impacts would be less than significant. • Construction and operation of recycled water treatment facilities and distribution systems would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Construction and operation of recycled water treatment facilities and distribution systems would not be expected to affect the ability to meet the wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of recycled water from a WWTP. The purpose of developing recycled water is to use it as a replacement for other water sources (e.g., potable water, irrigation water), not to dilute WWTP effluent. Additionally, recycled water facilities would not increase the actual volume of wastewater generated in the service area or affect the WWTPs capacity. Impacts would be less than significant. • Construction and operation of recycled water treatment facilities and distribution systems involves construction at wastewater treatment facilities and other areas where the distribution pipelines would be installed. Environmental effects are discussed earlier in this table (Aesthetics through Transportation and Traffic sections). Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant construction or operation impacts related to all environmental resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Operation of recycled water facilities would not need the construction of additional storm water drains because the facilities would likely be built within the footprint of existing WWTPs, which currently have impervious surfaces that generate runoff. It is expected that existing storm water infrastructure would be used. Construction and operation of the distribution system would not require the construction of additional storm water drains because the pipeline would be located underground. Impacts would be less than significant. • Construction and operation of recycled water facilities would not be expected to require a new water supply or increased water supply because these facilities would be treating existing wastewater. Impacts would be less than significant. • Construction and operation of recycled water treatment facilities and distribution systems is not expected to result in a substantial increase in solid waste. WWTPs generate solid waste in the form of biosolids and other byproducts of the treatment stream. While recycled water facilities may also have solid waste, it is anticipated that biosolids would be minimal since they are removed during the wastewater treatment process. Generally, this type of solid waste is not considered hazardous, and the disposal of it follows all regulations and guidelines of solid waste at normal landfills. Impacts would be less than significant.

16.2.5 In-Delta Diversions

Reductions in surface water diversions are possible as a result of approving an LSJR alternative and the respective program of implementation. These reductions in surface water could potentially affect SFPUC by reducing some portion of its current water supply obtained from the Tuolumne River during a 6-year drought, as described in Appendix L, *City and County of San Francisco Analyses*. Under certain LSJR alternatives (i.e., higher unimpaired flow LSJR Alternatives 3 and 4), SFPUC may need multiple new water supplies to augment its current drought supply. As described in SFPUC documents, specifically the Water Supply Options (WSO) report (SFPUC 2007), SFPUC has several options for augmenting or increasing its water supply including diverting water from the Sacramento–San Joaquin Delta (Delta). The SFPUC WSO report was developed in support of the SFPUC WSIP prepared by SFPUC to increase reliability of the regional water system that provides water to San Francisco and neighboring communities (SFPUC 2008). In the 2008 WSIP Programmatic Environmental Impact Report (PEIR), SFPUC concluded that the in-Delta diversion option was infeasible, in part, because it would not achieve consistent year-round diversions due to uncertainties regarding the availability of water supplies and pumping capacities (SFPUC 2008). Nonetheless, a discussion of this possible water supply option has been included in light of the changing circumstances since 2008 (e.g., Pelagic Organism Decline, climate change, California WaterFix, and the State Water Board's *Final Report on the Development of Flow Criteria for the Sacramento Delta Flow Criteria* [State Water Board 2010]).

This section uses information regarding a delta diversion project as was analyzed in the WSO report to evaluate costs and potentially significant environmental impacts. The project as described in the WSO report has a design capacity of 28,000 acre-feet per year (AF/y) and would require relatively little new infrastructure. This design capacity would replace a portion of the supplies potentially reduced by the higher range of the LSJR alternatives (i.e., LSJR Alternative 4) and would likely be needed in addition to other supplies under certain LSJR alternatives given the amount of water potentially needed by SFPUC (see Appendix L, *City and County of San Francisco Analyses*). A delta diversion project would potentially allow SFPUC to use any of the rivers that flow into the Delta as a water supply source, instead of the Tuolumne River. Under this type of project, it is anticipated water would be purchased from any user upstream from the Delta or from a State Water Project (SWP) or Central Valley Project (CVP) contractor south of the Delta. A new connection to either the California Aqueduct or the Delta-Mendota Canal would be constructed to accommodate the transfer. Water would be pumped by the Projects (the SWP and CVP) from the Delta and would be treated and introduced to the system at Tesla Portal. Infrastructure requirements would include diversion from aqueduct, treatment facilities, and modification of Tesla Portal.

Cost Evaluation

SFPUC estimated a delta diversion project with a design capacity of 28,000 AF/y to cost about $306.1 million for capital cost, $7.8 million for annual operation and maintenance costs, and $357.1 million for lifecycle costs (SFPUC 2007). For a project of 28,000 AF/y, this results in approximately $255 per AF over the 50-year lifecycle. The cost per AF of additional water from a delta diversion for a larger project could be less than $255 per AF because of the economies of scale (i.e., the larger infrastructure projects are, the less they cost per unit per year). These costs do not include the cost of purchasing the water from willing sellers to supply the diversion project. Purchase costs would vary depending on market conditions, entities selling the water, and water-year conditions (i.e., drought), but could range from about $50 to $600 per AF, which could result in costs of $1.4–$16.8 million per year (PPIC 2011, Maven's Notebook 2015).

Environmental Evaluation

Summary of Potential Action

The precise location, size, timing of construction, and details of a delta diversion project cannot be known at this time. It is assumed that the project would be carried out by SFPUC; however, other service providers in the region may partake in a joint effort which may increase overall efficiency and reduce costs per unit water diverted. The size of the project may need to be larger than what was examined in the WSO report which is summarized below.

Water diverted from the Tuolumne River is unfiltered and delivered directly to customers after disinfection at the Tesla Portal near Tracy. Any water diverted from the Delta would need to be fully treated before it is blended with Hetch Hetchy water. The project, as outlined in the WSO report (SFPUC 2007), would include a new Delta intake and pumping plant, a new pipeline, a new Delta water treatment plant, and a new blending facility at Tesla Portal.

The intake facilities would draw from the California Aqueduct or the Delta-Mendota Canal. The intake would require a right-of-way purchase and permits to penetrate the aqueduct levee. The pumping capacity would be about 100 million gallons per day (mgd) operating against a head of 180 ft. The pumping plant would be large enough to house five 1,400 brake horsepower (bhp) vertical turbine pump units. Water would be conveyed from the pumping plant to the treatment facilities via a new 60-inch diameter welded steel pipe about 4 miles long. This new pipeline would run parallel to the existing San Joaquin Pipeline and would be within the Hetch Hetchy right-of-way. The new pipeline would be routed through agricultural land but would need to cross Interstate 580. SFPUC's report describes the new Delta water treatment plant as having a 100 mgd capacity and requiring about an 18-acre footprint. The site would be located within SFPUC property boundary just north of the Tesla Portal. A blending facility would be located at Tesla Portal to blend the newly treated water with the disinfected Hetch Hetchy water before being delivered through the existing system.

Potential Environmental Effects

Construction of any diversion and treatment facilities would likely result in temporary, and localized effects typically associated with similar activities including air quality effects and ground disturbance.

Effects associated with exporting water from the Delta are being debated and analyzed by U.S. Bureau of Reclamation (USBR), DWR, and various fisheries agencies as part of the California WaterFix process. If water was purchased from a south of Delta contractor there would be no increase in Delta exports. If water was purchased from a contractor upstream of the Delta, there may be an increase in Delta exports, which could affect Delta fish. This effect would likely be very small due to the size (39 cfs to SFPUC versus 10,000 cfs of combined exports) and would be minimized by operating under current fisheries agencies and State Water Board regulations and requirements.

Potable water treatment and pumping facilities are typically relatively energy intensive; however, the overall increased electrical load would be extremely small compared to the existing electrical load from the large Delta export pumps. Therefore, it is unlikely to require the construction of major new power generation or transmission facilities. The operation of Delta diversion facilities may require a slight increase in chemical transport and storage; however, because the facilities would likely be constructed within or adjacent to existing treatment facilities, the increase would be negligible compared to existing chemical use and transport at these locations.

The Delta diversion facilities would be constructed in areas that are already disturbed by urban development, and most facilities would be located within existing facility footprints and rights-of-way. In addition, because such facilities are publicly owned and subject to CEQA and other environmental regulations, depending on site-specific conditions, any new water treatment projects would undergo the appropriate level of CEQA and other required regulatory compliance at the time they are proposed.

As part of the WSO report, SFPUC prepared a preliminary analysis of environmental effects of a conceptual Delta diversion facility (SFPUC 2007). The analysis identified environmental commitments and/or potential mitigation measures to be implemented by SFPUC to reduce potentially significant impacts for the following resources: aesthetics, agriculture, air quality, biological resources, cultural resources, geology and soils, GHG emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, transportation and traffic, and utilities and service systems. Attachment 2 of Appendix H, *Supporting Materials for Chapter 16*, contains the analysis of the conceptual plan and is incorporated into this evaluation. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, lists potential mitigation measures that SFPUC can and should implement to reduce potentially significant environmental effects on the environmental resources identified in Attachment 2 of Appendix H, *Supporting Materials for Chapter 16*. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, similar to construction impacts disclosed in Section 16.2.4, *Recycled Water Sources for Water Supply*, it is likely impacts related to the construction of facilities could be mitigated to less than significant once mitigation measures were implemented. This is because of the temporary nature of construction, the relative short duration of construction, and that construction would generally occur within existing facility footprints or the public right-of-way. However, the generation of GHGs during construction and operation over the lifetime of the project may not be lessened with mitigation measures and as such, may result in exceedances of existing air quality management basin thresholds resulting in GHG impacts and utilities and service system impacts that cannot be mitigated to less than significant levels.

16.2.6 Water Supply Desalination

Reductions in surface water diversions are expected as a result of approving an LSJR alternative and the program of implementation. These reductions in surface water could potentially affect SFPUC by reducing some portion of their current water supply obtained from the Tuolumne River during a 6-year drought as described in Appendix L, *City and County of San Francisco Analyses*. Under certain LSJR alternatives (i.e., higher unimpaired flow LSJR Alternatives 3 and 4), SFPUC may need multiple new water supplies to augment their current drought supply. One option is desalination of ocean or brackish water. The WSO report addressed potential challenges or issues associated with constructing and operating a year-round desalination facility (capacity of 28,000 AF/y) near the existing Oceanside Water Pollution Control Plant in San Francisco (SFPUC 2007). In the WSIP PEIR (SFPUC 2008), the Oceanside site, along with two other alternative locations, were identified as potential sites for desalination in drought years as part of the Bay Area Regional Desalination

Program (BARDP). SFPUC included the BARDP in the WSIP PEIR analysis as part of a "variant" of the WSIP. The BARDP would involve a partnership among five regional water agencies—SFPUC, Contra Costa Water District (CCWD), East Bay Municipal Utility District (EBMUD), Santa Clara Valley Water District (SCVWD), and Zone 7 Water Agency (Zone 7). In addition to the WSIP PEIR analysis of the BARDP, feasibility studies evaluating various sites, a site-specific pilot study and other site-specific analyses have been completed for the BARDP since 2003. Following the Institution Feasibility Analysis, the participating water agencies concluded that the Oceanside site and the Bay Bridge site in Oakland were not feasible (CCWD et al 2016). Presently, water supply desalination is being considered for all hydrologic year types under the BARDP at Mallard Slough in the Delta, with an estimated production of 20,900 AF/y (CCWD 2014).

This section presents information regarding a desalination project (maximum capacity of 28,000 AF/y) provided in the Bay Area Regional Desalination Project Site Specific Analyses Final Report (CCWD 2014), the Final Draft Bay Area Regional Desalination Project Greenhouse Gas Analysis (Kennedy/Jenks Consultants 2013), and the WSIP PEIR (SFPUC 2008), as well as information for the Poseidon Desalination Facility in Carlsbad (capacity of 56,000 AF/y). The cost and environmental evaluation for the BARDP presented in the following sections are based on information from site-specific pilot studies and feasibility studies, and assumes the BARDP desalination plant and intake to be located at the existing Mallard Slough intake/pump station site.

A desalinization project would provide a reliable water supply regardless of the water year type or other surface water supplies used by SFPUC. A desalinization project would likely need to be larger than analyzed in the WSO report, or the BARDP feasibility studies, for LSJR Alternatives 3 and 4. Therefore, costs and environmental impacts associated with the larger Poseidon Desalination Facility in Carlsbad are also provided below.

Cost Evaluation

The State Water Board analyzed the potential water needed in the service area of SFPUC during a 6-year drought sequence (Appendix L, *City and County of San Francisco Analyses*). The analysis determined SFPUC may need to replace between 13,800 AF/y and 207,810 AF/y during a 6-year drought sequence. The conveyance and storage options being considered for the BARDP would involve the use of CCWD's Mallard Slough, Transfer, Old River, and Middle River pumping plants and CCWD's Old River, Transfer, and Los Vaqueros pipelines, as well as storage in Los Vaqueros Reservoir. CCWD developed a cost estimate for the BARDP use of the Mallard Slough Pump Station, conveyance to Los Vaqueros storage, storage in Los Vaqueros, and delivery from storage to the Mokelumne Aqueduct. Those cost estimates are provided in Table 16-11a, *Cost Estimates for BARDP Use of Existing Water Conveyance and Storage Facilities*.

Table 16-11a. Cost Estimates for BARDP Use of Existing Water Conveyance and Storage Facilities

BARDP Component	Estimated Cost ($/AF/y)
Use of Mallard Slough Pump Station and associated water rights	$86–$121
Conveyance to Los Vaqueros Reservoir	<$1
Storage in Los Vaqueros Reservoir	$70–$105
Delivery from Los Vaqueros Reservoir[a]	$16

Source: CCWD 2014.

BARDP = Bay Area Regional Desalination Project.

AF/y = acre-feet per year.

[a] Cost does not include the East Bay Municipal Utility District's costs for wheeling water through their system for final delivery to other BARDP participating water agencies.

In 2010, a cost estimate was prepared as part of a pilot study at the Mallard Slough Pump Station. It was estimated that the capital cost for a facility that would use 28,000 AF/y of brackish or ocean water to produce approximately 22,175 AF/y of treated water, including the intake and pipeline for conveyance to the existing conveyance system, would be $168 million, or approximately $8.50 per gallon per day. This includes contingencies and planning, permitting, engineering, and administrative costs. The annual operating cost was estimated at approximately $10.5 million (MWH 2010).

Current desalination projects under development in California have estimated costs between $1,000 and $3,000 per AF (WaterReuse 2012, SDCWA 2015). Poseidon Resources is currently developing the Carlsbad Desalination Project, and will own and operate the facility after construction is completed. However, the County of San Diego has the option to purchase the plant in 30 years. A purchase agreement for water from the plant is in place and water is expected to cost between $1,849 and $2,064 per AF in 2012 dollars (SDCWA 2015). Based on total costs per AF of other desalination facilities in California (WaterReuse 2012, SDCWA 2015) it is estimated that the total cost for water produced would be between $1,000 and $2,200 per AF.

Environmental Evaluation

Summary of Potential Action

The BARDP would entail diverting water from the Delta through an existing intake at the CCWD Mallard Slough Pump Station (available capacity up to 40 mgd subject to existing water rights, terms and conditions) through existing pipelines to a proposed desalination plant for treatment. The desalination plant and connections to the existing water conveyance network in the region are the only new infrastructure anticipated for the project. The desalination plant is expected to draw a constant 21 mgd of water. Treated water from the new BARDP desalination plant would be conveyed via CCWD's Multi-Purpose Pipeline for delivery to CCWD customers or the Mokelumne Aqueduct for delivery to EBMUD's water treatment plants and subsequent delivery to the participating water agencies, or both (Kennedy/Jenks Consultants 2013). Based on pilot project results, it is assumed that the brine stream from the new desalination plant would be a constant 20 percent of the diverted 21 mgd, or approximately 5 mgd (CCWD 2014). Two potential existing WWTPs have been identified to dispose of the brine originating from the desalination treatment process: Central Contra Costa Sanitary District (CCCSD) and Delta Diablo Sanitation District (DDSD). It is estimated that given the current the dry weather discharge capacities of CCCSD and DDSD, CCCSD would have the capacity to accept the brine through 2030 (CCWD 2014).

BARDP desalinated water production would exceed participating water agencies' demands in non-drought years, but would fall short of the higher combined demands in drought years. Excess BARDP water production would be stored in Los Vaqueros Reservoir in non-drought years through an exchange with CCWD, and the stored BARDP water would be released from the reservoir in drought years. The minimum BARDP demand would be approximately 14 mgd in all years. EBMUD, SCVWD, and CCWD BARDP water demand would occur less frequently and is based on hydrologic year type as well as other factors, but estimated demand could be as high as approximately 46 mgd in some drought years. In drought years, the demand of all five water agencies could not be met with only BARDP production. However, unused production stored via exchange in Los Vaqueros Reservoir during non-drought years (maximum 4.6 mgd) could augment deliveries in drought years. CCWD estimated over an 82-year CalSim II modeling period that the combined demand of SFPUC, EBMUD, SCVWD, CCWD, and Zone 7 is 1,754 thousand AF (TAF) and the maximum BARDP production would be 1,714 TAF. Accordingly, approximately 98 percent of the combined demand could be met. This is considered an upper limit that assumes all excess BARDP production could be stored in Los Vaqueros Reservoir (CCWD 2014).

Potential Environmental Effects

As part of the WSIP PEIR, SFPUC prepared a conceptual-level, generalized impact analysis of the BARDP, which, at the time of the analysis, was based on limited, preliminary information regarding project design and operation, and site location. Because of this limited project-specific information, it was generally determined that most of the potential impacts associated with construction and operation of a desalination plant and associated facilities would be potentially significant for the following resources: land use and visual quality; geology, soils, and seismicity; air quality; cultural resources; GHG emissions; hazards; noise and vibration; traffic, transportation, and circulation; public services and utilities; recreational resources; and agricultural resources (SFPUC 2008). However, for these resources it was presumed that potentially significant impacts could be avoided or reduced to a less-than-significant level through site selection, project design, and implementation of "environmentally-sensitive" construction and operation techniques or through implementation of mitigation measures (SFPUC 2008). With respect to mineral resources and population and housing that were not evaluated by the WSIP PEIR, it's anticipated that impacts would not occur under construction and operations. This is because the desalination facilities would not result in a loss of mineral resources. In addition, the facilities would not be built to accommodate an increase in population in the service area and would not include housing or other amenities that might result in an increase in population. Construction and operation of the BARDP would require substantial nonrenewable energy resources and although some of the impacts could potentially be mitigated through project design with application of energy-saving technologies, impacts were considered significant and unavoidable to be conservative (SFPUC 2008). It was determined in the WSIP PEIR impact analysis that operation of the BARDP would result in potentially significant and unavoidable impacts on hydrology and water quality, biological resources, and energy resources. Although potential water quality impacts due to brine and associated impacts on biological resources (specifically, aquatic resources including special-status species) for the BARDP could potentially be mitigated through design/operation, mitigation measures, and regulatory compliance, the impact was considered significant and unavoidable, to be conservative (SFPUC 2008). Attachment 3 of

Appendix H, *Supporting Materials for Chapter 16,* contains a summary of the impacts, mitigation measures, and SFPUC construction measures applicable to the BARDP. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, as noted by the WSIP PEIR, significant impacts associated with the following resources could likely be reduced to less than significant with the implementation of mitigation measures: land use and visual quality; geology, soils, and seismicity; air quality; cultural resources; GHG emissions; hazards; noise and vibration; traffic, transportation, and circulation; public services and utilities; recreational resources; and agricultural resources.

BARDP feasibility studies done for a desalination facility at the Mallard Slough intake analyzed potential water quality impacts of operating the desalination facility and brine disposal, as well as the potential impacts on sensitive fish populations due to operating the facility (CCWD 2014). In addition, the study estimated GHG emissions associated with operation of the desalination facility and water conveyance to participating water agencies (Kennedy/Jenks Consultants 2013). Based on water quality modeling, it was determined that changes in ambient water quality associated with BARDP operations and brine disposal at CCWD or DDWD were too small to be accurately measured in the field, and that during most conditions, operations would not have a significant impact on water quality or beneficial uses (i.e., municipal water supply, wildlife, agriculture). Further, during critically dry water years, BARDP operations would need to be coordinated with CVP, SWP, and the City of Antioch[14] operations to avoid impacts (CCWD 2014). Construction of the BARDP would produce one-time estimated GHG emissions associated with the use of construction equipment and vehicles. As estimated by the GHG analysis performed for the BARDP, facility operations would produce approximately 9,200 MT CO_2e emissions (Kennedy/Jenks Consultants 2013). Potential GHG reduction measures/projects identified in the 2013 GHG analysis for the project included: green building design, pump energy optimization program, commercial/residential rebates (solar hot water heater program), invest in large-scale renewable energy, local solar photovoltaic projects, fleet fuel reduction, GHG offset purchases, and wetlands restoration (Kennedy/Jenks Consultants 2013).

A facility that is larger than the BARDP (e.g., 56,000 AF/y) would have similar types of construction and operation impacts. The types of construction activities associated with a large desalination facility with a capacity of 56,000 AF/y would be similar to those required for a smaller facility like the BARDP and would likely result in temporary, and localized effects typically associated with similar activities including air quality effects and ground disturbance. Long-term operational impacts associated with a large desalination facility with a capacity of 56,000 AF/y would be similar in nature to those described in the feasibility studies as well as in the WSIP PEIR for the BARDP, and are primarily related to marine life entrainment, brine outfall, and impact on open space and recreation areas. Desalination facilities are typically relatively energy intensive. The increased electrical demand as a result of a larger design capacity (i.e., increase from 28,000 to 50,000 AF/y) could result in increases in GHG emissions and air quality impacts under operating conditions. The operation of desalination facilities may require a slight increase in chemical transport and storage, but as the facilities would likely be constructed within or adjacent to existing treatment facilities, the increase would be negligible compared to existing chemical use and transport at these locations.

[14] The City of Antioch has an intake in close proximity to the proposed BARDP facilities.

While there are many geographic differences between the San Francisco Bay–Delta and Carlsbad, similar environmental impacts were identified for the project-level analysis of the Carlsbad facility (City of Carlsbad 2015). Cumulative regional impact on air quality for the production of ozone and PM10 were determined to be significant and unavoidable. The following resources were identified as less than significant after mitigation for the Carlsbad facility: cultural resources, hazards and hazardous materials, hydrology and water quality, land use and planning, and traffic and circulation.

16.2.7 New Surface Water Supplies

Reductions in surface water diversions are expected as a result of implementing an LSJR alternative. As such, some water suppliers may explore the feasibility of constructing and operating on- or off-stream reservoirs to obtain new surface water supplies. However, new reservoirs present unique technological challenges that require extensive engineering, biological, and environmental studies to evaluate the feasibility of constructing, operating, and maintaining them. Amongst many considerations, the feasibility of constructing and operating a surface water reservoir depends on the implementation of an LSJR alternative and whether water is available in the Stanislaus, Tuolumne, and Merced River Watersheds for such use.

It is likely that the implementation of the LSJR alternatives would reduce surface water availability on the Stanislaus, Tuolumne, and Merced Rivers. With more water devoted to instream flow requirements, existing surface water reservoirs on these rivers would receive less water relative to current conditions. As such, any new surface water reservoir would be in competition with older reservoirs that likely have senior water rights. If the new reservoir could not capture enough storage, or generate enough hydropower, to outweigh the costs of construction and operation, it may be deemed infeasible. Furthermore, some parts of the Upper Stanislaus, Tuolumne, and Merced Rivers Watersheds are fully appropriated, meaning all available water has been claimed. Specifically, 8 percent of the Upper Stanislaus River Watershed, 3 percent of the Upper Tuolumne River Watershed, and 14 percent of the Upper Merced River Watershed are fully appropriated. This would constrain potential locations for a new surface water reservoir and potentially limit the volume of water that could be stored. In addition, planning and constructing new surface water reservoirs would likely not occur within a reasonable timeframe to augment or provide new water supplies in the foreseeable future. For example, Tuolumne Utilities District (TUD) is considering a backup reservoir for one of its current water delivery flumes in its service area on the Stanislaus River and has estimated it could be built and filled within the next 10 years (The Union Democrat 2016). In addition, the Temperance Flat Reservoir on the Upper SJR has been contemplated, discussed, and evaluated for over 15 years (Friant Waterline 2014). These projects typically have incredibly long-lead times because multiple pre-project studies for engineering, environmental, and economic analyses would be required before any construction could begin. These studies would need to show that a proposed on- or off-stream reservoir in the eastside LSJR tributary watersheds could be constructed and operated with an estimated average annual water supply yield and associated benefits to justify the cost. Given the above, the likelihood of constructing and operating a new surface water reservoir is low. However, general costs associated with constructing and operating new reservoirs are still evaluated below, as well as environmental resources for which there could be a significant and unavoidable impacts. The environmental analysis does not include the construction of new reservoirs within Yosemite National Park because it is not reasonably foreseeable.

Cost Evaluation

The costs associated with constructing and operating a reservoir depend on numerous factors including, but not limited to: its potential location, the size of the reservoir, the type of demand to be served, the infrastructure needed to convey stored water to end users, and the regulatory and political climate.

Within the state, several reservoirs are in the planning stage, including the Temperance Flat Reservoir, which would be located in Fresno and Madera Counties between Friant Dam and Kerckhoff Dam, on the Upper SJR (SJVWIA 2016). The total estimated investment cost for the Temperance Flat Reservoir is $2.5–$2.8 billion (USBR 2014a, SJVWIA 2016). The project would include a dam at river mile (RM) 274 on the Upper SJR, diversion and outlet works, a low-level intake structure, valve house, powerhouse, transmission facilities, and access roads (USBR 2014a). Total annual costs once the dam and reservoir are operational would be approximately $116–$121 million. This cost would include operation and maintenance for the reservoir facilities, hydropower mitigations, and net additional CVP and SWP power costs (USBR 2014a). The estimated annual cost does not include water conveyance costs beyond the net power requirement for delivering the new water supply (USBR 2014a).

The California Water Commission (CWC) has been accepting concept papers for other potential new reservoirs or reservoir expansions across California in preparation for funding projects with Proposition 1. Three of these projects were proposed by TUD to serve Tuolumne County and would be located on tributaries to the Stanislaus River above New Melones. Given that the details of the projects are not yet known, it is speculative to analyze them prior to the project proponent's funding, approval, and design; however, they are provided here as comparison points to the Temperance Flat Reservoir. The three projects are the expansion of the Herring Creek Reservoir, Sierra Pines Reservoir, and Upper Strawberry Reservoir, with expected costs of $150 million, $40 million, and $120 million, respectively (TUD 2016a, TUD 2016b, TUD 2016c). However, none of these proposals included justification of additional water supply to meet demand, rather they cited water supply reliability in the event of an unanticipated need. The expansion of the Herring Creek Reservoir would include construction of a 130-foot high dam to store 11,000 AF on Herring Creek, a tributary to the South Fork of the Stanislaus River, because the current reservoir is silted and abandoned (TUD 2016a). The Sierra Pines Reservoir proposal would construct and operate an 850 AF reservoir and recreational area at the existing confluence of the Pacific Gas and Electric Company (PG&E) Tuolumne Main Canal and the TUD Section 4 Ditch. It would not add to the existing water supply of TUD, but rather would be used in the event that there is a critical distribution outage. This proposal is undergoing feasibility studies, but the water source to fill this reservoir would come from an existing contract with PG&E for diversions out of the Tuolumne Main Canal (TUD 2016b). The Upper Strawberry Reservoir proposal would include constructing a 120-foot high dam to store 6,000 AF just above Pinecrest Lake (TUD 2016c).

Environmental Evaluation

Summary of Potential Action

It is unknown exactly how surface water users would respond to a reduction in their surface water supply as a result of the program of implementation and the potential of developing surface water storage is low because of the limits on available water supplies. Further, it is not possible to estimate the construction parameters of potential reservoirs here because their construction will depend on too many factors unknown at this time. However, the Temperance Flat Reservoir can be used as an example for describing the construction and operation of a potential reservoir, given that Temperance Flat would be located on the Upper SJR Watershed. Using the Temperance Flat Reservoir as an example does not mean it would be constructed or operated. It is simply used to provide context for the type of significant environmental impacts that could occur if new surface water reservoirs were constructed and operated. Any project-specific conditions for this reservoir or other surface water reservoirs that may be constructed and operated would need to be considered, analyzed, and mitigated. For example, Temperance Flat is a significantly larger reservoir than the three reservoirs described in the concept papers by TUD. As such, smaller reservoirs would likely result in smaller construction and operation footprints and thus have reduced or fewer impacts when compared to larger projects, such as Temperance Flat. In addition, reservoirs constructed in different locations than Temperance Flat with a different physical environment would have different impacts and mitigation measures to accommodate those physical environmental conditions.

The Temperance Flat reservoir and dam, if constructed, would be built in the upstream portion of Millerton Lake on the SJR. The reservoir would provide approximately 1,260 TAF of additional storage capacity and increased water supply reliability. In addition, it would improve system operational flexibility for agricultural, urban, and environmental purposes in the CVP's Friant Division, as well as in other San Joaquin Valley areas and other regions of California (USBR 2014b).

Currently, a preferred alternative for the Temperance Flat reservoir project has not been chosen, and five alternatives, including a no action alternative, have been analyzed in the Draft Environmental Impact Report (DEIR) for the project. All action alternatives adjust Friant Dam operations for delivery of new water supplies via the SJR to Mendota Pool. The action alternatives also propose modifying the timing and quantity of water diverted to Madera and Friant-Kern canals, which would increase water supply reliability to Friant Division contractors and provide opportunities for groundwater banking. Further, the action alternatives would improve conjunctive management in the Friant Division of the CVP by increasing incidental groundwater storage and/or recharge. The action alternatives primarily differ in terms of carryover storage for Millerton Lake and Temperance Flat Reservoir, beneficiaries and routing of new water supply, and type of intake. (USBR 2014b).

Potential Environmental Effects

If the construction and operation of a new dam and the Temperance Flat Reservoir proceeds, it would result in temporary and permanent environmental impacts. Significant and unavoidable construction- and operations-related impacts were identified for the following resources in the DEIR: air quality and GHG emissions; fisheries and aquatic ecosystems; botanical and wetlands resources; wildlife; cultural resources; paleontological resources; geology and soils; land use, planning and agricultural resources; transportation; noise; energy; recreation; and visual resources (USBR 2014b). Impacts that were mitigable to a less-than-significant level were identified for the following resources: air quality, botanical and wetlands resources, wildlife, paleontological resources, surface water quality, geology and soils, transportation, recreation, public health and hazardous materials, and utilities and service systems (USBR 2014b).

Table 16-11b, *Potential Environmental Effects of New Surface Water Supplies*, summarizes the potential environmental effects of the Temperance Flat Reservoir as well as the potential impacts of construction and operation of a large reservoir on the Stanislaus, Tuolumne, or Merced Rivers upstream of the rim dams. As noted above, it is not reasonably foreseeable that new reservoirs would be constructed within Yosemite National Park; therefore, such reservoirs are not analyzed. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of this action and is referenced in Table 16-11b, where appropriate.

Table 16-11b. Potential Environmental Effects of New Surface Water Supplies

Potential Environmental Effects of New Surface Water Supplies	
Resource	Discussion
Aesthetics	• Construction of new surface water supplies (dams and associated storage reservoir) would be expected to significantly affect the visual character or quality of areas because construction would be a multi-year process with major excavation for the dam footprint, excavation of major aggregate source areas at or near the site, creation of multiple access roads to the new dam and associated structures for personnel and equipment access, clearing and grading for equipment staging areas, clearing and grading for onsite, temporary construction buildings, nighttime lighting for construction, safety and security, and cutting of all trees that would be in the reservoir inundation zone. Once the dam was completed, reservoir filling for dam stability testing would convert the natural river canyon scenery to a placid lake. Construction and operation of new surface water storage facilities may have operational, security and safety lights. Impacts would depend on the location of sensitive receptors to potential lighting; however, lights would be expected to follow lighting guidelines and lighting plans of local jurisdictions approving the construction and operation of the new surface water storage facilities. Table 16-38 identifies potential mitigation measures lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant environmental effects associated with lighting. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • If new surface water reservoirs were constructed and operated in the portions of rivers designated as National Wild and Scenic River (83 miles of the Tuolumne River: 47 miles wild, 23 miles scenic, 13 miles recreational) or studied as potentially eligible (Stanislaus River) then the impacts would be significant and unavoidable. The impacts would be significant and unavoidable because of the substantial change to the visual character and quality of the surrounding area from natural river canyon scenery to a placid lake and there is no mitigation available that would reduce these aesthetic impacts to less than significant.
Agriculture and Forestry Resources	• Construction and operation of new surface water storage facilities would not be expected to take place on lands used for agriculture (including Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) because there is limited agricultural land adjacent to the river systems where new reservoirs might be built. Impacts would be less than significant. • Construction and operation of new surface water facilities could affect forestry resources, either private forest lands or federal National Forest System lands (e.g., Stanislaus National Forest) because most of the potential reservoir sites partially overlap forest vegetation zones. As such, there would be a conflict with existing zoning for forest land and potentially timberland, and potentially a loss or conversion of forest land to non-forest use. Table 16-38 identifies potential mitigation measures lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant environmental effects on forestry resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. If forest land or timberland is permanently removed from production due to construction and operation of new surface water facilities, then it is likely impacts would not be fully mitigated and would be significant and unavoidable.

Potential Environmental Effects of New Surface Water Supplies	
Resource	Discussion
Air Quality	• It is expected that a new surface water reservoir would be located upstream of the existing rim dams, and potentially in the MCAB, and the GBVAB. New surface water storage facilities and associated recreation facilities could be located in these air basins. This could occur within the jurisdictions of CCAPCD, the GBUAPCD, MCAPCD, and TCAPCD. For projects within CCAPCD jurisdiction a significant impact would occur if project emissions are greater than 150 pounds per day for ROG, NO_X, or PM10 in either the construction or operational periods. No thresholds for other criteria pollutants or their precursors have been established by the CCAPCD. The GBUAPCD does not have adopted quantitative thresholds of significance for criteria pollutants for proposed projects for the purposes of CEQA, although thresholds from neighboring air districts (e.g., CCAPCD, TCAPCD, SJVAPCD) may be used to evaluate impacts within the GBUAPCD. For construction impacts, the GBUAPCD requires that project proponents adopt comprehensive mitigation measures to mitigate fugitive dust impacts. For emissions associated with the operation of stationary sources, the GBUAPCD considers stationary emissions to be less than significant if they are exempt from Rule 202 pursuant to Rule 209-A(B)(2). Rule 209-A identifies emission limits of 250 pounds per day for ROG, NO_X, SO_X, and particulate matter. For projects within MCAPCD jurisdiction a significant impact would occur if project operational emissions are greater than 100 tons per year for ROG, NO_X, CO, SO_X, PM10, and PM2.5 (County of Mariposa 2006). For projects within TCAPCD jurisdiction a significant impact would occur if project emissions are greater than 100 tons per year or 1,000 pounds per day for ROG, NO_X, CO, and PM10. If SJVAPCD requirements are used their published guidelines, *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002), do not require the quantification of construction emissions. Rather, the guidelines require implementation of effective and comprehensive feasible control measures to reduce PM10 emissions (SJVAPCD 2002). SJVAPCD considers PM10 emissions to be the greatest pollutant of concern when assessing construction-related air quality impacts and has determined that compliance with its Regulation VIII, including implementation of all feasible control measures specified in its *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002), constitutes sufficient mitigation to reduce construction-related PM10 emissions to less-than-significant levels and minimize adverse air quality effects. All construction projects must abide by Regulation VIII. Further consultation with SJVAPCD staff indicates that, though explicit thresholds for construction-related emissions of ozone precursors are not enumerated in the *Guide for Assessing and Mitigating Air Quality Impacts*, SJVAPCD considers it a significant impact when construction or operational emissions of ROG or NO_X exceed 10 tons per year or if PM10 or PM2.5 emissions exceed 15 tons per year (Siong pers. comm.). • Construction of new surface water storage and recreation facilities would result in emissions associated with: general construction equipment, concrete batch plants, heavy-duty off-road equipment, materials transport in haul trucks, worker commute to the site, and increases in recreational visitors to the area. The amount of criteria air pollutant emissions would be less if amortized over the total life of the project (i.e., total daily or yearly emissions would be averaged over a longer time interval). Fugitive dust emissions would occur from exposed soils during the construction period. Depending on the level of activities and amount of infrastructure built, construction of new surface water storage facilities could exceed air quality thresholds established by applicable APCDs and would be required to implement measures to help reduce or minimize construction-related emissions. Lead agencies (e.g., state or federal agencies, utility districts) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects

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	on air quality from construction-related emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Operation of new surface water storage facilities would result in minimal air quality related emissions because one of the primary activities would be hydroelectric generation. Associated recreational facilities would generate air quality related emissions from vehicle trips, motorized boating or Jet Ski use, and electricity use. However, local electricity use would likely be from the dam hydroelectric facility itself, so there would be no emissions from other region-wide electrical generation. Emissions from vehicle trips, motorized boating or Jet Ski use could result in exceedances of applicable APCDs within the plan area or extended plan area, and could result in a potentially significant impact. Lead agencies (e.g., state or federal agencies, utility districts) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on air quality associated with operational emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • The various APCDs have determined some common types of facilities that have been known to produce odors in the region. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants. Construction and operation of new surface water storage facilities would not involve the type of facility identified by, for example, SJVAPCD, as a known odor source (SJVAPCD 2002). Consequently, it is expected that new surface water storage facilities would not create objectionable odors affecting a substantial number of people. Impacts would be less than significant. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction and operation of new surface water storage facilities would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. Construction and operation of new surface water storage facilities would not result in growth because the facilities would not involve the construction of new homes in the area, the extension of roads, or other infrastructure that may induce substantial property or population growth in an area, and because the storage facilities would be constructed and operated to replace a water source that was reduced (i.e., surface water) rather than to increase capacity to serve new users. Construction and operation of new surface water storage facilities would not result in population or employment growth that would result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Accordingly, this impact is less than significant.

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Biological Resources	• It is expected that construction and operation of new surface water facilities would be in natural landscapes that could include chaparral, oak woodland, conifer forest and perhaps alpine, depending on location. These areas are expected to have a high potential for special-status plant species, animal species, and habitat (including federally protected wetlands). Additionally, these habitats would be completely replaced by aquatic lake habitats. There is minimal potential to fully mitigate these impacts. In addition, operation of new surface water facilities would result in a change in the flow regime and potentially alter temperature downstream, which could result in impacts to aquatic species. There is also potential that construction or operation of new surface water storage facilities would result in a conflict with an existing local policy or an adopted habitat conservation plan or natural community conservation plan. Reservoir construction within the boundaries of the Stanislaus or Sierra National Forests or the Bureau of Land Management lands could conflict with their existing management direction. Table 16-38 lists potential mitigation measures lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant environmental effects of construction and operations on special-status biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. Even after mitigation, however, impacts would still likely remain significant and unavoidable due to the large scale replacement of habitat with an aquatic lake habitat.
Cultural Resources	• Construction of new surface water storage facilities would likely take place in relatively natural settings, however, these areas have an extensive history of use by Native American tribes and Euro-Americans during and subsequent to the Gold Rush era. Consequently, extensive archaeological and historical resources would likely be disrupted by construction, filling and operation of new surface water storage facilities. Construction may result in ground-disturbing activities which have the potential to disturb or destroy buried, unknown, significant cultural resources (significant historical, archeological, or paleontological resources). Lead agencies (e.g., state or federal agencies, utility districts) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on cultural resources associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. Even after mitigation, however, impacts would still likely remain significant and unavoidable due to the potential large scale disturbance of the area. • Operation of reservoir facilities has the potential to affect cultural resources during reservoir drawdown which could expose cultural resource sites to discovery and disruption by the general public. Lead agencies (e.g., state or federal agencies, utility districts) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on cultural resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. Even after mitigation, however, impacts would still likely remain significant and unavoidable due to the potential large scale disturbance of the area. • As described above, it is expected that new surface water storage sites would not have been previously disturbed. Therefore, there is potential that human remains, typically buried at depths of 6 ft, would be disturbed during construction. If, in the highly unlikely event human remains are uncovered during construction, compliance with the State Health and

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	Safety Code would be required. As specified by Section 7050.5 of the Health and Safety Code, and described in Table 16-38, no further disturbance would occur until the county coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If such a discovery occurs, excavation or construction would halt in the area of the discovery, the area would be protected, and consultation and treatment would occur as prescribed by law. If the coroner recognizes the remains to be Native American, he or she would contact the NAHC, who would appoint the Most Likely Descendent. Additionally, if the human remains are determined to be Native American, a plan would be developed regarding the treatment of human remains and associated burial objects, and the plan would be implemented under the direction of the Most Likely Descendent. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. Even after mitigation, however, impacts would still likely remain significant and unavoidable due to the potential large scale disturbance of potential areas.
Geology and Soils	• The locations of new surface water storage facilities could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, the counties in the extended plan area do not contain known Alquist-Priolo faults and are in a zone of low seismic shaking. The new surface water supply facilities could result in an impact on or be affected by expansive soils, or landslides. Landslides could occur on cut slopes created for dam building or from the reservoir side slopes when filled with water. New structures would be required to follow all appropriate building codes and dam design criteria and would be designed to withstand seismic-related activities as identified by the building codes and dam design criteria. Dam design criteria include those from the DWR Division of Safety of Dams (DSOD), federal Dam Safety and Security Act of 2002 (Public Law 107-310), as well as geological engineering, geotechnical engineering, and engineering design standards. New surface water storage facilities would not substantially increase the number of people exposed to the risk of earthquakes since the areas are not in areas with Alquist-Priolo faults or strong seismic shaking. If there was an increase in reservoir side slope instability, people drawn to the reservoir for recreational opportunities would be exposed to that geologic hazard. However, geological engineering and geotechnical engineering studies for new surface water storage facilities would address these potential instabilities. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts related to geology and soils associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the need to follow the building code and other state and federal building and dam design requirements. • The construction and operation of new surface water storage and related facilities would potentially involve constructing or operating septic tanks for construction crews or for post-construction recreation facilities. Therefore, septic tanks could be affected by soils incapable of supporting the use of them or other alternative wastewater disposal systems. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts related to septic tanks associated with construction and operations. Until such time

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	that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction and the relatively small scale of the recreation facilities. • Construction of new surface water storage facilities would result in substantial ground-disturbing activities that could cause soil erosion or loss of topsoil that would occur with a construction period of multiple years. Ground-disturbing activities of 1 acre or greater would require preparation and implementation of a SWPPP, as required by the Regional Water Quality Control Board. The SWPPP would require soil and erosion control mechanisms for all stages of construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts on soil erosion and storm water runoff associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary, albeit multi-year, nature of construction.
Greenhouse Gas Emissions	• Generation of GHG emissions associated with new surface water storage facilities and associated recreation facilities would result from: general construction equipment, concrete batch plants, heavy-duty off-road equipment, materials transport in haul trucks, worker commute to the site, increases in recreational visitors to the area, and loss of CO_2 sequestration from vegetation that dies within the reservoir inundation zone. The total amount of GHG emissions would be less if amortized over the total life of the project. The following APCDs do not have applicable GHG thresholds: CCAPCD, MCAPCD, TCAPCD. For air districts in which there is no adopted GHG threshold, the ZEL for SJVAPCD could be applied. As such, it is anticipated that increased GHG emissions could exceed the applicable SJVAPCD ZEL threshold and result in a potentially significant impact. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts of construction and operations from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs

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	AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Hazards and Hazardous Materials	• Construction of new surface water storage facilities would occur over several years and would involve the limited transport, storage, use, and disposal of hazardous materials such as fuel and lubricating grease for motorized heavy equipment. Some examples of typical hazardous materials handling are fueling and servicing construction equipment on the site, and transporting fuels, lubricating fluids, solvents, and bonding adhesives. Operation of hydroelectric generation facilities at the dam would involve various oils and greases for lubrication. These types of materials are not acutely hazardous, and storage, handling, and disposal of these materials are regulated by local, county, and state laws. While the quantities of these materials used during construction would not be small, the amount used at any one time would be small (e.g., less than 100 gallons). Therefore, if a spill occurred, it could be readily and easily contained. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary, albeit multi-year, nature of construction. • The precise location of where new surface water storage facilities would be constructed is not yet known; however, these facilities could be constructed within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Additionally, depending on the location of construction, remediation may be needed to address soil contamination during excavation activities. As such, if a school existed within close proximity to construction of new surface water storage facilities, those mitigation measures identified table 16-38 applied to project-specific construction needs would reduce potentially significant impacts during construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction.

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	• Lists of hazardous materials site are compiled by different state agencies under Government Code, § 65962, these sites are also known as Cortese Sites. There were no sites identified on the Hazardous Waste and Substance Site List compiled into the EnviroStor online database managed by the DTSC for Alpine, Calaveras, or Tuolumne Counties (i.e., counties where the Stanislaus or Tuolumne Rivers are located) (CalEPA 2016). In addition to these sites identified by the EnviroStor database, CalEPA also identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facilities where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action for these counties (CalEPA 2016). There are approximately 62 active open leaking underground storage tanks in these counties (CalEPA 2016). There are approximately 7 facilities in these counties identified as having active CDOs/CAOs (CalEPA 2016). The active and open leaking underground storage tank cases and the CDO/CAO facilities are located throughout these counties. Although it is not yet known precisely where in the extended plan area new surface water storage facilities would be constructed, if they were constructed on a Cortese Site, there would be potential for release and spread of existing soil or groundwater contaminants because construction of new surface water storage facilities would entail substantial excavation. Were release and spread of existing soil contaminants to occur, impacts could be significant. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • Operation of new surface water storage facilities would not involve the use of hazardous materials and impacts would not occur. • Construction and operation of new surface water storage facilities would not be a hazard or cause safety concerns to public or public use airports or private airstrips because the facilities would be constructed and operated within, or immediately adjacent to, the river banks and channels and would not involve structures that could impede, interfere, or otherwise create a safety hazard to airports or air traffic. As such, construction and operation of new surface water storage would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Construction and operation of new surface water storage facilities would not physically interfere with an adopted emergency response plan or emergency evacuation plan. Reservoirs could potentially restrict the mobility of people to escape potential emergencies in the vicinity of the reservoir (e.g., wild fires, forest fires). Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts associated with restricted travel routes during construction or reservoir operations. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction and the fact that there are relatively few road systems in these areas that could potentially be blocked by new reservoirs.

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	• Construction and operation of new surface water storage facilities would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Because construction would involve substantial clearing of work sites and construction laydown areas, onsite workers would have access to substantial shelter-in-place areas from wildfires during that time. These cleared areas would also be useable by local residents evacuating wildfires in the areas. Impacts would not occur.
Hydrology and Water Quality	• Construction of new surface water storage facilities and associated recreation facilities could result in temporary and permanent changes to drainages, erosion, or runoff associated with typical construction activities, such as grading or preparation of land as well as major excavation and blasting for dam foundation preparation. As discussed earlier in this table (Geology and Soils section), for soil disturbance of over 1 acre, wastewater treatment special districts or municipalities would be required to prepare and implement a SWPPP. In addition, as discussed in this table for Hazards and Hazardous Materials, construction of new surface water storage facilities may involve the limited transport, storage, use, and disposal of hazardous materials, which, if spilled, could have adverse effects on water quality depending on the location and magnitude of the spill. However, storage, handling, and disposal of these materials is regulated by local, county, and state laws, and the quantities of these materials used during construction would be small (e.g., less than 100 gallons) and construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained and, as such, violations of water quality standards are not expected to occur. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts of construction on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary, albeit multi-year, nature of construction. • It is likely that the new surface water storage facilities would be located in a flood hazard area because the dam and reservoir would be within an existing river channel. However, the flood hazard area would be relatively narrow as the dam and reservoir would likely be built in a relatively deep canyon to maximize storage. Once constructed the reservoir area would prevent flooding within the reservoir zone and also provide storage to minimize major floods downstream of the dam. Additionally, construction and operation of the new surface water storage facilities would not substantially increase the number of people exposed to the risk of flooding because they would not draw people to or place housing within flood hazard locations (including 100-year flood hazard areas). Construction and operation of new surface water storage facilities would not expose people to significant loss, injury, or death related to flooding. Impacts would be less than significant. • Construction of new surface water storage facilities would not substantially alter the existing drainage pattern of the site or area, or substantially increase the rate or amount of surface runoff such that the new surface water storage facilities would result in flooding or otherwise cause flooding, or create or contribute runoff water. New structures would be required to follow all appropriate building codes, dam design criteria, and engineering design standards, which would address drainage of the site. Impacts would be less than significant. • Operation of new surface water storage facilities and associated recreation facilities would not likely contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems. However, because there

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	would potentially be an increase in impervious surfaces associated with new recreational facilities (e.g., restrooms), stormwater runoff could increase. Table 16-38, under "Geology and Soils" lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts of recreational facility operation related to storm water runoff and drainage. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction of new surface water storage facilities and associated recreation facilities would not increase the volume of treated effluent discharged into receiving waters. This is because effluent would be treated via septic systems or contained in closed vault toilet systems. Therefore, it is expected that hydrology would not be affected. However, since these facilities may use septic systems, Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts of reservoir construction and operations and recreational facility operation related to septic systems. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Increases in groundwater pumping are not expected to occur under the construction and operation of new surface water storage facilities because such facilities would only pump groundwater to locally dewater wet areas during construction. Because construction of new surface water storage facilities would not result in a substantial increase in impervious surfaces and therefore would not interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or lowering of the local groundwater table. Impacts would be less than significant. • Construction and operation of new surface water storage facilities would primarily be located in areas of relatively steep relief because they would be within deep river canyons. Therefore, these locations would support mudflows, which typically need very steep slopes and large amounts of precipitation to occur. Additionally, reservoir filling would potentially increase landslides and mudflows from the steep reservoir side slopes as they were saturated by reservoir water. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts of reservoir construction and operations and recreational facility operation related to landscape instability. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • New surface water storage reservoirs are not expected to experience sufficient seismic ground shaking to generate in-reservoir seiches that could inundate recreational sites. However, large fast landslides into the reservoir could generate splash waves that would affect recreational sites along the reservoir. The potential for these large, fast landslides would depend on the local slope steepness, geologic materials, and thickness of surficial deposits. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts of reservoir creation on large fast landslides. Until such time that these potential mitigation

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	measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • There are no other ways in which construction or operation of new surface water storage reservoirs could result in a substantial degradation of water quality.
Land Use and Planning	• Construction and operation of new surface water storage facilities would not physically divide an established community because there are few communities in the vicinity of potential construction sites. Impacts would not occur. • Construction and operation of new surface water storage facilities would likely take place within areas designated as rural residential, open space or timber production zone (if on private lands) or on areas managed for forestry and wildlife (if on National Forest System lands or Bureau of Land Management administered lands). These lands are unlikely to be designated for dam and reservoir development and would require changes in zoning (for county or private lands) and changes in land use management designation (for National Forest System lands or Bureau of Land Management administered lands). • If the new surface water storage facilities were inconsistent with applicable land use plans, policies, or regulations, an amendment or variant from the local jurisdiction or National Forest or Bureau of Land Management approving the discretionary action associated with these facilities would be required to be obtained by the project proponent prior to project approval and construction. If no discretionary action occurred as a result of the construction or operation of the new surface water storage facilities, it is assumed they would not result in a conflict with local land use plans, policies, or regulations. Impacts would be less than significant. • Potential conflicts with habitat conservation plans, natural community conservation plans, Stanislaus or Sierra National Forest Plans or Bureau of Land Management plans or other plans, policies and regulations protecting biological species and resources are evaluated in the Biological Resources section of this table.
Mineral Resources	• Construction and operation of new surface water storage facilities would have a potential to result in the removal or inability to access state or locally designated mineral resource areas. This is because the new surface water storage facilities would inundate a large area along an existing river which could potentially include such designated mineral resource areas. If the new surface water storage facilities construction or inundation zone are located within a state or locally designated mineral resource area, construction and operation of these facilities would permanently remove access to these mineral resources. Before constructing new surface water facilities, sites would be assessed for suitability and property ownership as part of design and engineering feasibility studies. Sites would be assessed to determine if they are located on a state or locally designated mineral resource area, and mineral resource areas would be avoided to the extent feasible so that impacts on mineral resources can be avoided or minimized. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts associated with mineral resources during construction or reservoir operations. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, other than aggregate resources, there is limited potential to mitigate the loss of access to these mineral resources and impacts would be significant and unavoidable if they occurred.

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Noise	• Construction of new surface water storage facilities could generate temporary noise or ground-borne vibrations if blasting is used. It is likely that the new surface water storage facilities would be constructed in areas relatively removed from towns or population centers with sensitive receptors (e.g., homes, hospitals, schools). Additionally, since this would be a major, multi-year construction effort public access to the area would be restricted, thereby limiting the potential for public exposure to construction noise. If sensitive receptors were adjacent to construction activities and experienced construction noise, the impacts would likely be temporary and would be required to follow existing local noise ordinances limiting the timing of construction (e.g., generally Mondays–Fridays, 7am–6pm). However, given the large scale of constructing a new surface water reservoir and the unique types of construction required, it is likely that activities may need to occur for extended periods of time in 24-hour intervals. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant noise impacts related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • New surface water storage facilities would generate minimal noise during operation. The noise would be from release of water from the dam, from hydroelectric components within the dam, or alarm bells. This noise would only occur within the immediate vicinity of the reservoir dam. It is anticipated there would be a very low probability that sensitive receptors (e.g., homes, hospitals, schools) would be located within close proximity to experience the operating noise generated because it is anticipated that the facilities would be not be located near an existing town or population center. People exposed to the noise would be those visiting or recreating in the immediate vicinity and noise associated with the facility would be an expected part of that experience. Impacts would be less than significant. • The construction and operation of new surface water storage facilities would not bring people within close proximity to an airport or expose people to airport noise. Impacts would not occur.
Population and Housing	• The construction and operation of new surface water storage facilities would not involve the construction of new homes in the area. However, some operational personnel would be necessary for dam and hydroelectric operation and development of recreation facilities on the reservoir are likely. Depending on the distance to local small towns, onsite housing might be required for operational personnel. Recreation could involve camping, hiking, swimming, non-motorized or motorized boating, jet skis, hunting and angling. Depending on the size of the reservoir there is potential that new local small businesses (such as marinas, house boats, tent camp grounds, camp grounds with recreational vehicle utility hook ups, grocery and general purpose stores) could be located onsite or nearby. These recreational and business amenities would be expected to draw seasonal recreational users. The construction and operation of new surface water storage facilities would not involve the construction of new homes, the extension of roads, or other infrastructure that may induce substantial property or population growth in an area. Accordingly, impacts would be less than significant. • The construction and operation of new surface water storage facilities would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere because the facilities would be located in relatively remote areas. Impacts would not occur.

Potential Environmental Effects of New Surface Water Supplies	
Resource	Discussion
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. The operation of new surface water storage facilities and associated recreation facilities would involve an increase in people in the area, primarily for seasonal recreational purposes. The increased recreational use in an area would require additional local fire protection, wild land fire protection (e.g., CALFIRE), police protection, electrical service, and water service. Electrical service would likely be provided by dam hydroelectric power and the local water supply would likely come from the new reservoir. The need for new schools is not considered likely given that any population growth, if it occurs, is expected to be small. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts on public services related to operations and recreational use. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Recreation	• If new surface water reservoirs were constructed and overlapped the portions of rivers designated as National Wild and Scenic River (83 miles of the Tuolumne River: 47 miles wild, 23 miles scenic, 13 miles recreational) or studied as potentially eligible (Stanislaus River) then the impacts would be significant and unavoidable. The impacts are considered significant and unavoidable because of the elimination of these designated recreational resources and there is no mitigation available that would reduce these recreation impacts to less than significant. • Construction of new surface water storage facilities would likely involve the development of reservoir-associated recreation facilities. Recreation could involve camping, hiking, swimming, non-motorized or motorized boating, jet skis, hunting, and angling. Depending on the size of the reservoir there is potential that new local small businesses (such as marinas, house boats, tent camp grounds, camp grounds with recreational vehicle utility hook ups, grocery and general purpose stores) could be located on site or nearby. These recreational and business amenities would be expected to draw recreational users and some permanent residents to the area. These new recreation opportunities would be a benefit to recreational use in the vicinity of the new surface water storage facilities. Potential impacts on other resources as a result of constructing new recreational facilities are addressed by resource in this table. • Construction and operation of new surface water storage facilities could increase the use of existing parks or recreational facilities in the local region as recreationists unfamiliar with the area explore the area. However, it is not anticipated that additional new recreational facilities would be constructed beyond those described for Population and Housing in this table (e.g., marinas, house boats, tent camp grounds). Impacts would not occur.

Potential Environmental Effects of New Surface Water Supplies	
Resource	Discussion
Transportation and Traffic	• Construction of new surface water storage facilities would result in substantial additional trips associated with pre-construction surveys (e.g., geotechnical, environmental), construction workers, and equipment delivery over a multi-year period. New surface water storage facilities likely would be located in rural, low population areas with a limited and narrow lane road network with limited baseline congestion. The increased traffic over this multi-year period would exceed local or regional road trip thresholds. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts on transportation and traffic related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction. • Operation of new surface water storage facilities and new recreational use of reservoir facilities would generate additional vehicle trips by workers and recreationists. The number of trips by dam workers would be small. However, recreation and recreation-associated traffic would likely be substantial at times (such as summer holiday weekends) potentially exceeding local or regional trip thresholds. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts on transportation and traffic associated with operations. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Construction of new surface water storage facilities would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Construction and operation of new surface water storage facilities would not be expected to exceed wastewater treatment requirements of the Central Valley Water Board because water releases from a new dam would be expected to meet water quality objectives in the receiving water. The additional storage could also provide flexibility to meet water quality objectives in the rim dams if there was additional control of inflowing water. Dam operational facilities and recreation sites would not be expected to require a new WWTP in the vicinity. Wastewater would be addressed via properly designed septic systems and/or closed vault toilet systems. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts from septic systems associated with construction and operations. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The construction and operation of new surface water storage facilities would require the construction of additional storm water drains for them or for the associated recreational facilities. However, surface water drainage design from these locations would be required to ensure that new septic system leach fields function properly. Table 16-38 lists potential mitigation measures that lead agencies (e.g., state or federal agencies, utility districts) can and should implement to reduce potentially significant impacts from septic systems associated with construction and operations (identified in the table under Utilities and Service Systems), and from storm water drains (identified in the table under Hydrology and Water

Potential Environmental Effects of New Surface Water Supplies	
Resource	Discussion
	Quality). Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of new surface water storage facilities could generate solid waste from construction debris, from operational facilities and from recreation sites at the reservoir. Most of this type of solid waste is not considered hazardous. Disposal of hazardous and non-hazardous materials would follow all regulations and guidelines of solid waste in Class I (hazardous waste)/II landfills (non-hazardous waste landfills). Impacts would be less than significant.

16.3 Lower San Joaquin River Alternatives – Non-Flow Measures

This section describes non-flow measures that affected entities may undertake in the plan area between the rim dams on the Stanislaus, Tuolumne, and Merced Rivers or on the LSJR and in the southern Delta. Non-flow measures would not be implemented above the rim dams in the extended plan area. These non-flow measures would inform the body of scientific literature and understanding regarding special-status fish species and the stressors and mechanisms that have contributed to their decline on the three tributaries and in the southern Delta. The information provided by these measures could potentially be used to inform adaptive implementation decisions under each of the LSJR alternatives. The non-flow measures evaluated in this section include the following.

- Floodplain and Riparian Habitat Restoration
- Reduce Vegetation-Disturbing Activities in Floodplains and Floodways
- Gravel Augmentation
- Enhance In-Channel Complexity
- Improve Temperature Conditions
- Fish Passage Improvements—Fish Screens (screen unscreened diversions in tributaries and LSJR)
- Fish Passage Improvements—Physical Barriers in the Southern Delta
- Fish Passage Improvements—Removal or Modification to Human-Made Barriers to Fish Migration
- Predatory Fish Control
- Invasive Aquatic Vegetation Control (i.e., plant control)

While these actions may inform adaptive implementation, the State Water Board would not be undertaking these actions since these non-flow measures are beyond its regulatory authority to undertake; rather, it is the entities affected by the LSJR alternatives, or resource agencies with the authority to do so, who could choose to undertake one or more of these actions to inform adaptive implementation. The environmental impacts of these potential actions are evaluated below.

16.3.1 Floodplain and Riparian Habitat Restoration

Floodplain and riparian habitat restoration is recognized as a key component of comprehensive ecosystem restoration and species recovery efforts in the Central Valley. These types of projects are typically focused on the lowland mainstem and tributary reaches of Central Valley rivers, such as the Stanislaus, Tuolumne, and Merced Rivers, where channels, bars, and floodplains are formed and maintained through the processes of sediment transport, deposition, and channel migration. In addition to flow modification to promote natural physical and ecological processes that form and sustain riparian and floodplain habitat (Opperman 2012), a number of non-flow actions, typically acting in concert with flow, have been identified as integral components of floodplain and riparian habitat restoration. It is broadly recognized that historical and contemporary impacts on floodplain and riparian habitat associated with flow regulation, channelization, levee building, and human land use have greatly diminished the capacity of Central Valley rivers to support the ecologic functions necessary to restore native fish and wildlife populations (CALFED 2000a, USFWS 2001), and that active, physical modification of existing and historical river corridors is also required to substantially improve these functions (McBain and Trush 2000).

Typical non-flow measures to restore floodplain and riparian habitats include the following:

- Creation or expansion of natural or engineered floodways or flood bypasses.
- Modifications of river and floodplain geometry (e.g., floodplain lowering) to increase floodplain inundation.
- Active planting or allowing natural establishment of riparian vegetation on restored floodplain surfaces or converted agricultural land.
- Hydrologic reconnection of historical floodplains to active river channels through levee breaches and/or setbacks.
- Removal of riprap or other bank protection (e.g., dredger tailings) restricting active channel migration and floodplain creation.

Cost Evaluation

Floodplain and riparian habitat restoration can be achieved through the different approaches described above. While site-specific conditions influence the cost of the approach, in general, removal of riprap or other bank protection and active plantings are generally lower cost approaches when compared to creating or expanding natural or engineered floodways, modifications of river and floodplain geometry, or hydrologic reconnection of historical floodplains through levee breaches and/or setbacks. This is generally because removal of riprap and active plantings may require fewer feasibility and design studies, fewer permits, and fewer responsible agencies may be involved and require limited adaptive management and mitigation monitoring plans to evaluate the effectiveness of the projects. In addition, removal of riprap and active plantings are less likely to require the purchase of property, which can be a substantial cost associated with floodplain and riparian habitat restoration. For example, the LSJR Floodplain Protection and Restoration Project acquired a total of 223.54 acres of wildlife habitat adjacent to the SJR and eastside tributaries for preservation and future enhancement of riparian and wetland habitats for a cost of $1.1 million (CALFED ERP 2016). The Basso Bridge Ecological Reserve and Merced River Ranch Land Acquisitions on the Merced River were purchased for approximately $830,000 of riparian habitat in 1997 to protect spawning riffles and enhance riparian species (CALFED ERP 2016). At the time of purchase, it was simply to secure the land and active restoration was not planned (CALFED ERP 2016). Levee breaches depending on the size, scale, and location of the projects, can be very costly. For example, the Cosumnes River Floodplain Restoration Project, where the U.S. Army Corps of Engineers breached and abandoned 5.5 miles of levees to allow the river to flow into the floodplain as a result of the 1997 floods, resulted in a cost of $1.55 million (Swenson et al. n.d.).

Environmental Evaluation

The primary sources of information for the following general description of floodplain and riparian restoration projects and associated environmental impacts were DWR (2013a), National Marine

Fisheries Service (NMFS) (2013), U.S. Fish and Wildlife Service (USFWS) (2013), and McBain and Trush (2000). Additional references are cited below.

Summary of Potential Action

Planning and design activities for floodplain and riparian restoration projects may include topographic surveys, flood frequency analysis, hydraulic modeling, geomorphic investigations, and sediment modeling of alternative design scenarios. Integration of ecological criteria to define specific hydrologic, hydraulic, and topographic attributes of functional floodplain and riparian habitat may also be used to guide restoration design and optimize benefits for target restoration species (Williams et al. 2009, Matella and Merenlender 2014).

The magnitude of construction impacts on vegetation, soils, streambed substrates, and water quality depends on the extent and duration of disturbance to existing habitat and species, and the extent of temporary and permanent habitat loss. Construction activities for floodplain and riparian restoration projects may include demolition and/or relocation of roads, utilities, and other existing structures; clearing and grubbing of staging and work areas; removal and/or placement of rock or biotechnical slope protection (depending on hydraulic considerations); grading of river–floodplain connections and floodplain surfaces; stockpiling of equipment and materials; and installation of irrigation systems and restoration plantings. Typical construction equipment includes graders, excavators, loaders, cranes, and barges. Common environmental commitments or BMPs to avoid, minimize, or offset potential environmental effects may include seasonal work windows; preconstruction biological surveys; biological monitoring during construction; invasive species prevention; construction noise and light reduction measures; traffic control; SWPPP; spill prevention, control, and countermeasure plan; turbidity compliance monitoring; and soil hazard testing and disposal.

Operation and maintenance of floodplain and riparian restoration sites may include vegetation maintenance (irrigation, weeding, and monitoring), control of burrowing rodents, road reconditioning, visual inspections, and slope repair. To address uncertainties in the ecological processes governing floodplain and riparian habitat formation and maintenance at selected sites, progress toward achieving the objectives or optimizing the benefits of these projects is typically monitored and guided through an adaptive management process.

Potential Environmental Effects

Depending on the size and scale of floodplain or riparian restoration, these types of projects may fit within a categorical exemption under CEQA. CEQA allows categorical exemptions for classes of projects which have been determined not to have a significant effect on the environment. (Pub. Res. Code, § 21084.) Specifically, small habitat restoration projects, on sites that do not exceed 5 acres, are exempt from CEQA review under a Class 33 categorical exemption provided that:

- There would be no significant adverse effect on endangered, rare, or threatened species or their habitat.
- There are no hazardous materials or toxic waste at or around the project site that may be disturbed or removed.
- The project would not result in impacts that are significant when viewed in connection with effects of past projects, the effects of current projects, and the effects of probable future projects.

Small habitat restoration projects include stream or river bank revegetation to improve habitat for amphibians or native fish.

If a floodplain or riparian habitat restoration project does not meet the Class 33 exemption requirements, then the project would require CEQA review. Construction of floodplain and riparian habitat restoration projects may result in temporary and localized effects typically associated with construction activities, including a change in water quality, air quality effects, and ground and channel disturbance. Floodplain and riparian restoration would likely occur below the dams which are accessible to Chinook salmon and steelhead on the LSJR, and Stanislaus, Tuolumne, and Merced Rivers where there is currently a lack of floodplain and riparian habitats. The restoration areas would vary by river, depending on the channel geometry and if fish are currently using the areas. River channels would be graded and riparian vegetation planted in areas that could support special-status fish species such as Chinook salmon and steelhead. Aquatic and terrestrial biological resources would be the most affected during construction activities to restore floodplain and riparian habitat.

It is reasonable to assume that restoration of floodplain and riparian habitat would be professionally installed by contractors familiar with such projects. Depending on the magnitude of the projects, construction could last anywhere from several weeks to several months. If the project is large enough, it may extend over two construction seasons but last no more than a total of 12 months, to comply with June–October in-water work restrictions. It is expected construction activities would occur during the dry season (typically June–October) when anadromous fish would not be spawning and in compliance with endangered species requirements. BMPs for controlling sediment and contaminant release into waterbodies would be used to minimize potential effects associated with water quality and hazardous materials per regulations under the Clean Water Act and any permitting requirements and conditions from the Central Valley Water Board or the U.S. Army Corps of Engineers. Floodplain restoration sites would result in changes to hydraulics, channel substrate, and stream habitats. Riparian restoration would increase habitat for special-status wildlife and fish species. The changes to hydraulics, channel substrate, stream habitats, and increases in habitat conditions are expected to achieve the purpose of restoring the habitat and benefit aquatic and terrestrial biological resources.

Table 16-12, *Potential Environmental Effects of Floodplain and Riparian Habitat Restoration*, summarizes the potential environmental effects associated with floodplain and riparian habitat restoration. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of this non-flow measure and is referenced in Table 16-12 where appropriate.

Table 16-12. Potential Environmental Effects of Floodplain and Riparian Habitat Restoration

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
Aesthetics	• Construction and operation of floodplain and riparian restoration projects could affect scenic vistas, but only temporarily during construction and they would not permanently alter scenic vistas. Construction may be observable for a temporary period of time when heavy equipment is used to grade banks, move sediment, and plant vegetation around the project site. However, it is anticipated that the location of these projects would not be within close proximity to sensitive viewers (e.g., recreationists or residents) given the remote location of the projects within rivers. If sensitive viewers are located within close proximity, the temporary nature of construction and the fact that views would not be permanently changed would be such that significant impacts would not occur. Operation may be noticeable at first during the time it takes for natural processes such as establishment of riparian vegetation and river channel dynamics to occur. After that, the river channel may be more aesthetically pleasing due to the enhanced vegetation and restoration of natural river morphology. Lighting is not expected to be used during floodplain and riparian restoration projects. Construction is expected to occur during daylight hours given the location of the projects. Impacts would be less than significant.
Agriculture and Forestry Resources	• Construction and operation of floodplain and riparian restoration projects could be located on lands used for agriculture if the expansion of floodplain habitat included setback levees and breaches. Land use below the dams on the rivers is predominantly zoned as general agriculture and limited agriculture. Allowed uses for general agriculture typically include compatible public, quasi-public, and special uses and natural open space areas. Limited agriculture also allows for compatible public, quasi-public, a special uses such as parks and natural open spaces. Floodplain expansion and riparian vegetation planting or natural establishment may occur on agricultural land (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) if located close to the river channel. In some instances, if agricultural land is allowed for special uses and natural open spaces, floodplain expansion and riparian vegetation restoration could fall into these categories and there would be no conflict with existing zoning for agriculture use or a Williamson Act contract. If agricultural land is not allowed for special uses and natural open space, then floodplain expansion and riparian vegetation may permanently convert Prime Farmland, Farmland of Statewide Importance and Unique Farmland to nonagricultural uses (i.e., restored floodplain and riparian habitat). The extent of the impact would depend on the total acres permanently removed from agricultural use and whether they were in Williamson Act contracts. Agricultural mitigation programs and agricultural preservation statutes are designed to compensate for the premature and unnecessary conversion of agricultural land to urban uses, discourage discontiguous urban development patterns, and promote the conservation, preservation, and continued existence of open space lands. For this reason, traditional agricultural mitigation programs, such as agricultural conservation easements, may be inapplicable to habitat projects, which retain land in open space use even if it is not agricultural. As a result, agencies have taken different approaches in addressing conversion of agricultural lands for ecosystem improvements, based, in part, on their missions. Table 16-39 identifies mitigation strategies that may be applicable that lead agencies can and should implement, which have been identified for prior habitat

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
	projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Forest land is limited or does not occur below the dams on the rivers; therefore there would be no conflict with existing zoning of forest land, or conversion of forest land to non-forest use. Impacts would not occur.
Air Quality	• Construction of floodplain and riparian restoration projects would likely result in emissions associated with construction equipment and construction worker vehicle trips. The quantity, duration, and the intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. Floodplain and riparian restoration could take several weeks to several months, depending on the magnitude of the project. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Since construction of groundwater wells does not require lengthy construction activities, the potential for significant environmental effects is minimal. Further, construction emissions generated would need to comply with the SJVAPCD regulations and established thresholds. Lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on air quality associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction of floodplain and riparian restoration projects would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The construction of floodplain and riparian restoration projects would not result in growth because these projects are habitat restoration projects for the benefit of special-status fish species. Accordingly, these projects would not result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Impacts would not occur. • Operation of floodplain and riparian restoration projects would likely result in scheduled maintenance or monitoring vehicular trips. Emissions from the vehicles would not prevent compliance with regulations or exceed thresholds established by SJVAPCD, conflict with or obstruct implementation of the applicable air quality plan or violate any air quality standard or contribute substantially to an existing or projected air quality violation, or result

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
	in a net increase of any criteria pollutant for which the project region is nonattainment under applicable federal or state ambient air quality standards, given the limited number of vehicles over a longer timeframe. Impacts would be less than significant. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). Floodplain and riparian restoration projects would not create objectionable odors affecting a substantial number of people. Impacts would not occur.
Biological Resources	• Construction of floodplain and riparian restoration projects could release sediment and possibly hazardous materials (e.g., oil or gas from construction equipment) into waterbodies, affecting water quality. Release of sediment can bury macroinvertebrates which are prey for fish and other aquatic species, coat or bury eggs from frogs and fish, and fill in pool habitat. Operation of floodplain and riparian restoration projects would change aquatic habitat by changing river width, river habitat types (riffles, pools, runs), and hydraulics. While construction may have some temporary adverse effects, overall restoration would have beneficial long-term effects for sensitive aquatic and terrestrial species (e.g., Chinook salmon, steelhead, California red-legged frog, western yellow-billed cuckoo). Water quality measures such as monitoring turbidity during construction to ensure compliance with the objectives of the Water Quality Control Plan for the Sacramento River and SJR Basins (Basin Plan) and construction BMPs would be implemented as either mitigation measures under CEQA or permit requirements and conditions. Furthermore, a mitigation, monitoring, and management plan (MMP) would be enforced after restoration is completed. These measures are part of permitting requirements and conditions by resource agencies including USFWS, California Department of Fish and Wildlife (CDFW), Central Valley Water Board, and U.S. Army Corps of Engineers. The floodplain and riparian restored areas would need maintenance to control invasive plant species, and monitoring to determine survival of planted riparian vegetation and to ensure the floodplain is functioning as designed and benefiting fish and wildlife species once construction is complete. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction of floodplain and riparian restoration projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction of floodplain and riparian restoration projects would not interfere with the movement of native residential or migratory fish species and associated migratory corridors, or impede the use of nursery sites because any work done in the water would occur during June to October when fish are not spawning or migrating. In addition, overall it is expected that there would be a beneficial effect on special-status fish species following restoration. Impacts would not occur.

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
	• The surrounding habitat on river banks may include riparian vegetation and/or wetlands. Riparian vegetation may have to be removed to facilitate heavy equipment movement and wetlands may also be disturbed during construction activities. This would result in a significant impact on riparian habitat and wetlands. Under operations, wetlands would not be affected and riparian vegetation would be enhanced. Removal and/or disturbance of riparian and wetlands habitats would be compensated for at a ratio appropriate for the disturbance per standard permit requirements or conditions from the U.S. Army Corps of Engineers and the Central Valley Water Board, or the floodplain and riparian restoration would be self-mitigating if it included wetland habitat. This would reduce and minimize impacts on fish and wildlife species and their habitats. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction of floodplain and riparian restoration projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of floodplain and riparian restoration projects would be located in river reaches that support special-status fish species such as Chinook salmon and steelhead. These areas are expected to have high potential for special-status plant species, animal species, and habitat, and support biological resources. Floodplain and riparian restoration projects would occur during the least sensitive periods of special-status species life stages, (i.e., during the dry season between June and October), as this would reduce and minimize impacts on aquatic species and would be required through either the CEQA process or through permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers. Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce potentially significant environmental effects of construction and operations on special-status biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • While construction may result in temporary localized adverse effects on special-status species, plants, and habitat, construction activities are highly unlikely to result in population level adverse effects for any species. Floodplain and riparian restoration are discussed under the SJR Wildlife Refuge CCP and the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) as a means to enhance fish habitat on the rivers. In addition, conflicts with local policies as a result of construction are not considered significant because of the temporary and localized nature of the effects. As such, this impact would be less than significant.

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
Cultural Resources	• Construction and operation of floodplain and riparian restoration projects would be within existing river banks and channels or immediately adjacent. It is unknown if cultural resources (significant historical, archeological, or paleontological resources) exist in these locations, and river banks that contain cultural resources could be excavated for floodplain restoration during construction. Typically the river channels have had high levels of disturbance because of hydraulic conditions; and as such, there is a low potential for significant cultural resources to exist within the rivers. Similarly, there would be a low potential for the discovery of human remains due to the regular disturbance. However, if levees were breached during construction, there could be cultural resources or human remains within the potential levee. Operation of floodplain and riparian restoration areas would have a very low potential to affect cultural resources because operation would be along the river bank and channels. Where construction within areas that may contain cultural resources cannot be avoided, an assessment would be conducted of the potential for damage to cultural resources prior to construction. The assessment may require hiring a qualified cultural resources specialist to determine the presence of significant cultural resources or human remains. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant effects on cultural resources associated with construction of floodplain and riparian restoration projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.
Geology and Soils	• Floodplain and riparian restoration could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, floodplain and riparian restoration would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, or landslides. Impacts would not occur. • Project sites would be evaluated before construction begins for the potential of soil erosion in the design of the restoration project. Floodplain and riparian restoration projects should not result in substantial erosion or sedimentation that would not support the objectives of the restoration under operating conditions. However, given construction would likely take place along rivers and in riparian areas where erosion can take place depending on the soil characteristics, geology, and area of disturbance, lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant erosion or sediment effects associated with construction or operation of floodplain and riparian restoration projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Floodplain and riparian restoration would not bring people to the risk of earthquakes or geologic hazards, meaning the operation of the restored areas would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur.

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
Greenhouse Gas Emissions	• Construction of floodplain and riparian restoration would result in increased GHG emissions from use of heavy equipment. While construction activities would be limited from several weeks to several months, it is likely that restoration activities could result in a potentially significant GHG impact. Although the SJVAPCD has not established construction-related GHG thresholds, they have identified a level of GHG emissions per year (230 MT CO_2e) below which project-specific increases in GHG emissions would be considered equivalent to zero for CEQA purposes. This amount, known as a ZEL, can be used to evaluate construction emissions when they are amortized over the project's anticipated operational lifespan. For example, a project using a 30-year operational lifespan would be considered significant if total construction emissions would exceed 6,900 MT CO_2e (230 MT CO_2e/year* 30 years = 6,900 MT CO_2e), while a project using a 50-year operational lifespan would be considered significant if total construction emissions would exceed 11,500 MT CO_2e (230 MT CO_2e/year * 50 years = 11,500 MT CO_2e). Depending on the level of construction activities and the potential operational lifespan of the project, construction-related GHG emissions could exceed these values and result in a potentially significant impact. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • During operation, some vehicles may be needed for monitoring or maintenance of restored areas. However, the trips would be limited, of very short duration, and over a long period of time (e.g., one trip every year). As such, they would likely result in extremely small quantities of GHG emissions. However, GHG emissions may still exceed SJVAPCD's ZEL. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
	inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Hazards and Hazardous Materials	• Construction and operation of floodplain and riparian restoration would not be a hazard or provide a safety concern to public or public use airports or private airstrips because restoration would be constructed and operated within, or immediately adjacent to, the river banks and channels and would not involve structures that could impede, interfere, or otherwise create a safety hazard to airports or air traffic. As such, construction and operation of floodplain and riparian restoration would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Construction and operation of floodplain and riparian restoration would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road and within, or immediately adjacent to, the river banks and channels. Impacts would not occur. • Construction and operation of floodplain and riparian restoration projects would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur. • Construction of floodplain and riparian restoration projects could involve the temporary use of small amounts of hazardous materials, such as gasoline or diesel, to power construction equipment. Excavation would be necessary and utility lines could be within proximity to the project site. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts due to hazards and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The precise location of where floodplain and riparian restoration projects would be constructed is not yet known; however, these projects could be constructed within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Additionally, depending on the location of construction, remediation may be needed to address soil contamination during excavation activities. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because

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Resource	Discussion
	hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • Lists of hazardous materials site are compiled by different state agencies under Government Code, § 65962. These sites are also known as Cortese Sites. There were no sites identified on the Hazardous Waste and Substance Site List compiled into the EnviroStor online database managed by the DTSC for Calaveras, Tuolumne, or Mariposa Counties (CalEPA 2016). There were a total of 17 sites identified for Merced, San Joaquin, and Stanislaus Counties. In addition to these sites identified by the EnviroStor database, CalEPA also identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facilities where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action for these counties (CalEPA 2016). There are approximately 500 leaking underground storage tanks designated as open in these counties (CalEPA 2016). There are approximately 55 facilities in these counties that have received CDOs/CAOs not identified as non-hazardous wastes, domestic wastewater or domestic sewage (CalEPA 2016). The active and open leaking underground storage tank cases and the CDO/CAO facilities are located throughout these counties. Although it is not yet known precisely where floodplain and riparian restoration would be constructed, if restoration were done on a Cortese Site, because construction activities would likely entail some ground disturbance (e.g., grading), there would be potential for release of existing soil contaminants. Were this to occur, impacts could be significant. Table 16-39 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • Construction of floodplain and riparian restoration sites would require excavation. Utilities may be underneath the sites or adjacent to a site and may need to be relocated or avoided. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potential hazards associated with excavation around utilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.
Hydrology and Water Quality	• Construction of floodplain and riparian restoration projects may temporarily change water quality due to grading the river banks and channels. Excavating the river bank and driving heavy equipment in and near the river channel could result in a temporary increase in turbidity. Due to the limited nature of construction and construction activities limited to the dry season, it is not expected that water quality standards for the protection of fish and wildlife would be exceeded because construction timing (i.e., June–October) would avoid the most sensitive life stages of special-status fish species. Additionally, turbidity would be monitored to maintain compliance with Basin Plan water quality objectives. Construction of floodplain and riparian restoration projects would not alter the capacity of existing or planned storm water drainage systems, and would not provide substantial additional sources

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
	of polluted runoff. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of floodplain and riparian restoration projects would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge because these projects would not require groundwater during construction or operation, and would not result in an increase in impervious surfaces. Impacts would not occur. • Operation of floodplain and riparian restoration projects could alter the existing drainage pattern of the site or area, but is not expected to cause substantial erosion, siltation, substantial runoff, or result in flooding on- or offsite. Floodplain restoration is typically used as a mechanism to decrease flooding. Floodplains allow water to spread across a wider area and relieve constricted channels of flow. Constriction of flow typically results in erosion or siltation. Additionally, site design would assess existing hydrology and channel geomorphology to ensure the restoration of floodplain or riparian habitat meets project objectives and provides benefits to intended targeted species. An MMP, which is part of the permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers, would be implemented to ensure no erosion is occurring, floodplain design is successful, and newly planted riparian vegetation is surviving. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of floodplain and riparian restoration projects would not place housing within a 100-year flood hazard area because implementation of these restoration project would not entail the construction of housing. Impacts would not occur. • Construction and operation of floodplain and riparian restoration projects would not substantially increase the number of people exposed to the risk of flooding because these projects would not draw people to flood hazard locations. As such, construction and operation of floodplain and riparian restoration projects would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Construction and operation of floodplain and riparian restoration projects would not entail the construction of structures in a 100-year flood hazard area that would impede or redirect flows. Impacts would not occur. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Floodplain and riparian restoration is not expected to occur near a lake or reservoir. Impacts would not occur.

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
	• There are no other ways in which construction or operation of floodplain and riparian restoration areas could result in a substantial degradation of water quality.
Land Use and Planning	• Construction and operation of floodplain and riparian restoration projects would not physically divide an established community because they would be located within existing river banks and channels, or immediately adjacent to them, and communities are not established in these areas. Impacts would not occur. • Construction and operation of floodplain and riparian restoration sites would occur in existing river banks and channels, or immediately adjacent to them, and would not conflict with land use designations or zoning. Frequently these areas are designated natural resource or open space areas by land use plans. Restoration would be consistent with those designations because it would enhance existing habitat for fish and wildlife species. Impacts would not occur. • The following habitat conservation plans cover parts of the Stanislaus, Tuolumne, and Merced Rivers: SJR Wildlife Refuge CCP and the SJMSCP. These plans protect special-status species within the San Joaquin, Stanislaus, Tuolumne, and Merced Rivers. As described in the Biological Resources section of this table, there would be some temporary construction impacts on adjacent riparian and/or wetland areas, but lead agencies would mitigate these temporary impacts through measures identified in Table 16-39. As such, no conflicts are expected with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations. Impacts would not occur.
Mineral Resources	• There are known aggregate mines along all three eastside tributaries[15] (Clinkenbeard 1999, Clinkenbeard 2012a and 2012b, Higgins and Dupras 1993, Rapp et al. 1977, Smith and Clinkenbeard 2012). Although these may not all be active at present, it is assumed some exist on each river even if their exact location with respect to active channel proximity is unknown. Construction and operation of floodplain and riparian restoration could have the potential to result in the removal or inability to access state or locally designated mineral resource areas, depending on the location of the restoration area and the location of the active mining site. However, there are several reasons why there is a low potential for this to occur. Before constructing floodplain and riparian restoration areas, sites would be assessed for suitability and property ownership as part of design and engineering feasibility studies. Restoration sites would be assessed to determine if they are located on a state or locally designated mineral resource area. It is likely these areas would be avoided for restoration because these areas do not have the characteristics needed for successful floodplain and riparian habitat restoration projects (i.e., suitable substrate and lack of aggregate). Further, it is unlikely that a gravel operator/owner would allow floodplain and riparian restoration on a designated mineral resource area that is being actively mined. In addition, aggregate mine operators are required to reclaim mined areas once the mining is complete and there may be opportunities to enter into cooperative agreements for floodplain and riparian habitat restoration projects once active mining is complete. Therefore, there is a low

[15] In this document, the term *three eastside tributaries* refers to the Stanislaus, Tuolumne, and Merced Rivers.

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
	potential that the construction and operation of floodplain and riparian restoration would remove or prevent access to state or locally designated mineral resource areas. As such, impacts would be less than significant.
Noise	• Construction of the floodplain and riparian restoration sites would create noise related to the use of heavy construction equipment. The sites would be located within, or immediately adjacent to, river banks and channels on the San Joaquin, Stanislaus, Tuolumne, and Merced Rivers where people generally do not live. It is unlikely people would be permanently exposed to noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies due to the remote location of these projects from populous areas. Excessive ground-borne vibration or ground-borne noise levels are also not expected due to the location of the projects and the standard type of construction equipment that would be used. Temporary elevated noise in excess of standards established in local general plans, noise ordinance, or applicable standards, may occur during the day (as construction is not expected to occur at night) and for short periods of time. However, given the limited exposure of potential sensitive receptors to this potential temporary increase and low likelihood of potential sensitive receptors to exist because of the remoteness of the project sites, it is expected impacts would be less than significant. Operation of the floodplain and riparian restoration sites would not create noise. There may be some maintenance activities requiring construction equipment and vehicular trips for monitoring, but they would not create a permanent increase in ambient noise and would be temporary in duration and infrequent. This impact would be less than significant. • Construction and operation of floodplain and riparian restoration sites would not generate excessive noise that would result in people's exposure to excessive noise levels near airports. Impacts would not occur.
Population and Housing	• The construction and operation of floodplain and riparian restoration sites would not involve construction of new homes or businesses, extension of roads, or other actions that may induce substantial property or population growth in an area. Furthermore, restoration sites would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people. Impacts would not occur. • The construction and operation of floodplain and riparian restoration sites would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere. Restoration sites would be located within, or immediately adjacent to, river banks and channels. No homes or people would be displaced. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, construction and operation of floodplain and riparian restoration sites would not involve an increase in population or housing. In addition, these actions would not include proposals for new housing or increase demands for school services or facilities. Impacts would not occur.

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
Recreation	• Construction of floodplain and riparian restoration sites would occur within, or immediately adjacent to, river banks and channels on the San Joaquin, Stanislaus, Tuolumne, and Merced Rivers. It is possible that recreational facilities would be located in areas where floodplain and riparian restoration sites would occur. If recreational facilities were located within very close proximity, construction of floodplain and riparian restoration sites may affect them; however, it is unlikely that there would be significant effects on recreational facilities because construction would be temporary and limited (e.g., several weeks to several months). Construction and operation of floodplain and riparian restoration sites would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would be less than significant.
Transportation and Traffic	• Construction of floodplain and riparian restoration sites could result in some additional vehicle trips associated with construction workers. The temporary increased traffic during construction would likely not exceed local or regional road trip thresholds, because generally a small number of construction workers are required. Generally these types of projects require approximately 45 additional trips per day for construction workers and approximately 50 trips per day for borrow material transport (CVFPB 2013). Additionally, the duration of construction would be short (e.g., several weeks to several months). Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant transportation and traffic impacts related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Operation of floodplain and riparian restoration sites would not generate additional trips beyond those required to maintain the sites. If maintenance activities are needed, they would be temporary in nature, infrequent and operation of the sites would not increase traffic. Impacts would not occur. • Construction of floodplain and riparian restoration sites would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.

Potential Environmental Effects of Floodplain and Riparian Habitat Restoration	
Resource	Discussion
Utilities and Service Systems	• Construction and operation of floodplain and riparian restoration sites would not affect the ability to meet wastewater treatment and discharge requirements of the Central Valley Water Board because site restoration would not involve wastewater. Impacts would not occur. • Construction and operation of floodplain and riparian restoration sites would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. As such, impacts would not occur. • Construction and operation of floodplain and riparian restoration sites would not need the construction of additional storm water drains because the restoration would be built within, or immediately adjacent to, river channels and would not generate storm water and would not need storm water infrastructure. Impacts would not occur. • Construction and operation of floodplain and riparian restoration sites would not generate an increase in solid waste because modifications would be limited to the river bank and channel and would not generate large quantities of solid waste. Impacts would not occur. • Construction and operation of floodplain and riparian restoration sites would not require a water supply because modifications to the river bank and channel do not require a water supply. Impacts would not occur.

16.3.2 Reduce Vegetation-Disturbing Activities in Floodplains and Floodways

This action may be included as part of discretionary or non-discretionary permit conditions, guidelines, or policies governing existing levee and floodway maintenance activities as well as implementation of floodplain, floodway, or riparian management and restoration plans in areas adjacent or within the Stanislaus, Tuolumne, and Merced River channels. Participating entities may include NMFS, CDFW, USFWS, Central Valley Water Board, Central Valley Flood Protection Board, U.S. Army Corps of Engineers, local landowners, county governments, local agricultural commissions, and other land management agencies in the watersheds of the LSJR, Stanislaus, Tuolumne, and Merced Rivers. Where such actions do not conflict with existing federal, state, or local flood risk reduction policies, regulations, or ordinances, reducing vegetation-disturbing activities would apply to grazing, mowing, cutting, spraying, disking, and other activities to promote preservation and restoration of riparian vegetation in floodplains or floodways.

Cost Evaluation

Removal of floodway vegetation is typically considered a maintenance cost by the responsible flood control agencies. Reduction in floodway vegetation removal could be accomplished as a collaborative effort between the flood control and environmental agencies. The flood control agency maintenance costs would be reduced by allowing vegetation to stay in the floodway. If environmental agencies incentivized retaining vegetation, then flood control agencies could receive a credit for increasing habitat.

Environmental Evaluation

Measures to reduce vegetation-disturbing activities in floodplains and floodways include but are not limited to the following:

- Develop grazing strategies that protect and improve streamside vegetation and minimize bank disturbance.
- Conduct outreach to inform landowners of state and federal laws and regulations that protect riparian, wetland, and Endangered Species Act (state and federal) protected vegetation.
- Review and potentially modify existing floodplain, floodway, and riparian vegetation management plans, or develop new ones using the best available science, to balance the needs of the ecosystem, public safety, and other considerations.
- Compile data, conduct studies, and review literature to determine the influence that large trees and other vegetation types have on levee and floodway safety, and use this information to make science-based floodplain and floodway management decisions.

Potential Environmental Effects

The measures listed above that would reduce vegetation-disturbing activities have a relatively limited ability to result in significant physical impacts on the environment. These measures would generally not require substantial construction activities, and would not result in potential construction-related environmental impacts.

CEQA allows categorical exemptions for classes of projects which have been determined not to have a significant effect on the environment. (Pub. Res. Code, § 21084.) Specifically, information collection is exempt from CEQA review under a Class 6 categorical exemption. The Class 6 exemption consists of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. These may be strictly for information gathering purposes or as part of a study leading to an action which a public agency has not yet approved, adopted or funded. (Pub. Res. Code, § 21084.) In addition, a Class 7 categorical exemption consists of actions taken by regulatory agencies to assume the maintenance, restoration, or enhancement of natural resources where the regulatory process involves procedures for protection of the environment. (Pub. Res. Code, § 21084.) Examples include, but are not limited to, wildlife preservation activities by CDFW. Since the measures to reduce vegetation-disturbing activities in floodplains and floodways generally do not require construction activities, some of the measures may be categorically exempt from CEQA including: conducting outreach to land owners, compiling data, and reviewing literature for reducing vegetation-disturbing activities.

Reviewing and modifying management plans could physically affect the environment if the modifications are implemented. If modification to these plans resulted in more floodplain restoration projects and riparian habitat restoration projects, then impacts would be similar to those disclosed in Section 16.3.1, *Floodplain and Riparian Habitat Restoration*, and in Table 16-12, *Potential Environmental Effects of Floodplain and Riparian Habitat Restoration*. Developing strategies to protect and improve streamside vegetation could result in actions such as fencing off certain areas to prevent or reduce grazing or other more intensive ground-disturbing agricultural activities or reducing streamside application of herbicides and pesticides. These types of physical actions taken to reduce vegetation disturbance would be considered minor, and are not expected to result in significant environmental impacts on resources, including special-status species, given the limited geographic scope and scale when compared to areas that would not be affected by the actions.

Reducing vegetation-disturbing activities in floodplains and floodways may result in long-term beneficial effects on water quality, hydrology, and channel geometry because vegetation stabilizes slopes and retains sediment resulting in clearer water, creates more complex habitat for fish by changing water velocity, and can narrow or widen the river channel. The reduction of vegetation-disturbance activities would likely occur below the major rim dams on the LSJR, and the Stanislaus, Tuolumne, and Merced Rivers where there is a lack of riparian habitat or there is active vegetation disturbance. A change in vegetation could result in changes to hydraulics, channel substrate, and stream habitats. Controlling erosion and allowing riparian vegetation to become re-established by fencing off streams from cattle, would improve water quality and habitat for special-status wildlife and fish species. These changes are expected to benefit aquatic and terrestrial biological resources.

Table 16-13, *Potential Environmental Effects of Reducing Vegetation-Disturbing Activities in Floodplains and Floodways*, summarizes the potential environmental effects associated with reducing vegetation-disturbing activities in floodplains and floodways. Those impacts associated with floodplain or habitat restoration are identified in Table 16-12, *Potential Environmental Effects of Floodplain and Riparian Habitat Restoration,* and are not incorporated into Table 16-13.

Table 16-13. Potential Environmental Effects of Reducing Vegetation-Disturbing Activities in Floodplains and Floodways

Potential Environmental Effects of Reducing Vegetation-Disturbing Activities in Floodplains and Floodways	
Resource	Discussion
Aesthetics	• Studies or activities implemented to reduce vegetation-disturbing activities would not affect or change scenic vistas. No lighting would be used during the activities, all would be done during daylight hours. Impacts would not occur.
Agriculture and Forestry Resources	• Reduction of vegetation-disturbing activities could be located on lands used for agriculture or forestry, depending on how far reducing vegetation-disturbing activities extend from the Stanislaus, Tuolumne, and Merced Rivers and the extent of implementation of the vegetation-disturbing reduction activities. While these measures may decrease the level of agricultural activities or grazing occurring adjacent to a river, they are not expected to result in a conversion of farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural use. Furthermore, it would be expected that modifications to management plans and strategies would assess conflicts with existing zoning for agriculture use or a Williamson Act contract, or conflict with existing zoning of forest land in order to balance the needs of the ecosystem and the needs of public safety and other land use considerations. Impacts would not occur.
Air Quality	• Air quality would not be affected by reducing vegetation-disturbing activities because no heavy construction equipment would be used. Emissions from the vehicles used for implementation and monitoring of the measures identified to reduce vegetation-disturbing activities would not prevent compliance with regulations or exceed thresholds established by SJVAPCD, conflict with or obstruct implementation of the applicable air quality plan or violate any air quality standard or contribute substantially to an existing or projected air quality violation, result in a net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standards, or create objectionable odors. Impacts would not occur.
Biological Resources	• Reduction of vegetation-disturbing activities would not: (1) 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; (2) adversely affect riparian habitat or federally protected wetlands; (3) interfere 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; or (4) conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. This is mainly because reduction of vegetation-disturbing activities would not require substantial construction activities, the use of heavy construction equipment, or removal of habitat. These reduction of vegetation-disturbing activities are expected to have a beneficial effect on fish and wildlife species habitat. Additionally these activity-reduction measures would not conflict with the provisions of the SJR Wildlife Refuge CCP and the SJMSCP, which covers the San Joaquin, Stanislaus, Tuolumne, and Merced Rivers. Impacts would not occur.
Cultural Resources	• Reduction of vegetation-disturbing activities would not cause a substantial adverse change in the significance of cultural resources (significant historical, archaeological, or paleontological resources), directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, or disturb any human remains because substantial ground-disturbing activities are not expected as a result of implementing the reduction measures. Impacts would not occur.

Potential Environmental Effects of Reducing Vegetation-Disturbing Activities in Floodplains and Floodways	
Resource	Discussion
Geology and Soils	• Reduction of vegetation-disturbing activities would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, soil erosion, loss of topsoil, or landslides. The activities would not increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Reducing vegetation-disturbing activities would actually prevent erosion and sediment release because less activities would occur adjacent to the river channels. Impacts would not occur.
Greenhouse Gas Emissions	• Reduction of vegetation-disturbing activities would not result in increased GHG emission because no heavy construction equipment would be used. Activities may require vehicle trips to perform any studies required, but these would be trips of very short duration over a long period of time and would have less-than-significant impacts from GHG emissions, as potential GHG emissions could be reduced as vegetation- disturbing activities are reduced. Impacts would be less than significant.
Hazards and Hazardous Materials	• Reduction of vegetation-disturbing activities does not require the use or transportation of hazardous materials. Therefore, reduction of vegetation-disturbing activities would not be expected to create a significant hazard to the public or the environment through release of these types of substances, or result in a hazard to schools if these activities occur within one-quarter mile of a school or schools. Impacts would not occur. • Reduction of vegetation-disturbing activities would not be a hazard or provide a safety concern to public or public use airports or private airstrips because they would not result in the construction of tall structures and would be located either within, or immediately adjacent to, the Stanislaus, Merced and Tuolumne Rivers banks and channels. As such, reduction of vegetation-disturbing activities would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Reduction of vegetation-disturbing activities would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road and within, or immediately adjacent to, the river banks and channels. Impacts would not occur. • Reduction of vegetation-disturbing activities would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur. • Reduction of vegetation-disturbing activities would not entail substantial ground disturbing activities (e.g., grading, excavation) and would actually result in fewer ground disturbing activities. As such, if reduction of vegetation-disturbing activities occurred on a Cortese Site (i.e., hazardous waste site list compiled pursuant to Government Code, § 65962), there would be no significant hazard to the public or environment as a result. Impacts would not occur.

Potential Environmental Effects of Reducing Vegetation-Disturbing Activities in Floodplains and Floodways

Resource	Discussion
Hydrology and Water Quality	• Reduction of vegetation-disturbing activities could affect water quality if activities included in-water work. However, in-water work would be short term and only one or two persons would be in the river channel, and therefore water quality standards would not be violate. Impacts would not occur. • Reduction of vegetation-disturbing activities would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge because these activities would not require groundwater and would not result in an increase in impervious surfaces. Impacts would not occur. • Reduction of vegetation-disturbing activities may alter the existing drainage pattern of the site or area or alter the course of a stream or river, depending on the action taken (i.e., fencing off cattle from a stream), but this would not result in substantial erosion or siltation on- or offsite or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite or alter the capacity of existing or planned storm water drainage systems. Reduction of vegetation-disturbing activities would be beneficial in stopping erosion and flooding because it would allow further establishment of riparian communities and vegetation. Impacts would not occur. • Reduction of vegetation-disturbing activities would not substantially increase the number of people exposed to the risk of flooding because these projects would not draw people to flood hazard locations. As such, these activities would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Reduction of vegetation-disturbing activities would not involve the construction of housing, therefore this activity would not place housing within a 100-year flood hazard area. Impacts would not occur. • Reduction of vegetation-disturbing activities would not involve the construction of structures. Therefore, this activity would not place structures which would impede or redirect flood flows within a 100-year flood hazard area. Impacts would not occur. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Reduction of vegetation-disturbing activities is not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which reduction of vegetation-disturbing activities could result in a substantial degradation of water quality.
Land Use and Planning	• There would be no impact on land use and planning due to reduction of vegetation-disturbing activities. Implementation of the reduction measures would not conflict with any applicable land use plan, policy, or regulation including general plan, specific plan, local coastal program, or zoning ordinance adopted for the purpose of avoiding or mitigating an environmental effect. Reduction of vegetation-disturbing activities that take place within existing river banks and channels would be consistent with land use designations or zoning because frequently these areas are designated natural resource or open space areas by land use plans, and the reduction measures would enhance existing habitat for fish and wildlife species. Measures to reduce vegetation-disturbing activities would also not conflict with any applicable habitat conservation plan or natural community conservation plan which covers the San Joaquin, Stanislaus, Tuolumne, and Merced Rivers such as the SJR Wildlife Refuge CCP and the SJMSCP. Impacts would not occur.

Potential Environmental Effects of Reducing Vegetation-Disturbing Activities in Floodplains and Floodways	
Resource	Discussion
Mineral Resources	• Reduction of vegetation-disturbing activities would not 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 or loss of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan because there would be no substantial construction activities. Impacts would not occur.
Noise	• Reduction of vegetation-disturbing activities would not result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or generate excessive ground-borne vibration or ground-borne noise levels because there would be no substantial construction activities and because the proximity to sensitive receptors (e.g., residences) is expected to be limited. Impacts would not occur.
Population and Housing	• Population and housing would not be affected by reduction of vegetation-disturbing activities because activities would not induce population growth, displace people or existing housing, or necessitate the construction of replacement of new housing. Impacts would not occur.
Public Services	• Reduction of vegetation-disturbing activities would not result in the need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services because they would not result in population growth or the need for these services. Impacts would not occur.
Recreation	• Reduction of vegetation-disturbing activities would not affect recreational facilities because these activity-reduction measures would not remove vegetation or result in substantial construction that could affect the use of existing recreational facilities. Reduction of vegetation-disturbing activities would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Reduction of vegetation-disturbing activities would not result in a significant increase in traffic because it would not require large numbers of people or vehicles to conduct studies or implement the reduction measures. Impacts would not occur. • Reduction of vegetation-disturbing activities would not result in an increase demand for air traffic or the need for airports because these activities would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Reduction of vegetation-disturbing activities would not involve the discharge of wastewater, construction of additional storm water drains, generate an increase in solid waste, nor require a water supply. Additionally, these activities would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. Impacts would not occur.

16.3.3 Gravel Augmentation

Gravel augmentation is the artificial addition of spawning-sized gravel to streams to increase the quantity and quality of spawning and incubation habitat where the natural processes of gravel recruitment have been disrupted by dams, regulated flows, gravel mining, and other instream activities (e.g., bank stabilization). In the Central Valley, gravel augmentation projects are generally focused on gravel-bed reaches of streams below mainstem dams where historical degradation of spawning habitat has been identified as a major limiting factor for salmon and steelhead populations (USFWS 2001 or AFRP 2002, 2003, 2004; see Bunte 2004).

The general approaches to spawning gravel augmentation include the following.

- Gravel injection, a passive approach in which relatively large amounts of spawning-sized gravel are dumped in channel areas where high flows can transport the gravel to downstream spawning areas.
- Spawning bed enhancement, an active approach in which spawning-sized gravel is either added directly to known spawning areas (e.g., riffles), and/or modified through mechanical grading, ripping, or cleansing (i.e., reducing fine sediment) to create or restore the streambed and hydraulic characteristics of functional spawning habitat.
- Hydraulic structure placement, an active approach which may be used in conjunction with spawning bed enhancement, entails placement of large woody debris, boulder clusters, weirs, or other structures to create localized hydraulic conditions conducive to gravel deposition and retention.

Different methods can be used to place and distribute spawning gravel depending on site constraints. Heavy construction equipment is typically used but various kinds of conveyor belts, slurries, high pressure pipes, helicopters, and cable lines also may be used depending on the project.

Cost Evaluation

Gravel augmentation can be achieved through the three approaches identified above. While site specific conditions influence the cost of the approach, generally gravel injection is the lower cost approach, while hydraulic structure installation is the higher cost approach. This section provides discussion of the general costs associated with the three approaches, and then summarizes actual costs associated with gravel augmentation projects in the Central Valley (Table 16-14, *Central Valley Project Improvement Act Spawning & Rearing Habitat Restoration Projects*).

The costs associated with gravel injection are primarily related to fuel costs for gravel delivery. These costs are estimated at $15–$20 per ton plus $0.16–$0.20 per mile to transport. Gravel injection is typically used where flows are high enough to mobilize the material such as downstream of a reservoir or on locations with easy access to the river for placement of the gravel (Cramer Fish Sciences 2010).

Spawning bed enhancement is more expensive than gravel injection because it typically requires engineering design. The cost of spawning bed enhancement is estimated at $25–$33 per ton ($19–$25 per cubic yard) (Bunte 2004). This cost does not include engineering design. The design involves choosing the appropriate location and gravel mix as the variability of gravel sizes is crucial for successful augmentation. For example, if the gravel is too large, female salmonids may be unable to mobilize enough substrate to build a high-quality redd or they may build shallow redds, resulting in higher risk of scour. If the gravel is too small, egg or alevin survival may be low if temperature and oxygen levels are compromised as a result of reduced redd permeability (Zeug et al 2014).

Hydraulic structure installation is generally the most expensive of the approaches because it requires engineering analysis and in-stream work with heavy equipment which results in necessary permits from different agencies that can take 6–18 months to obtain. Project costs for this approach can range from $1,500 to $100,000 depending on the complexity of the project, project length, and materials (Cramer Fish Sciences 2010).

The costs provided above do not include maintenance and monitoring which depend on the approach selected. A project's budget typically includes basic monitoring costs that would enable implementation of adaptive management appropriate for the size, scale, and site-specific conditions and needs. Adaptive management helps refine the actions needed to meet certain restoration objectives based on data obtained from monitoring (Cramer Fish Sciences 2010).

Table 16-14. Central Valley Project Improvement Act[a] Spawning & Rearing Habitat Restoration Projects

Project	Description	Construction/ Implementation[b]	Monitoring + Adaptive Mgt.[c]
Sacramento River Project	Annual placement of 10,000 tons of gravel for spawning and rearing habitat restoration – between Clear Creek & Keswick Dam	$795,000	$120,000
American River Project	Annual placement of 7,000 tons of gravel at Nimbus Basin on the American River	$745,000	$6,000 + $100,000
Stanislaus River Project	Annual placement of 3,000 tons of gravel at the Two Mile Bar or Upper Honolulu Bar along the Stanislaus River	$670,000	$15,000
Program Management & Support (for 3 projects over 2 fiscal years)		$450,000	

Source: Hannon et al 2013.

[a] The Central Valley Project Improvement Act of 1992 (CVPIA) is a collaboration of agencies that includes the Department of the Interior, Bureau of Reclamation, USFWS in collaboration with state and local governments, tribes and stakeholders.

[b] Costs provided are the requested funding for Fiscal Year 2015 and 2016. Costs represent the amount being cost-shared between the state and federal agencies in CVPIA.

[c] The adaptive management cost is intended to build a model and assemble information to create model parameters to identify restoration actions and monitoring priorities for the American River Project.

Environmental Evaluation

The primary sources of information for the following general description of gravel augmentation projects and associated environmental impacts were Bunte (2004), DWR (2004), NMFS (2013), and USFWS (2013). Additional references are cited below.

Summary of Potential Action

Pre-project assessment, planning, and design activities for gravel augmentation projects may include geomorphic surveys, topographic/bathymetric surveys, sediment sampling, hydrologic analyses, and hydraulic and sediment transport modeling. Integrated approaches utilizing quantitative hydraulic, sediment transport, and habitat modeling tools have been developed to facilitate the design process and improve success of spawning habitat rehabilitation projects (Pasternack et al. 2004; Wheaton et al. 2004a, 2004b).

The magnitude of construction impacts on vegetation, soils, streambed substrates, and water quality during construction activities depends on site selection and gravel placement methods (e.g., passive or active). Potential construction activities include clearing of vegetation to construct temporary roads, access, and staging areas; placement of temporary gravel berms or other structures to provide construction access and isolate work areas from the river; permanent placement of gravel, boulders and other flow or sediment control structures; and grading, ripping, and recontouring of newly deposited or existing gravel. Typical construction equipment includes graders, excavators, and loaders. Common environmental commitments or BMPs to avoid, minimize, or offset potential environmental effects may include seasonal work windows, preconstruction biological surveys; biological monitoring during construction; construction noise; traffic control; SWPPP; spill prevention, control, and countermeasure plan; and turbidity compliance monitoring.

Operation and maintenance of gravel augmentation projects may include periodic replenishment of gravel as needed. Post-project monitoring activities typically include monitoring and evaluation of key geomorphic, hydraulic, and biological parameters in an adaptive management framework.

Potential Environmental Effects

Construction of gravel augmentation projects may result in temporary and localized effects typically associated with construction activities, including a change in water quality, air quality effects, and ground and channel disturbance. Gravel placement would be located in areas that support spawning for special-status fish species such as Chinook salmon and steelhead. These areas are below the dams on the Stanislaus, Tuolumne, and Merced Rivers where most spawning occurs and gravel is lacking.

It is reasonable to assume that new gravel placement would be professionally installed by contractors familiar with such projects. Depending on the magnitude of the projects, construction could last from 1 to 12 weeks (i.e., up to 3 months) depending on the nature of the project and amount of gravel to be augmented (e.g., Feather River Gravel Supplementation Project duration is 3 months). Construction activities would occur during the dry season (typically June–October) when anadromous fish would not be spawning. BMPs for controlling sediment and contaminant release into waterbodies would be used to minimize impacts on water quality. Gravel augmentation sites would result in changes to hydraulics, channel substrate, and stream habitat types such as pools, runs, and riffles. However, all of these changes are expected to benefit aquatic biological resources.

Table 16-15, *Potential Environmental Effects of Gravel Augmentation*, summarizes the potential environmental effects associated with gravel augmentation. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of this non-flow measure and is referenced in Table 16-15 where appropriate.

Table 16-15. Potential Environmental Effects of Gravel Augmentation

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
Aesthetics	• Construction and operation of gravel augmentation projects would not be expected to significantly affect scenic vistas because they would be located within or immediately adjacent to existing river channels. Construction and operation of the augmented areas would not have a substantial adverse effect on a scenic vista. Construction may be observable for a temporary period of time when heavy equipment is used to transfer gravel in and around the project site. However, it is anticipated that the location of these projects would not be within close proximity to sensitive viewers (e.g., recreationists or residents) given the potential remote location of the projects within rivers. If sensitive viewers are located within close proximity, the temporary nature of construction and the fact that views would not be permanently changed would be such that significant impacts would not occur. Operation may be noticeable at first during the time it takes for natural processes such as establishment of vegetation and gravel movement to occur. After that, the river channel may be more aesthetically pleasing due to the enhanced gravel habitat and movement of the channel. Lighting is not expected to be used during gravel augmentation activities because the construction would occur during the day given the need to work within or immediately adjacent to the channels. This impact would be less than significant.
Agriculture and Forestry Resources	• Construction and operation of gravel augmentation projects would not be expected to be located on lands used for agriculture or forestry because they would be located within or immediately adjacent to existing river channels. There would be no conversion of farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural use, conflict with existing zoning for agriculture use or a Williamson Act contract, conflict with existing zoning of forest land, or conversion of forest land to non-forest use. Impacts would not occur.
Air Quality	• Construction of gravel augmentation projects would likely result in emissions associated with construction equipment and construction worker vehicle trips. The quantity, duration, and the intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Since construction of gravel augmentation projects does not require lengthy construction activities, the potential for significant environmental effects is minimal. Further, construction emissions generated would need to comply with the SJVAPCD regulations and established thresholds. Lead agencies (e.g., irrigation districts or municipal water purveyors) can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on air quality associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction of gravel augmentation projects would be

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
	inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The construction of gravel augmentation projects would not result in population or employment growth because these projects are habitat restoration projects for the benefit of special-status fish species. Therefore, construction of gravel augmentation projects would not result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Impacts would not occur. • Operation of gravel augmentation projects would likely result in scheduled maintenance or monitoring vehicle trips. Given the limited number of vehicles and monitoring trips, over a longer timeframe, emissions from the vehicles would not be expected to prevent compliance with regulations or exceed thresholds established by SJVAPCD, conflict or obstruct implementation of the applicable air quality plan, violate any air quality standard, contribute substantially to an existing or projected air quality violation, or result in a net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standards. Impacts would be less than significant. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). Gravel augmentation projects would not create objectionable odors affecting a substantial number of people. Impacts would not occur.
Biological Resources	• Construction of gravel augmentation projects would release sediment and possibly hazardous materials (e.g., oil or gas from construction equipment) into waterbodies, affecting water quality. Release of sediment can bury macroinvertebrates which are prey for fish and other aquatic species, coat or bury eggs from frogs and fish, and fill in pool habitat. Operation of gravel augmentation projects would change aquatic habitat by changing river width, stream habitat types (riffles, pools, runs), and hydraulics. While construction may have some temporary significant impacts, gravel augmentation would have beneficial long-term effects on Chinook salmon and steelhead spawning habitat. Water quality measures such as monitoring turbidity during construction to ensure compliance with Basin Plan water quality objectives and construction BMPs would be implemented as either mitigation measures under CEQA or permit requirements and conditions. Furthermore, an MMP would be enforced after restoration is completed, which is part of permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers. After construction is complete, the gravel augmented areas would need to be monitored to determine if the quantity and location of gravel was correct and to ensure the augmented areas are functioning as designed and benefiting Chinook salmon and steelhead. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
	of gravel augmentation projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction of gravel augmentation projects would not interfere with the movement of native residential or migratory fish species and associated migratory corridors, or impede the use of nursery sites because any work done in the water would occur during June to October when fish are not spawning or migrating. Impacts would not occur. • The surrounding habitat on river banks may include riparian vegetation and/or wetlands. Riparian vegetation may have to be removed to facilitate heavy equipment operation. Wetlands may also be disturbed during construction activities. This would result in a temporary significant impact on riparian habitat and wetlands. Under operations, riparian habitat and wetlands would not be affected. Removal and/or disturbance of riparian and wetlands habitats would be compensated for at a ratio appropriate for the disturbance per standard permit requirements or conditions from U.S. Army Corps of Engineers, Central Valley Water Board, and other responsible agencies. This would reduce and minimize impacts on fish and wildlife species and their habitats. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction of gravel augmentation projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of gravel augmentation projects would be located in river reaches that support special-status fish species such as Chinook salmon and steelhead. These reaches are expected to have high potential for special-status plant species, animal species, and habitat, and support biological resources. Gravel augmentation projects would occur during the least sensitive periods of special-status species life stages (i.e., during the dry season, June–October), as required through either the CEQA process or through permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers. Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce potentially significant environmental effects of construction and operations on special-status biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • While construction may result in temporary localized adverse effects on special-status species, plants, and habitat, construction activities are highly unlikely to result in population level adverse effects for any species. As such, these activities are not expected to conflict with habitat conservation plans such as the SJR Wildlife Refuge CCP or the SJMSCP, which are meant to provide protection at the population level. In addition, conflicts with local policies as a result of construction are considered less than significant because of the temporary and localized nature. Finally, because gravel augmentation is expected to produce beneficial results for special-status fish and other wildlife species, ultimately gravel augmentation would not conflict with local policies protecting biological resources or with provisions of an

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
	adopted habitat conservation plan or natural community conservation plan (e.g., SJR Wildlife Refuge CCP, SJMSCP). This would be a less-than-significant impact.
Cultural Resources	• Construction and operation of gravel augmentation projects would be within or immediately adjacent to existing river channels. While it is unknown if cultural resources (significant historical, archaeological, or paleontological resources) or human remains exist in these locations, these areas would not be excavated and ground disturbance would not occur, which are two of the primary mechanisms for affecting cultural resources or human remains. Gravel would be placed on the existing substrate in the river channel. Operation of gravel augmentation would have a very low potential to affect cultural resources because the gravel would be in the river and would be augmented periodically. Typically the river channels have had high levels of disturbance because of hydraulic conditions; and as such, there is a low potential for significant cultural resources or human remains to existing within the rivers. This would be a less-than-significant impact.
Geology and Soils	• The locations of gravel augmentation could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, gravel augmentation would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, soil erosion, loss of topsoil, or landslides. Gravel augmentation would not bring people to the risk of earthquakes or geologic hazards, meaning the operation of the augmented areas would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur. • Project sites would be evaluated before construction begins for the potential of soil erosion in the design of the augmentation project. Construction would likely take place within stream channels and adjacent to rivers and in riparian areas. Erosion could take place depending on the site-specific soil characteristics, geology, area of disturbance by construction equipment, and construction equipment used. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant erosion or sediment effects associated with construction or operation of gravel augmentation projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-12, augmentation of gravel would result in increased GHG emissions because heavy construction equipment would be used. While construction activities would be relatively limited and short term in duration, it is likely that gravel augmentation activities could result in a potentially significant GHG impact beyond the SJVAPCD ZEL. Depending on the level of construction activities and the potential operational lifespan of the project, construction-related GHG emissions could exceed SJVAPCD's ZEL and result in a potentially significant impact. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • During operation, heavy equipment may be needed to replenish gravel sites, but these would be limited activities of very short duration and would likely result in small quantities of GHG emissions. In addition, vehicles may be needed for monitoring or maintenance of restored areas. However, the trips would be limited, of very short duration, and over a long period of time (e.g., one trip every year). As such, they would likely result in small quantities of GHG emissions. However, GHG emissions may still exceed SJVAPCD's ZEL. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
Hazards and Hazardous Materials	• Construction and operation of gravel augmentation would not be a hazard or provide a safety concern to public or public use airports or private airstrips because augmentation would be constructed and operated within or immediately adjacent to river channels, and would not result in the construction of tall structures. As such, construction and operation of gravel augmentation would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Construction and operation of gravel augmentation would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road and within or adjacent to river channels. Impacts would not occur. • Construction and operation of gravel augmentation projects would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur. • Construction of gravel augmentation projects could involve the temporary use of small amounts of hazardous materials, such as fuel to power construction equipment. There is a low potential for a hazardous materials spill associated with construction equipment to affect the environment given the short duration of construction and the generally limited number of construction equipment that would be used. However, given the projects would be within or immediately adjacent to existing river channels, Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts due to hazards and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The precise location of where gravel augmentation would occur is not yet known; however, these projects could be constructed within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • The precise location of where gravel augmentation would occur is not yet known; however, gravel augmentation would not entail substantial ground disturbing activities (e.g., grading, excavation). As such, if gravel augmentation occurred on a Cortese Site (i.e., hazardous waste site list compiled pursuant to Government Code, § 65962), there would be no significant hazard to the public or environment as a result because if soil or groundwater contamination occurred it would not be released. Impacts would not occur.

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
Hydrology and Water Quality	• Construction of gravel augmentation projects may temporarily affect water quality due to the placement of gravel in active river channels. Placing gravel and driving heavy equipment in and near the river channel could result in a temporary increase in turbidity. Due to the limited nature and occurrence of construction activities during the dry season, it is not expected that water quality standards for the protection of fish and wildlife would be violated because the timing of work construction windows (i.e., June–October) would avoid the most sensitive life stages of special-status fish species. Additionally, turbidity would be monitored to maintain compliance with Basin Plan water quality objectives. Construction of gravel augmentation projects would not alter the capacity of existing or planned storm water drainage systems, and would not provide substantial additional sources of polluted runoff. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of gravel augmentation projects would not deplete groundwater supplies or interfere substantially with groundwater recharge because these projects would not require groundwater during construction or operation and would not result in an increase in impervious surfaces. Impacts would not occur. • Operation of the gravel augmentation sites could alter the existing drainage pattern of the site or area. However, it is not expected to cause an increase in substantial erosion or siltation or result in flooding on- or offsite. In addition, operation of gravel augmentation sites would not exceed the capacity of existing or planned storm water drainage systems, and would not provide substantial additional sources of polluted runoff. Site design would take into account existing hydrology and channel geomorphology and gravel placement would be done so no erosion or flooding would occur. An MMP, which is part of the permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers, would be implemented to ensure no erosion is occurring and the gravel placement is functioning successfully. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Gravel augmentation projects would not substantially increase the number of people exposed to the risk of flooding because these projects would not draw people to flood hazard locations. As such, these projects would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Construction and operation of gravel augmentation sites would not involve the construction of housing, and therefore this activity would not place housing within a 100-year flood hazard area. Impacts would not occur. • Gravel augmentation projects would entail the placement of spawning-sized gravel and/or hydraulic structures (e.g., large woody debris, boulder clusters, weirs) within stream channels. Neither gravel nor hydraulic structures would impede or redirect flood flows within a 100-year flood hazard area. Site design would take into account existing

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
	hydrology and channel geomorphology and gravel placement would be done so no flooding would occur. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Gravel augmentation is not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of gravel augmentation projects could result in a substantial degradation of water quality.
Land Use and Planning	• Construction and operation of gravel augmentation projects would not physically divide an established community because they would be located in the existing river channels, or immediately adjacent to them, and communities are not established in these areas. Impacts would not occur. • Construction and operation of gravel augmentation sites would occur in existing river channels, or immediately adjacent to them, and would not conflict with land use designations or zoning. Frequently these areas are designated natural resource or open space areas by land use plans and gravel augmentation would be consistent with those designations because it would enhance existing habitat for fish and wildlife species. Impacts would not occur. • The following habitat conservation plans cover parts of the Stanislaus, Tuolumne, and Merced Rivers: SJR Wildlife Refuge CCP and the SJMSCP. These plans protect special-status species within the Stanislaus, Tuolumne, and Merced Rivers. As described in the Biological Resources section of this table, there would be some temporary construction impacts on adjacent riparian areas, but lead agencies could mitigate these temporary impacts through measures identified in Table 16-39. As such, no conflicts are expected with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations. Impacts would not occur.
Mineral Resources	• As mentioned in the Mineral Resources section in Table 16-12, there are known aggregate mines along the three eastside tributaries (Clinkenbeard 1999, Clinkenbeard 2012a and 2012b, Higgins and Dupras 1993, Rapp et al. 1977, and Smith and Clinkenbeard 2012). While mining within the active river channel is not typically performed, aggregate sites may be located in close proximity to the active river channel. Construction and operation of gravel augmentation could have potential to affect access to state or locally designated mineral resource areas. This is because the gravel augmentation sites would be within existing river channels and could cover mineral areas located downstream of the augmentation if the gravel moves downstream within the river channel. As discussed under the Biological Resources section of this table, an MMP would be enforced after restoration is completed, which is part of permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers. Until such time that the potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. After construction, the gravel augmented areas would need to be monitored using the MMP to determine if the quantity and location of gravel was correct and to ensure the augmented areas are functioning as designed and benefiting Chinook salmon and steelhead. Movement of gravel would also be monitored to ensure it was not covering or removing access to existing important or designated mineral resources. If gravel movement covers or removes

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
	access to mineral resource areas, gravel augmentation could be re-evaluated and discontinued at the site. However, if gravel augmentation is not discontinued, impacts would remain significant and unavoidable.
Noise	• Construction of the gravel augmentation sites would create noise related to the use of heavy construction equipment and rock placement. The sites would be located in river channels, or immediately adjacent to them, where people generally do not live. It is unlikely people would be permanently exposed to noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies due to the limited duration of construction and the remote location of these projects from populated areas. Excessive ground-borne vibration or ground-borne noise levels are also not expected due to the small nature of the projects and the standard type of construction equipment that would be used. If there was temporary elevated noise in excess of standards established in local general plans, noise ordinance, or applicable standards, it would occur during the day (as construction is not expected to occur at night) and for short periods of time within the day over a short duration (e.g., 1–12 weeks). Given the limited exposure of potential sensitive receptors to this potential temporary increase and low likelihood of potential sensitive receptors to exist because of the remoteness of the project sites, it is expected impacts would be less than significant. Operation of gravel augmentation sites would not create noise. There may be some maintenance activities, but that would not create a permanent increase in ambient noise. Impacts would not occur. • Projects would not be constructed near airports or airstrips so people would not be exposed to excessive noise levels. Impacts would not occur.
Population and Housing	• The construction and operation of gravel augmentation sites would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Furthermore, it would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people. Impacts would not occur. • The construction and operation of gravel augmentation sites would not displace substantial numbers of people or existing housing, or necessitate the construction of replacement housing elsewhere because the sites would be located in, or immediately adjacent to, river channels. No homes or people would be displaced. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed above, the construction and operation of gravel augmentation sites would not involve an increase in population or housing. In addition, these actions would not include new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.

Potential Environmental Effects of Gravel Augmentation	
Resource	Discussion
Recreation	• Construction of gravel augmentation sites would occur within, or immediately adjacent to, river channels. It is possible that recreational facilities would be located in areas where gravel augmentation sites would be located. If recreational facilities were located within very close proximity, construction of gravel augmentation sites may affect them; however, it is unlikely that there would be significant impacts on recreational facilities because construction would be temporary and limited (e.g., 1–12 weeks). And once construction is complete the river would be returned to similar conditions prior construction because the gravel would be submerged in the channel on the bottom of the river. Impacts would be less than significant. • Construction and operation of gravel augmentation sites would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Construction of gravel augmentation sites could result in some additional trips associated with construction workers. Depending on the location of the site, there could be an increase in traffic from construction workers. The temporary increased traffic during construction would likely not exceed local or regional road trip thresholds because the number of construction workers that gravel augmentation projects typically require is less than 30. Additionally, the duration of construction would be very short (e.g., 1–12 weeks). This would be a less-than-significant impact. Operation of gravel augmentation sites would not generate additional trips beyond those needed to maintain the sites. If maintenance activities are needed, they would be temporary and infrequent in nature and would not increase traffic. Impacts would not occur. • Construction of gravel augmentation sites would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Construction and operation of gravel augmentation sites would not exceed wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of wastewater. Impacts would not occur. • Construction and operation of gravel augmentation would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. Impacts would not occur. • Construction and operation of gravel augmentation sites would not need the construction of additional storm water drains because the facilities would likely be built within, or immediately adjacent to, river channels and would not generate storm water. Impacts would not occur. • Construction and operation of gravel augmentation sites would not generate an increase in solid waste because activities are limited to gravel placement into an existing river channel. Impacts would not occur. • Construction and operation of gravel augmentation sites would not require a water supply. Impacts would not occur.

16.3.4 Enhance In-Channel Complexity

Enhancement of in-channel complexity focuses on the placement of large wood or boulder structures to assist in the restoration of degraded river ecosystems. A major factor that has contributed to historical decline and current status of Central Valley salmon and steelhead populations is the lack of habitat complexity resulting from dam construction and operation, channelization, levee construction, bank stabilization, and major land uses along major tributaries and mainstem reaches of the Sacramento and San Joaquin Rivers. Historically, extensive clearing of large wood from rivers and streams for water conveyance, navigation, and fish passage, and loss of riparian forests have greatly diminished the primary sources of large wood in spawning and rearing areas below mainstem dams (Bilby and Ward 1991). The loss of riparian vegetation, instream cover, and river-floodplain connectivity have greatly simplified riverine habitat and disrupted the natural processes that promote habitat diversity and complexity in Central Valley rivers and streams (NMFS 2008, 2014a).

Structural methods for enhancing habitat complexity in rivers span a wide range of designs that depend on project objectives and site-specific hydraulic, geomorphic, and ecological conditions. Such structures may be used to address other high-priority stream management needs (e.g., scour protection) or used in conjunction with other enhancement actions (e.g., spawning gravel augmentation) to achieve the project objectives. Three general categories of commonly used instream structures are cover structures, boulder structures, and log structures.

- Cover structures are often incorporated into other stream enhancement structures (e.g., log or boulder weirs) and include logs, root wads, tree bundles, and boulders that are typically placed in pools to serve as a direct source of cover for salmonids.
- Boulder structures include weirs, clusters, and deflectors that are typically placed in the active channel to concentrate the flow and create a diversity of hydraulic conditions promoting deposition (spawning gravel retention) and scour (pool formation), facilitating fish passage, and/or providing cover and resting areas for juvenile and adult salmonids.
- Log structures have similar applications as boulder structures and include a range of weirs, barbs, and engineered log jams.

Cost Evaluation

The costs for enhancing in-channel complexity through the installation of cover structures, boulder structures and log structures depend primarily on the size of the stream, channel hydrology, complexity of the design, site accessibility, cost of materials, and equipment needed to transport and install the material. One of the primary costs associated with enhancing in-channel complexity is the cost for large woody materials, such as logs, which is highly dependent on the type of tree selected. For example, Washington Douglas Fir is $100 per 1,000 board ft while the California Redwood costs about $510 for the same amount. The National Resources Conservation Service cost share practice standard estimates that the material cost for large woody material ranges between approximately $1,900 per acre and $924 per acre (Guhin and Hayes 2015). Table 16-16, *Engineered Log Structures and Large Woody Debris – Cost Estimates*, shows the approximate costs (low–high) based on the stream size.

Table 16-16. Engineered Log Structures and Large Woody Debris – Cost Estimates

Stream Size (cfs)	Cost[a] (Low–High)
Small stream (1–100 cfs)	\$10–\$40K
Medium stream (101–2000 cfs)	\$20–\$70K
Large stream (2000+ cfs)	\$10–\$80K

Source: Thomson and Pinkerton 2008.

cfs = cubic feet per second.

[a] Estimates identified above include construction, design, permitting, basic monitoring and routine maintenance (up to 2 years), reestablishing site to prior conditions and project management costs. These estimates assume purchased materials.

In 2008, the Lower Mokelumne River Joint Settlement Agreement (JSA) between EBMUD, USFWS, and CDFW included approval of$25,663 in funding to UC Davis to conduct a study along the Lower Mokelumne River to determine the effectiveness of large woody materials in aiding fish habitat (Partnership Steering Committee 2008). The project consisted of placing 542 large wood pieces along 4.8 miles on the Lower Mokelumne River directly below the Camanche Dam where the flows averaged 350 cfs (Pasternack and Senter 2008).

Environmental Evaluation

The primary sources of information for the following general description of in-channel habitat enhancement projects and associated environmental impacts were NMFS (2000) and USBR and U.S. Army Engineer Research and Development Center (ERDC) (2016). Additional references are cited below.

Summary of Potential Action

Pre-project assessment, planning, and design activities for in-channel habitat enhancement projects may include geomorphic surveys, topographic/bathymetric surveys, sediment sampling, hydrologic analyses, and hydraulic and sediment transport modeling. Major design considerations include long-term stability and viability of the proposed structures relative to site-specific hydraulic conditions, scour and depositional effects, and ecological performance objectives.

The magnitude of construction impacts on native fish and wildlife species, vegetation, soils, streambed substrates, and water quality during construction activities depends on site selection, type of structure, and installation methods. Potential construction activities include clearing of vegetation to construct temporary roads and staging areas; placement of temporary gravel berms, cofferdams, or other structures to provide construction access and isolate work areas from the river; excavation and grading of the channel and banks to anchor in-stream structures; and placement and anchoring of boulders, logs, and root wads. Typical construction equipment includes graders, excavators, and loaders. Common environmental commitments or BMPs to avoid, minimize, or offset potential environmental impacts may include seasonal work windows, preconstruction biological surveys; biological monitoring during construction; construction noise and light reduction measures; traffic control; SWPPP; spill prevention, control, and countermeasure plan; and turbidity compliance monitoring.

Operation and maintenance of in-channel enhancement projects may include periodic inspections, repairs, and replacement of structural elements. Post-project activities typically include monitoring and evaluation of key geomorphic, hydraulic, and biological parameters in an adaptive management framework.

Potential Environmental Effects

Construction of in-channel enhancing structures may result in temporary and localized effects typically associated with construction activities, including impacts on water quality, air quality effects, and ground and channel disturbance. River channels may be graded to facilitate structures to be anchored into the bank substrate and to stabilize the structures in areas that support special-status fish species such as Chinook salmon and steelhead. These areas would be located below the dams on the Stanislaus, Tuolumne, Merced, and San Joaquin Rivers, where the rivers may lack complexity of habitats such as riffles and pools. Aquatic and riparian special-status species would be the most affected by construction and installation of in-channel enhancing structures. Operation of the structures would benefit aquatic species and may require maintenance if the structures move or do not create the expected habitat.

It is reasonable to assume that installation of in-channel enhancing structures would be professionally installed by contractors familiar with such projects. Depending on the magnitude of the projects, construction could last anywhere from several weeks to up to 12 weeks (i.e., 3 months). Construction activities would occur during the dry season (typically June–October) to avoid the most sensitive spawning and rearing periods of anadromous fish. BMPs for controlling sediment and contaminant release into waterbodies would be used and minimize potential impacts on water quality associated with sediment and hazardous materials. In-channel enhancing structures would result in changes to hydraulics, channel substrate, and stream habitats. These structures would also increase habitat for special-status fish species. In-channel enhancing structures are expected to benefit aquatic biological resources.

Table 16-17, *Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures*, summarizes the potential environmental effects associated with installation and operation of in-channel enhancing structures. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of these in-channel enhancing structures and is referenced in Table 16-17 where appropriate.

Table 16-17. Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures	
Resource	Discussion
Aesthetics	• Construction and operation of in-channel enhancing structures is not expected to significantly affect scenic vistas because they would be located within existing river channels. Construction and operation of the in-channel enhancing structures would not have a substantial adverse effect on a scenic vista. Construction may be observable for a temporary period of time when heavy equipment is used to grade banks, move sediment, and install structures around the project site. However, it is anticipated that the location of these projects would not be within close proximity to sensitive viewers (e.g., recreationists or residents) given the remote location of the projects within rivers. If sensitive viewers are located within close proximity, the temporary nature of construction would result in less-than-significant impacts because views would not be permanently changed. Operation of the project may be noticeable at first during the time it takes for re-establishment of vegetation and river channel natural movement. After that, the river channel may be more aesthetically pleasing. Lighting is not expected to be used during construction of in-channel enhancing structures since all construction would occur during the day. Impacts would be less than significant.
Agriculture and Forestry Resources	• Construction and operation of in-channel enhancing structures would occur within the footprint of existing river channels and not on lands used for agriculture or forestry. There would be no conversion of farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural use, conflict with existing zoning for agriculture use or a Williamson Act contract, conflict with existing zoning of forest land, or conversion of forest land to non-forest use. Impacts would not occur.
Air Quality	• Construction of in-channel enhancing structures would likely result in emissions associated with construction equipment and construction worker vehicle trips. The quantity, duration, and the intensity of construction activities would have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Since construction of in-channel enhancing structures does not require lengthy construction activities, the potential for significant environmental effects is minimal. Further, construction emissions generated would need to comply with the SJVAPCD regulations and established thresholds. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on air quality associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction of in-channel enhancing structures would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures

Resource	Discussion
	applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The construction of in-channel enhancing structures would not result in population or employment growth because these projects are habitat restoration projects for the benefit of special-status fish species. Therefore, construction of in-channel enhancing structures would not result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Impacts would not occur. • Enhancing in-channel complexity would likely result in maintenance or monitoring trips by a few vehicles on a periodic schedule of limited duration. As such, emissions from maintenance vehicles are not expected to prevent compliance with regulations or exceed thresholds established by SJVAPCD, conflict or obstruct implementation of the applicable air quality plan, violate any air quality standard, contribute substantially to an existing or projected air quality violation, or result in a net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standards. Impacts would be less than significant. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). Enhancing in-channel complexity would not create objectionable odors affecting a substantial number of people. Impacts would be less than significant.
Biological Resources	• Construction of in-channel enhancing structures would release sediment and possibly hazardous materials (e.g., oil or fuel from construction equipment) into waterbodies, affecting water quality. Release of sediment can bury macroinvertebrates which are prey for fish and other aquatic species, coat or bury eggs from frogs and fish, and fill in pool habitat. In addition, due to the effects of in-channel construction, the movement of native resident or migratory fish species and the associated migratory corridors may be temporarily impeded. This would result in a significant impact. Water quality measures such as monitoring turbidity during construction, to ensure compliance with Basin Plan water quality objectives, and construction BMPs, would be implemented as either mitigation measures under CEQA or permit requirements and conditions. Further, an MMP would be enforced after restoration is completed, which is part of permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers. The enhanced areas would need to be monitored to determine that the structures were functioning as designed and benefiting Chinook salmon and steelhead once construction is complete, under operating conditions. However, operation of in-channel enhancing structures would change aquatic habitat by changing river width, river habitat types (riffles, pools, runs), and hydraulics. In-channel enhancing structures would have beneficial long-term effects on Chinook salmon and steelhead habitat, including migratory corridors. Impacts under operation would be less than significant. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction and operation of in-channel

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures	
Resource	Discussion
	enhancing structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of in-channel enhancing structures would be located in river reaches that support special-status fish species such as Chinook salmon and steelhead. This would result in take of special-status species. It is reasonable to assume that construction of in-channel enhancing structures would occur during the least sensitive periods of special-status species life stages, (i.e., during the dry season, June–October), as this would reduce and minimize impacts on aquatic species and would be required through either the CEQA process or through permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers. However, if construction of the in-channel enhancement requires the construction and installation of cofferdams, these can injure or kill fish. If pile driving is need to construct the cofferdam, it can create noise impacts harmful to fish. Stranding within the cofferdams can occur if special-status fish species become trapped inside a dewatered area. Fish rescue in the dewatered area (seining, electrofishing) could injure or kill fish. These activities could result in take of special-status fish species. Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce potentially significant environmental impacts on special-status biological resources from construction of in-channel enhancing structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. Even with mitigation measures, significant and unavoidable impacts may occur if the potential for take cannot be avoided or reduced or take occurs during construction. • The surrounding habitat on river banks may include riparian vegetation and/or wetlands. Riparian vegetation may have to be removed to allow heavy equipment movement and wetlands may also be disturbed during construction. This would result in a temporary significant impact on riparian habitat and wetlands. Under operations, riparian habitat and wetlands would not be affected. Removal and/or disturbance of riparian and wetlands habitats during construction would be compensated for at a ratio appropriate for the disturbance per standard permit requirements or conditions from the U.S. Army Corps of Engineers and the Central Valley Water Board. This compensation would reduce and minimize impacts on fish and wildlife species and their habitats. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on biological resources associated with construction of in-channel enhancing structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • While construction may result in temporary localized significant impacts on special-status species, plants, and habitat, construction activities are highly unlikely to result in population level adverse effects for any species. Therefore, these activities are not expected to conflict with habitat conservation plans such as the SJR Wildlife Refuge CCP or the SJMSCP, which are meant to provide protection at the population level. In addition, conflicts with local policies as a result of

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures	
Resource	Discussion
	construction are not considered significant because of the temporary and localized nature of the effects. Impacts would be less than significant.
Cultural Resources	• Construction and operation of in-channel enhancing structures would occur within existing river banks and channels. Typically the river channels have had high levels of disturbance because of hydraulic conditions and there is a low potential for significant cultural resources (significant historical, archaeological, or paleontological resources) or human remains to exist within the river channels or immediately adjacent. However, it is unknown if cultural resources or human remains would exist at locations that could be used for anchoring or installing in channel structures, if the design of the project required that type of installation. Operation of in-channel enhancing structures would have a very low potential to affect cultural resources or human remains because the in-channel structures would primarily be located in the river and would be monitored. Where construction within areas that may contain cultural resources or human remains cannot be avoided an assessment should be conducted of the potential for damage to cultural resources prior to construction; this may require hiring a qualified cultural resources specialist to determine the presence of significant cultural resources. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant effects on cultural resources associated with construction of in-channel enhancing structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.
Geology and Soils	• The locations of new in-channel enhancing structures could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, in-channel enhancing structures would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, loss of topsoil, or landslides. Impacts would not occur. • Project design would evaluate sites for the potential of soil erosion to minimize erosion or sediment release that would not support the objectives of in-channel enhancement during construction or operation. However, given, construction would likely take place along adjacent rivers and in riparian areas, erosion could take place depending on the soil characteristics, geology, and area of disturbance. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant erosion or sediment impacts associated with construction or operation of in-channel enhancement projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Enhancement of in-channel complexity would not bring people to the risk of earthquakes or geologic hazards, meaning the operation of the enhanced areas would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur.

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures	
Resource	Discussion
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-12, construction of enhanced in-channel complexity would generate GHG emissions because heavy equipment would be used for up to 12 weeks. While construction activities would be limited, it is likely that enhancement activities could result in a potentially significant GHG impact beyond SJVAPCD's ZEL. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • During operation, some vehicles may be needed for monitoring the enhanced areas. However, the trips would be limited, of very short duration, and over a long period of time (e.g., one trip every year). As such, they would likely result in less than significant quantities of GHG emissions. However, GHG emissions may still exceed SJVAPCD's ZEL. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures	
Resource	Discussion
Hazards and Hazardous Materials	• Construction and operation of in-channel enhancing structures would not be a hazard or provide a safety concern to public or public use airports or private airstrips because the structures would be constructed and operated within the river banks and channels and would not involve structures that could impede, interfere, or otherwise create a safety hazard to airports or air traffic. As such, construction and operation of in-channel enhancing structures would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Construction and operation of in-channel enhancing structures would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road and within the river banks and channels. Impacts would not occur. • Construction and operation of in-channel enhancing structures would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur. • Construction of in-channel enhancement projects could involve the temporary use of small amounts of hazardous materials, such as fuel to power construction equipment. There is a low potential for a hazardous materials spill associated with construction equipment given the limited duration of construction and the generally small number of construction equipment that would be used. However, since construction work would occur within river channels, Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts due to hazards and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The precise location of where in-channel enhancement projects would be constructed is not yet known; however, these projects could be constructed within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Additionally, depending on the location of construction, remediation may be needed to address soil contamination during excavation or grading activities. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • Lists of hazardous materials site are compiled by different state agencies under Government Code, § 65962. These sites are also known as Cortese Sites. There were no sites identified on the Hazardous Waste and Substance Site List compiled into the EnviroStor online database managed by the DTSC for Calaveras, Tuolumne, or Mariposa Counties (CalEPA 2016). There were a total of 17 sites identified for Merced, San Joaquin, and Stanislaus Counties. In addition to these sites

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures

Resource	Discussion
	identified by the EnviroStor database, CalEPA also identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facilities where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action for these counties (CalEPA 2016). There are approximately 500 leaking underground storage tanks designated as open in these counties (CalEPA 2016). There are approximately 55 facilities in these counties that have received CDOs/CAOs not identified as non-hazardous wastes, domestic wastewater, or domestic sewage (CalEPA 2016). It is not yet known precisely where in-channel enhancement would occur and if it would require excavation. However, if it occurred on a Cortese Site and required excavation there would be potential for release of existing soil or groundwater contaminants because of the ground disturbance. Were this to occur, impacts could be significant. Table 16-39 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • Enhancing in-channel complexity could require excavation. Utilities may be underneath the sites or adjacent to a site and may need to be relocated or avoided. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potential hazards associated with excavation around utilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.
Hydrology and Water Quality	• Construction of in-channel enhancing structures may temporarily affect water quality due to grading the river banks and channels. Placing and anchoring the structures and driving heavy equipment in and near the river channel could result in a temporary increase in turbidity. By scheduling construction activities during the dry season and isolating the work areas from surface water with cofferdams or some other means, it is expected that water quality standards would not be violated. Additionally, turbidity would be monitored to maintain compliance with Basin Plan water quality objectives. Operation of in-channel enhancing structures would not have a significant impact on water quality. Construction of in-channel enhancing structures would not provide substantial additional sources of polluted runoff. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction of in-channel enhancing structures would not exceed the capacity of existing or planned storm water drainage systems because it would not contribute substantial runoff to a storm water drainage system. In addition, construction would not provide substantial additional sources of polluted runoff. Impacts would not occur.

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures	
Resource	Discussion
	• Construction and operation of in-channel enhancing structures would not deplete groundwater supplies or interfere substantially with groundwater recharge because activities would not use groundwater and would not result in an increase in impervious surfaces. Impacts would not occur. • Operation of in-channel enhancing structures could alter the existing drainage pattern of the site or area and could cause an increase in substantial erosion or siltation or result in flooding on- or offsite. Site design would take into account existing hydrology and channel geomorphology and installation of the structures would be done so no erosion or flooding would occur. An MMP, which is part of the permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers, would be implemented to ensure erosion is minimized and the enhancing structures are functioning successfully. Table 16-39 lists potential mitigation measures in the Geology and Soils section that lead agencies can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of in-channel enhancing structures would not substantially increase the number of people exposed to the risk of flooding because these activities would not draw people to flood hazard locations. As such, construction and operation of in-channel enhancing structures would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Construction and operation of in-channel enhancing structures would not involve the construction of housing, and, therefore this activity would not place housing within a 100-year flood hazard area. Impacts would not occur. • Enhancement of in-channel complexity would focus on the placement of large wood or boulder structures within stream channels. Neither construction nor operation of in-channel enhancing structures would impede or redirect flood flows within a 100-year flood hazard area. Site design would take into account existing hydrology and channel geomorphology, and enhancement of in-channel complexity would be done so no flooding would occur. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction of in-channel enhancing structures is not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of in-channel enhancing structures could result in a substantial degradation of water quality.

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures	
Resource	Discussion
Land Use and Planning	• Construction and operation of in-channel enhancing structures would not physically divide an established community because they would be located within existing river banks and channels, or immediately adjacent to them, and communities are not established in these areas. Impacts would not occur. • Construction and operation of in-channel enhancing structures would occur in existing river banks and channels and would not conflict with land use designations or zoning. Frequently these areas are designated natural resource or open space areas by land use plans and in-channel enhancing structures would be consistent with those designations because they would enhance existing habitat for fish and wildlife species. Impacts would not occur. • The following habitat conservation plans cover parts of the Stanislaus, Tuolumne, and Merced Rivers: SJR Wildlife Refuge CCP and the SJMSCP. These plans protect special-status species within the San Joaquin, Stanislaus, Tuolumne, and Merced Rivers. As described in the Biological Resources section of this table, there would be some temporary construction impacts on adjacent riparian and/or wetland areas, but lead agencies would mitigate these temporary impacts through measures identified in Table 16-39. As such, no conflicts are expected with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations. Impacts would not occur.
Mineral Resources	• As mentioned in the Mineral Resources section of Table 16-12, there are known aggregate mines along the three eastside tributaries (Clinkenbeard 1999, Clinkenbeard 2012a and 2012b, Higgins and Dupras 1993, Rapp et al. 1977, and Smith and Clinkenbeard 2012). Construction and operation of in-channel enhancing structures are not likely to result in the removal or inability to access state or locally designated mineral resource areas. In-channel enhancing structures would be within existing river channels but would not be expected to cover existing mineral areas near operating mines. The locations selected for in-channel structures would be assessed to prevent them from being located within a state or locally designated mineral resource area. As such, construction and operation would not remove or result in significant impacts on these mineral resource areas. Impact would be less than significant.
Noise	• Construction of the in-channel enhancing structures would create noise related to the use of heavy construction equipment. The sites would be located where people generally do not live. It is unlikely people would be permanently exposed to noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. Excessive ground-borne vibration or ground-borne noise levels are also not expected due to the small nature of the projects and the type of construction equipment that would be used. If there was temporary elevated noise in excess of standards established in local general plans, noise ordinance, or applicable standards, it would occur during the day (as construction is not expected to occur at night) and for short periods of time within the day over a short duration (i.e., up to 12 weeks). However, given the temporary noise exposure to limited potential sensitive receptors, it is expected that noise impacts would be less than significant. Operation and maintenance of the in-channel enhancing structures would not create a permanent increase in ambient noise. This impact would be less than significant. • Projects would not be constructed near airports or airstrips so people would not be exposed to excessive noise levels. Impacts would not occur.

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures

Resource	Discussion
Population and Housing	• The construction and operation of in-channel enhancing structures would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Further, construction and operation of in-channel enhancing structures would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people. Impacts would not occur. • The construction and operation of in-channel enhancing structures would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere because the sites would be located within river banks and channels. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed above, the construction and operation of in-channel enhancing structures would not involve an increase in population or housing. In addition, these actions would not include new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.
Recreation	• Construction of in-channel enhancing structures would occur within river banks and channels. It is possible that recreational facilities would be located in areas where in-channel enhancing structures would be placed. If recreational facilities were located within very close proximity, construction of in-channel enhancing structures may affect them; however, it is unlikely that there would be significant impacts on recreational facilities because construction would be temporary and limited in duration (i.e., up to 12 weeks). After construction is complete, in-channel enhancing structures would be located primarily submerged in the river channel. Impacts would be less than significant. • Construction and operation of in-channel enhancing structures would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Construction of in-channel enhancing structures could result in some additional trips associated with construction workers. Depending on the location of the site, there could be an increase in traffic from construction workers. The temporary increased traffic during construction would likely not exceed local or regional road trip thresholds, because the number of construction workers that in-channel enhancing structures typically require is less than 30. Impacts would be less than significant. • Operation of in-channel enhancing structures would not generate additional trips beyond those needed to maintain the sites. If maintenance activities are needed, it would be temporary and infrequent in nature and operation of the sites would not increase traffic. Impacts would not occur. • Construction and operation of in-channel enhancing structures would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.

Potential Environmental Effects of Installation and Operation of In-Channel Enhancing Structures

Resource	Discussion
Utilities and Service Systems	• Construction and operation of in-channel enhancing structures would not exceed wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of wastewater. Impacts would not occur. • Construction and operation of in-channel enhancing structures would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. Impacts would not occur. • Construction and operation of in-channel enhancing structures would not need the construction of additional storm water drains because the structures would be built within river channels and would not generate storm water. Impacts would not occur. • Construction and operation of in-channel enhancing structures would not generate an increase in solid waste because activities are limited to modification of the river bank and channel. Impacts would not occur. • Construction and operation of in-channel enhancing structures would not require a water supply. Impacts would not occur.

16.3.5 Improve Temperature Conditions

Improving temperature conditions on the rivers can be done by operational and structural measures in upstream reservoirs. These have been identified as a priority conservation and recovery action in Central Valley rivers where coldwater reservoir supplies and operational flexibility may be sufficient to significantly improve water temperatures during critical migration, spawning, and rearing periods (NMFS 2014a). Currently, a number of naturally spawning populations of winter-run Chinook salmon, spring-run Chinook salmon, and steelhead populations in reaches below these dams (i.e., New Melones Dam, New Exchequer Dam) are artificially maintained by cool water releases from upstream reservoirs. However, warm water temperatures during critical spring, summer, and fall migration, spawning, and rearing periods continue to be a major threat to these populations, especially in dry years, and will likely exert increasing stress on these populations based on current climate change predictions (NMFS 2014a).

Key non-flow actions for managing water temperatures released from these dams include cold water pool management, installation or modification of selective withdrawal structures (e.g., temperature curtains or shutters), and floodplain and riparian restoration (discussed previously in Section 16.3.1, *Floodplain and Riparian Habitat Restoration*). While additional flows in the rivers can also contribute to reducing water temperatures, flows are not considered in this evaluation because they are not considered a non-flow measure.

Cost Evaluation

Costs associated with floodplain and riparian restoration are discussed in Section 16.3.1, *Floodplain and Riparian Habitat Restoration*. Availability of cost information regarding actions to improve temperature conditions, such as installation or modification of selective withdrawal structures, is limited. Considerations that contribute to the cost generally include high construction costs.

The Lake Natoma Temperature Curtains Pilot Project estimated the cost to be $1,960,196 for a 3-year study that included the installation of 2 curtains (one curtain 700-ft long with a depth of 15–20 ft, second curtain 600-ft long with a depth of 20–25 ft). Lake Natoma is located within the Lower American River, approximately 23 miles upstream of the American River's confluence with the Sacramento River in Sacramento County. The costs associated with this pilot project included: design, permitting and environmental review, project management, temperature monitoring, project installation and removal, and completion of a project analysis and report (Winternitz and Washburn 2002).

In 2011, installation of a temperature curtain took place at Whiskeytown Lake for a cost of $3 million; Whiskeytown Lake is approximately 10 miles west of the city of Redding in Shasta County. The new temperature curtain replaced a curtain from 1993 that had deteriorated and was no longer functional. The new temperature curtain is 2,400 ft long and drops into the lake 110-ft and is anticipated to achieve a 2–4 degree drop in water temperature (Gee et al. 2012).

Environmental Evaluation

The primary sources of information for the following general description of water temperature control projects and associated environmental impacts were EBMUD (2008), NMFS (2000), and USBR (1991, 2013).

Summary of Potential Action

Planning and evaluation for water temperature control projects generally includes the development and evaluation of a number of conceptual alternatives, including both operational and structural measures, to identify the most effective means of optimizing the use of cold water for protection of salmon and steelhead populations while maintaining existing water supply and power generation capabilities. Planning and evaluation of cold water management operations typically requires initial water supply and temperature modeling to evaluate the feasibility and potential effectiveness of alternative measures. Following implementation, the continued use of modeling and forecasting tools is generally required to adaptively manage available cold water supplies under variable hydrologic, water demand, and operational conditions to achieve the best possible release temperatures for fisheries protection.

The use of shutters or other structural devices, typically in conjunction with operational measures, has been shown to be an effective means to seasonally control the temperature of water released from major storage reservoirs (deep, seasonally stratified reservoirs) to protect salmon and steelhead populations in a number of Central Valley rivers (e.g., Sacramento River, American River, Feather River). The magnitude of construction impacts of temperature control structures on native fish and wildlife species, aquatic and terrestrial habitat, water quality, and other resources depends on the type of device (e.g., curtains, shutters), construction methods and materials, and the location of the structure relative to protected or sensitive resources. Installation of temperature control devices typically requires minimal ground clearing; most structures can be assembled offsite, hauled to the dam, and lowered into place from the top of the dam by a mobile crane. The construction methods vary in intensity depending on the dam size and the type of water control temperature device being installed. Barges are typically not used during construction of temperature curtains or shutters (e.g., Cougar Dam, Shasta Lake Water Resources Investigation). Assembly or attachment of the new structural components may require underwater cutting and assembly by divers. Installation of temporary barriers or dewatering is typically not necessary. Common environmental commitments or BMPs to avoid, minimize, or offset potential environmental effects may include seasonal work windows (e.g., non-flood control periods), preconstruction biological surveys; biological monitoring; construction noise and light reduction measures; traffic control; SWPPP; and a spill prevention, control, and countermeasure plan. Post-construction evaluation activities may include testing and evaluation of mechanical and electrical systems; water temperature monitoring and evaluation; and adaptive management to address unforeseen issues and optimize water temperature management relative to water supply, power generation, and biological objectives. Long-term operations and maintenance activities may include regular or periodic inspections, repairs, cleaning, and sediment and debris management.

Potential Environmental Effects

Construction of water temperature control structures may result in temporary and localized effects typically associated with construction activities, including impacts on water quality and air quality. It is assumed water temperature control structures could be implemented on the dam structures of New Melones, New Don Pedro, and New Exchequer on the Stanislaus, Tuolumne, and Merced Rivers respectively, where the reservoirs store water above the mainstem rivers. Aquatic resources would be the most affected by installation or implementation of water temperature control measures, primarily during installation. Operation of the water temperature control structures would benefit aquatic species by reducing the temperature of water released from the reservoirs downstream in the Stanislaus, Tuolumne, and Merced Rivers. Maintenance would be required to ensure proper operation of the water temperature control structures.

It is reasonable to assume that installation of water temperature control structures would be professionally installed by contractors familiar with such projects. Depending on the magnitude of the structures, construction could last up to 4 years with activities occurring up to 5 months per year. Construction activities would be expected to occur during the dry season (e.g., typically June–October) to avoid the flood control season and minimize exposure of sensitive fish and wildlife species to disturbance. BMPs for controlling sediment and contaminant release into waterbodies would be used to minimize potential impacts on water quality associated with hazardous materials that may potentially be used during construction (e.g., fuels and oils for construction equipment). Water temperature control structures or a change in reservoir releases would result in decreases in water temperature. A decrease in water temperature would be beneficial for Chinook salmon and steelhead migratory, spawning, and rearing habitat.

Table 16-18, *Potential Environmental Effects of Improved Temperature Conditions*, summarizes the potential environmental effects associated with construction and operation of water temperature control structures. Those impacts associated with floodplain or habitat restoration are identified in Table 16-12, *Potential Environmental Effects of Floodplain and Riparian Habitat Restoration,* and are not incorporated into Table 16-18. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of this non-flow measure and is referenced in Table 16-18 where appropriate.

Table 16-18. Potential Environmental Effects of Improved Temperature Conditions

Potential Environmental Effects of Improved Temperature Conditions	
Resource	Discussion
Aesthetics	• Construction may be observable for a limited period of time when heavy equipment is used to install the structures behind the dams. While this could be visible around scenic areas around the reservoir, it would not permanently alter the scenic vistas or aesthetic experience of sensitive viewers because the construction equipment would be removed and the sites restored to their previous conditions once construction is complete. Lighting is not expected to be used during construction of water temperature control structures because generally most construction would occur during the day. However, there may be a need for 24-hour construction for a short period of time. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction lighting. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Operation of water temperature control structures would not be expected to have a significant impact on scenic vistas because they would be located underwater at existing dams. Impacts would be less than significant.
Agriculture and Forestry Resources	• Construction and operation of water temperature control structures are not expected to be located on lands used for agriculture or forestry because they would be located within the footprint of existing dams. There would be no conversion of farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural use, conflict with existing zoning for agriculture use or a Williamson Act contract, conflict with existing zoning of forest land, or conversion of forest land to non-forest use. Impacts would not occur.
Air Quality	• Construction of water temperature control structures would likely result in emissions associated with construction equipment and construction worker vehicle trips, and fugitive dust emissions from ground disturbance, potentially at a laydown area. The quantity, duration, and the intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Similar to the discussion in Table 16-11b, *Potential Environmental Effects of New Surface Water Supplies,* emissions could be generated in the MCAB and GBVAB and depending on the air district and the criteria used, could exceed thresholds. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on air quality associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction of water temperature control structures would be

Potential Environmental Effects of Improved Temperature Conditions	
Resource	Discussion
	inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The construction of water temperature control structures would not result in population or employment growth because these projects are habitat restoration projects for the benefit of special-status fish species. Therefore, construction of water temperature control structures would not result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Impacts would not occur. • Construction and operation of water temperature control structures would not generate odors because the facility would exist behind a dam and not be located where people frequent. As such, impacts would not occur.
Biological Resources	• Construction of water temperature control structures would release sediment and possibly hazardous materials (e.g., oils or fuels from construction equipment) into waterbodies, temporarily affecting water quality. Dredging above the dam to clear sediment that may have settled against the dam would release sediment. Release of sediment into the river below the dam can bury macroinvertebrates which are prey for fish and other aquatic species, coat or bury eggs from frogs and fish, and fill in pool habitat. Water quality measures such as monitoring turbidity and assessing water quality measurements (i.e., water temperature, dissolved oxygen) below the dam during construction should occur to avoid effects on aquatic resources and to ensure compliance with Basin Plan water quality objectives, and construction BMPs, would be implemented as either mitigation measures under CEQA or permit requirements and conditions. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on biological resources associated with construction of water temperature control structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction of water temperature control structures would not interfere with the movement of native residential or migratory fish species and associated migratory corridors, or impede the use of nursery sites because any work done in the water would occur during June to October when fish are not spawning or migrating. Impacts would not occur. • Operation of water temperature control structures would change aquatic habitat by changing water temperature. The change in water temperature is expected to be beneficial for Chinook salmon and steelhead. Overall, the project may have some temporary significant impacts during construction, but beneficial long-term effects. Water temperature control structures are not expected to have a substantial adverse effect, either directly or through habitat modifications on special-status species. Operation of water temperature control structures is expected to have a beneficial effect on special-status fish species by providing water temperatures that would create better conditions for migration, spawning, and rearing. During operation, an MMP would be implemented to ensure water temperatures are within appropriate ranges for special-status fish and other aquatic species. Monitoring is part of permitting requirements and conditions by

Potential Environmental Effects of Improved Temperature Conditions	
Resource	Discussion
	resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers. To ensure this, lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on biological resources associated with operation of water temperature control structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of water temperature control structures would be located in river reaches that support special-status fish species such as Chinook salmon and steelhead. These areas are expected to have high potential for special-status plant species, animal species, and habitat, and support biological resources. It is reasonable to assume that construction of water temperature control structures would occur during the least sensitive periods of special-status species life stages, (i.e., during the dry season, June–October), as this would reduce and minimize impacts on aquatic species and would be required through either the CEQA process or through permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers. Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce potentially significant environmental construction and operations impacts on special-status biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.
	• The surrounding habitat, outside of the area of reservoir fluctuation, may include riparian vegetation and/or wetlands. The areas around the reservoirs have maintenance roads and access areas for maintenance workers, which are cleared of vegetation. These areas could be used for construction staging and laydown and would not affect riparian vegetation or wetlands. If riparian vegetation or wetlands are removed or disturbed, they would be compensated for at a ratio appropriate for the disturbance per standard permit requirements or conditions from the U.S. Army Corps of Engineers and the Central Valley Water Board. This compensation would ensure fish and wildlife species and their habitats are protected. Under operations, wetlands and riparian vegetation would not be affected because the water temperature control device would be located in the reservoir. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental impacts associated with construction of water temperature control structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • While construction may result in temporary localized significant impacts on special-status species, plants, and habitat, construction activities are highly unlikely to result in population level adverse effects for any species. As such, these activities are not expected to conflict with habitat conservation plans such as the SJR Wildlife Refuge CCP or the SJMSCP, which are meant to provide protection at the population level. In addition, conflicts with local policies as a result of construction are not considered significant because of the temporary and localized nature of the effects. Because temperature control devices are expected to produce beneficial results for special-status fish species, ultimately the water

Potential Environmental Effects of Improved Temperature Conditions	
Resource	Discussion
	temperature devices would not conflict with local policies protecting biological resources or conflict with provisions of an adopted habitat conservation plan or natural community conservation plan, such as the SJR Wildlife Refuge CCP or the SJMSCP. This impact would be less than significant.
Cultural Resources	• Construction and operation of water temperature control structures would be within existing dam footprints. With the exception of the New Melones, New Don Pedro, and New Exchequer dams themselves, it is unlikely that cultural resources (significant historical, archaeological, or paleontological resources) exist in these locations, because the areas where the dams were constructed are highly disturbed and no further ground disturbing activities or excavation is required to install the temperature control structures. However, New Melones, New Don Pedro, and New Exchequer dams are reasonably within or beyond the 50-year threshold to be considered for evaluation for listing in either the National or state historical registers. While the temperature improvement devices could be considered needed as part of the normal operation of these dams, depending on the device selected, the design and the size of it, a determination may need to be made of the potentially significant historic or non-historic nature of the dams and whether the device would affect the significance of the potential historic nature and, in so doing, result in a significant impact. California Public Resources Code Section 21084.1 and California Code of Regulations Section 15064.5 subd. (a) maintain that the lead agency shall consider the eligibility of these structures for listing in the California Register of Historic Resources despite the addition of a temperature control device that may have no physical impact on the dam(s). Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on cultural resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Geology and Soils	• Because the dams are already constructed, the soils and geology are stable to support the existing dams. Water temperature control structures would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, soil erosion, loss of topsoil, or landslides. Water temperature control structures would not bring people to the risk of earthquakes or geologic hazards, meaning the operation of the structures would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would be less than significant.
Greenhouse Gas Emissions	• Construction of water temperature control structures would result in increased GHG emissions because heavy equipment would be used. Given the duration of construction (up to 4 years with activities occurring up to 5 months per year). Similar to the discussion in Table 16-11b, the following APCDs do not have applicable GHG thresholds: CCAPCD, MCAPCD, TCAPCD. For air districts in which there is no adopted GHG threshold, the ZEL for SJVAPCD could be applied. While construction activities would be limited, it is likely that water temperature control structures construction activities could result in a potentially significant GHG impact beyond the SJVAPCD's ZEL. Depending on the level of construction activities and the potential operational lifespan of the project, construction-related GHG emissions could exceed these values and result in a potentially significant impact. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable,

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Resource	Discussion
	consistent with State CEQA Guidelines Section 15091. • During operation, vehicles may be needed for maintenance. The trips would be anticipated to be limited in number, of short distance and duration, and over a long period of time (e.g., one trip every year). As such, maintenance trips would likely result in small quantities of GHG emissions. However, GHG emissions may still exceed SJVAPCD's ZEL. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

Potential Environmental Effects of Improved Temperature Conditions	
Resource	Discussion
Hazards and Hazardous Materials	• Construction of water temperature control structures could possibly create a hazard if fuel trucks were used to transport fuel to the project sites. Gas and diesel are not acutely hazardous, and storage, handling, and disposal of these materials is regulated by local, county, and state laws. Although transportation and use of hazardous materials would occur, required safety protocols would be followed, mitigation measures and BMPs would be implemented, and the materials would be handled and transported appropriately to reduce the likelihood of a foreseeable accident involving the release of hazardous materials into the environment. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction of water temperature control structures would not emit hazardous emissions or handle hazardous materials, substances or waste within one-quarter mile (0.25 miles) of an existing school because all construction would occur near the dams. No schools are located within one-quarter mile of a dam. Impacts would not occur. • Construction and operation of water temperature control structures would not be located on a hazardous materials site, including a Cortese Site, because the structures would be located within the reservoirs or on the dam structure of the reservoirs. Impacts would not occur. • Construction and operation of water temperature control structures would not be a hazard or provide a safety concern to public or public use airports or private airstrips because the structures would be constructed and operated within the dams and would not involve structures that could impede, interfere, or otherwise create a safety hazard to airports or air traffic. As such, construction and operation of water temperature control structures would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Construction and operation of water temperature control structures would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road within the dams. Impacts would not occur. • Construction and operation of water temperature control structures would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur.
Hydrology and Water Quality	• Construction of water temperature control structures may temporarily affect water quality due to removing sediment buildup behind the dams before installation of the structures. Dredging could release sediments into the reservoir and could be discharged downstream of the dam. Resulting turbidity could cause a temporary exceedance of applicable water quality standards. Turbidity would be monitored to maintain compliance with Basin Plan water quality objectives. Operation of the water temperature control structures would decrease water temperatures and this would be a beneficial effect for Chinook salmon and steelhead in the mainstem of the river. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on water quality during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts

Potential Environmental Effects of Improved Temperature Conditions	
Resource	Discussion
	could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of water temperature control structures would not deplete groundwater supplies or interfere substantially with groundwater recharge because these projects would not require groundwater supplies and would not result in an increase in impervious surfaces. Impacts would not occur. • Operation of the water temperature control structures would not alter the existing drainage pattern of the site or area nor cause an increase in substantial erosion or siltation, substantial runoff, or result in flooding on- or offsite because it would operate within the reservoir. Installation of the structures would be done so no erosion or flooding would occur because it is likely the reservoirs would be drawn down to allow construction in the dry areas as much as possible. Additionally, an MMP would be implemented after restoration is completed, which is part of permitting requirements and conditions by resource agencies including USFWS, NMFS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers to ensure all of the structures are working as designed. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of water temperature control structures would not substantially increase the number of people exposed to the risk of flooding because these structures would not draw people to flood hazard locations. As such, construction and operation of water temperature control structures would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Construction and operation of water temperature control structures would not involve the construction of housing, and therefore this activity would not place housing within a 100-year flood hazard area. Impacts would not occur. • Construction and operation of water temperature control structures would occur within a reservoir and existing dams. The water temperature control structures would not impede or redirect flood flows within a 100-year flood hazard area. Impacts would be less than significant. • Construction and operation of water temperature control structures would occur in existing dams and would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems. Impacts would not occur. • Operation of water temperature control structures would not create or contribute runoff water. Impacts would not occur. • Construction of water temperature control structures is not expected to provide substantial additional sources of polluted runoff because these activities would occur primarily within existing dams. However, construction equipment would be required and, as a result, hazardous materials (e.g., fuels, lubricants, diesel) may be used during construction. While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it result in a significant impact. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water

Potential Environmental Effects of Improved Temperature Conditions	
Resource	**Discussion**
	purveyors) can and should implement to reduce potentially significant impacts on water quality associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Although construction and operation of temperature control structures would occur at reservoirs, these activities would not cause in seismic ground shaking to generate in-reservoir seiches. Furthermore, these activities would not result in an increase in the potential for a seiche to occur, as the reservoirs could already experience a seiche under baseline conditions. Impacts would not occur. • There are no other ways in which construction or operation of temperature control structures could result in a substantial degradation of water quality.
Land Use and Planning	• Construction and operation of water temperature control structures would not physically divide an established community. Impacts would not occur. • Construction and operation of water temperature control structures would occur in existing dams and would not conflict with land use designations or zoning. Frequently these areas are designated natural resource or open space areas by land use plans and would be consistent with those designations because it would enhance existing habitat for fish species. Impacts would be less than significant. • The SJMSCP covers parts of the Stanislaus, Tuolumne, and San Joaquin Rivers. This plan protects special-status species within the San Joaquin, Stanislaus, and Tuolumne Rivers. Operation of water temperature control devices would not affect special-status species and would be beneficial. As such, no conflicts are expected with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations. Impacts would be less than significant.
Mineral Resources	• Construction and operation of water temperature control structures are not expected to result in the removal or inability to access state or locally designated mineral resource areas. This is because the water temperature control structures would be behind (i.e., upstream of) existing dams and would not affect mineral areas. Impacts would not occur.
Noise	• Construction of the water temperature control structures would create noise related to the use of heavy construction equipment. The sites would be located behind (i.e., upstream of) dams, and within the reservoirs, where people do not live. As such, it is unlikely people would be permanently exposed to noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. Excessive ground-borne vibration or ground-borne noise levels are also not expected due to the fact that construction would primarily be in the water with equipment on land. While there may be temporary elevated noise in excess of standards established in local general plans, noise ordinance, or applicable standards, it would occur during the day (as construction is not expected to occur at night) and for short periods of time within the day. Given the relatively limited exposure of potential sensitive receptors

Potential Environmental Effects of Improved Temperature Conditions	
Resource	Discussion
	to this potential temporary increase in noise, and low likelihood of potential sensitive receptors to exist because of the location of construction, it is expected impacts would be less than significant. While it is not anticipated that potential sensitive receptors would be subject to excessive noise, Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce noise impacts during construction. However, it is likely that impacts could be mitigated to less than significant once implemented. • Operation of the water temperature control structures would not create noise. There would be maintenance activities, but they would not create a permanent increase in ambient noise. This impact would be less than significant. • Water temperature control structures would not be constructed near airports or airstrips so people would not be exposed to excessive noise levels. Impacts would not occur.
Population and Housing	• The construction and operation of water temperature control structures would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Further, it would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people. Impacts would not occur. • The construction and operation of water temperature control structures would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere. No homes or people would be displaced. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, the construction and operation of water temperature control structures would not involve an increase in population or housing. In addition, these actions would not include proposals for new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.
Recreation	• Construction and operation of water temperature control structures would occur behind (i.e., upstream of) dams. It is unlikely recreational facilities would be located near dams because recreational boating and fishing are typically not allowed near the dam structures. Impacts on recreational facilities are not anticipated. Construction and operation of water temperature control structures would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would not occur.

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Resource	Discussion
Transportation and Traffic	• Construction of water temperature control structures could result in additional trips associated with construction workers. Depending on the location of the site, there could be an increase in traffic from construction workers. The temporary increased traffic during construction would likely not exceed local or regional road trip thresholds, because the number of construction workers that work on water temperature control structures typically is less than 30. This impact would be less than significant. • Operation of water temperature control structures would not generate additional trips beyond those needed to maintain the structure. If maintenance activities are needed, they would be temporary in nature and operation of the structures would not affect traffic. Impacts would be less than significant. • Construction and operation of water temperature control structures would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Construction and operation of water temperature control structures would not exceed wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of wastewater. Impacts would not occur. • Construction and operation of water temperature control structures would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. Impacts would not occur. • Construction and operation of water temperature control structures would not need the construction of additional storm water drains because the structures would be built behind the dams and would not generate storm water. Impacts would not occur. • Construction and operation of water temperature control structures would not generate an increase in solid waste. Impacts would not occur. • Construction and operation of water temperature control structures would not require a water supply. Impacts would not occur.

16.3.6 Fish Passage Improvements – Fish Screens

NMFS (2014a) identified entrainment of juvenile salmonids at unscreened or inadequately screened water diversions as a major factor contributing to historical declines and current status of listed Central Valley Chinook salmon and steelhead. Consequently, a major focus of species protection and recovery efforts has been screening of water diversions, with a higher priority placed on the largest diversions. However, there are many smaller diversions (mostly agricultural) that remain unscreened (Herren and Kawasaki 2001). It is generally recognized that modern fish screens are effective in preventing entrainment of juvenile salmonids but information is lacking to evaluate the overall survival and population-level benefits of fish screens (Moyle and White 2002, Vogel 2013).

Fish screen design varies widely depending on site-specific engineering, hydraulic, and fish protection objectives and requirements. Common positive barrier screen types include flat plate, drum, traveling, cylindrical, and inclined screens. Fish screen projects where NMFS, USFWS, and CDFW have jurisdiction must be developed in consultation with these agencies and in accordance with established design, operational, and maintenance criteria and guidelines (e.g., NMFS 2011).

Cost Evaluation

The costs for fish screens vary significantly depending on the size of the existing intake. Typically, screening smaller or private intakes that primarily serve agricultural uses are less costly when compared to screening large intake projects that primarily serve municipal and industrial uses. Agricultural diversions (with an average diversion rate of 10 cfs) have an estimated cost of $75,000 per diversion (unit cost of $7,500/cfs) (URS Corporation and Jack R. Benjamin & Associates 2011). Capital costs for agricultural diversion screens in the western United States can range between $3,000 and $20,000 per cfs, with maintenance and operations costs ranging between $3,000 and $5,000 per year (FCA 2016).

The Anadromous Fish Screen Program (AFSP) under the Central Valley Project Improvement Act (CVPIA) has funded several fish screen projects in California. The most recent ones are listed below.

- Natomas Mutual Sankey Fish Screen Project (total cost $45.975 million) located off the left bank of the Sacramento River replaced existing unscreened diversions with a consolidated 434 cfs fish screen and intake facility (USBR and USFWS 2014).
- Reclamation District (RD) 2035/Woodland Davis Clean Water Agency Joint Intake and Fish Screen (estimated cost of $44 million) located off the right bank of the Sacramento River replacing unscreened diversion with a consolidated 400 cfs fish screen and intake facility to provide water to irrigate approximately 15,000 acres of crops and serve the cities of Davis, Woodland, and the University of California, Davis campus (USBR and USFWS 2014, Wilcox 2014).

Another large municipal intake that has been screened in the Central Valley is the Davis Ranches Fish Screen Project, located in Colusa County at RM 132.5. This fish screen consisted of installing a self-cleaning, cylindrical, brushed intake fish screen with a retrieving system. The cost for this project is $414,904 which includes planning, design, project management, construction, installation, and monitoring. Table 16-19, *Design and Construction Costs Davis Ranches Site 2 Pump 4 & 5 Project*, provides a more detailed breakdown of the costs for this project.

Table 16-19. Design and Construction Costs Davis Ranches Site 2 Pump 4 & 5 Project

Cost Category	Davis Ranches Site 2, Pumps 4 &5[a]
Design & construction of fish screen	$310,964.00
Eng. review, inspection & documentation, permit costs	$24,000.00
Accounting & project management & monitoring	$79,940.00
Total	**$414,904.00**

Source: Griffith 2001.

Costs represent the total costs over 2 years.

Environmental Evaluation

The primary sources of information for the following general description of fish screen projects and associated environmental impacts were USFWS (2004), USBR (2006b), NMFS (2004, 2011). Additional references are cited below.

Summary of Potential Action

The design process for fish screen projects may include hydrologic and hydraulic data collection and analysis, debris and sediment loading assessments, and biological investigations. Key design considerations include screen placement (e.g., in- or off-river); screen size, orientation to flow, and hydraulics; debris and sediment management (e.g., screen cleaning systems); size, life history, behavior, and swimming ability of the target species; ancillary fish guidance and protection facilities (e.g., bypass systems); and operation and maintenance schedules.

The magnitude of construction impacts of fish screen projects on native fish and wildlife species, aquatic and terrestrial habitat, water quality, and other resources depends on the type, size, and location of the intake; construction methods; and proximity of other protected or sensitive resources. There are 112 diversions on the Merced River, 51 on the Tuolumne River, 117 on the Stanislaus River, 36 diversions on the SJR between the Merced and Tuolumne Rivers, and 8 diversions on the SJR between the Tuolumne and Stanislaus Rivers and between the Stanislaus River and Vernalis. This is a total of 324 diversions that could be screened depending on project-specific circumstances. These diversions are used for hydropower and irrigation. The minimum diversion is 1 cfs (East Stanislaus Resources Conservation District) and ranges up to 6,000 cfs (hydropower at New Melones Dam). Replacing, relocating, or constructing new fish screens may include clearing of vegetation to construct temporary roads, staging, and storage areas; placement of temporary structures (e.g., cofferdams) to isolate work areas from flowing water; clearing, grading, and armoring of the channel and banks; and pile driving. Typical construction equipment includes excavators, pile drivers, bulldozers, dump trucks, and front-end loaders. Generally the projects are relatively small in size and only require a construction crew of 5–10 people.

Common environmental commitments or BMPs to avoid, minimize, or offset potential environmental effects may include seasonal work windows (e.g., low flow periods); preconstruction biological surveys; erosion and sediment control measures; biological monitoring; construction noise and light reduction measures; traffic control; SWPPP; spill prevention, control, and countermeasure plan; and turbidity compliance monitoring.

Post-construction evaluation activities may include testing and evaluation of mechanical and electrical systems, hydraulic evaluations, and biological evaluations (e.g., fish entrainment monitoring). Long-term operations and maintenance activities may include regular or periodic inspections, repairs, cleaning, and sediment and debris management to ensure the effectiveness of the screen over the design life of the facility.

Potential Environmental Effects

Some of the irrigation diversions in the Central Valley are relatively small (<5 cfs) and the scale and magnitude of potential impacts associated with screening these diversions are such that they could meet the requirements of a categorical exemption under CEQA. CEQA allows categorical exemptions for classes of projects which have been determined not to have a significant effect on the environment. (Pub. Res. Code, § 21084.) Specifically, the following types of facilities and activities are exempt under a Class 1 or Class 3 categorical exemption.

- Minor alterations of the existing public or private structure without expanding existing uses.
- Installation of small new equipment and facilities.

In addition, Class 2 categorical exemptions allow for the replacement or reconstruction of existing facilities where the new structure will be located on the same site and will have the same purpose and capacity as the structure replaced. Some fish screen projects could meet the requirements for this exemption.

If the screening project would not meet the requirements of a categorical exemption, depending on the size of the intake and the needed screen, construction of fish screens may result in temporary and localized effects typically associated with construction activities, including a change in water quality, air quality effects, and ground and channel disturbance. If cofferdam placement and dewatering is needed, this could result in special-status fish species becoming stranded within the cofferdam area. A rescue and relocation of all fish species would be needed within the isolated areas. This could result in injury or mortality of special-status fish species. Additionally, pile driving may be needed for structure and/or cofferdam installation. Noise levels could affect special-status fish species. River banks or channels may be graded to facilitate structures in areas that support special-status fish species such as Chinook salmon and steelhead. Riprap may need to be placed around the intake structures. These areas would be located below the dams on the Stanislaus, Tuolumne, Merced, and Lower San Joaquin Rivers, where unscreened diversions occur. Aquatic resources would be the most affected by installation of fish screens. Operation of the screens would benefit special-status fish species and would require maintenance. Maintenance would occur when needed and would include cleaning the screen and regular or periodic inspections.

It is reasonable to assume that installation of fish screens will be professionally installed by contractors familiar with such projects. Depending on the magnitude of the projects, construction could last anywhere from several weeks to several months, but generally less than 6 months. Construction activities would occur during the dry season (typically June–October), when anadromous fish would not be spawning. BMPs for controlling sediment and contaminant release into waterbodies would be used to minimize potential effects on water quality associated with sediment and hazardous materials. Mitigation measures to minimize stranding and protect fish from injury and mortality from pile driving noise, cofferdam installation, and riprap placement would be implemented. Operation of fish screens would result in changes to hydraulics and stream habitats by the addition of riprap around the intake structures. Fish screens would help decrease entrainment of special-status fish species and other fish species. Adding fish screens is expected to benefit aquatic biological resources.

Table 16-20, *Potential Environmental Effects of Fish Passage Improvements—Fish Screens*, summarizes the potential environmental effects associated with improving fish passage with fish screens. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of this non-flow measure and is referenced in Table 16-20 where appropriate.

Table 16-20. Potential Environmental Effects of Fish Passage Improvements—Fish Screens

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
Aesthetics	• Construction and operation of fish screens would not be expected to significantly affect scenic vistas because the screens would be located within existing river channels. Construction and operation of the fish screens would not have a substantial adverse effect on a scenic vista. Construction may be observable for a temporary period of time when heavy equipment is used to grade banks, move sediment, and install structures. Lighting is not expected to be used during construction of fish screens—all construction would occur during the day. This impact would be less than significant. • Operation has a low potential to substantially degrade the visual character and quality of the surrounding area, as the screen would be in the water and adjacent to the river channel. Further, a structure for diversion purposes is already part of the visual character and quality and the screen would be located in the same place. Impacts would be less than significant.
Agriculture and Forestry Resources	• Construction and operation of fish screens would not be expected to be located on lands used for agriculture or forestry but within the footprint of existing river channels. There would be no conversion of farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural use, conflict with existing zoning for agriculture use or a Williamson Act contract, conflict with existing zoning of forest land, or conversion of forest land to non-forest use. Impacts would not occur.
Air Quality	• Construction of fish screens would likely result in emissions associated with construction equipment and construction worker vehicle trips, as well as fugitive dust emissions from ground disturbance. The quantity, duration, and the intensity of construction activity may have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be “diluted” relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Since construction of fish screens does not require lengthy construction activities, the potential for significant environmental effects is minimal. Further, construction emissions generated would need to comply with the SJVAPCD regulations and established thresholds. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on air quality associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • SJVAPCD generally defines a sensitive receptor as a facility that houses or attracts children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants, and where there is a reasonable expectation of continuous human exposure according to the averaging period for National AAQSs (e.g., 24-hour, 8-hour, or 1-hour) (SJVAPCD 2002). Sensitive receptors are primarily concentrated in urbanized areas, and their

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
	proximity to construction or operational activities, the type of activity, and duration of activity, determines their potential exposure to pollutants. If criteria pollutant standards are exceeded during construction, and sensitive receptors are in proximity, mitigation measures identified in Table 16-38 would serve to reduce potentially significant air quality effects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, given the potential short term nature of construction and the required mitigation by the SJVAPC, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction of fish screens would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The construction of fish screens would not result in population or employment growth because these projects are intended only to benefit special-status fish species through improvement of fish passage. Therefore, construction of fish screens would not result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Impacts would not occur. • Operation of fish screens would not result in direct emissions because they are passive structures. However, the fish screens would long-term operations and maintenance activities, which may include regular or periodic inspections, repairs, cleaning, and sediment and debris management to ensure the effectiveness of the screen over the design life of the facility, which would require maintenance vehicle trips. Because vehicle trips would be relatively limited in number, impacts on air quality and any sensitive receptors would be less than significant. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). Construction and operation of fish screens would not create objectionable odors affecting a substantial number of people. Impacts would not occur.
Biological Resources	• Construction of fish screens would release sediment and possibly hazardous materials (e.g., oil or fuel from construction equipment) into waterbodies, creating water quality issues. Release of sediment can bury macroinvertebrates, which are prey items for fish and other aquatic species, coat or bury eggs from frogs and fish, and fill in pool habitat. Water quality measures such as monitoring turbidity to ensure compliance with Basin Plan water quality objectives and construction BMPs would be implemented. To ensure this, lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
	effects associated with construction of fish screens. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and installation of cofferdams can injure or kill fish, if cofferdams are needed, depending on the size of the diversion and the type and size of the screen. Pile driving can create noise impacts harmful to fish. Stranding within the cofferdams can occur if special-status fish species become trapped inside a dewatered area. Fish rescue in the dewatered area (seining, electrofishing) could injure or kill fish. These activities could result in take of special-status fish species. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction of fish screens. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. Even with mitigation measures, significant and unavoidable impacts may occur if the potential for take cannot be avoided or reduced or take occurs during construction. • Construction and operation of fish screens would be located in river reaches that support special-status fish species such as Chinook salmon and steelhead. These areas are expected to have high potential for special-status plant species, animal species, and habitat, and support biological resources. This could be a significant impact on special-status species and their habitats. It is reasonable to assume that construction of fish screens would occur during the least sensitive periods of special-status species life stages, (i.e., during the dry season, June–October), because this would reduce and minimize impacts on aquatic species and would be required through either the CEQA process or through permitting requirements and conditions by resource agencies including USFWS, CDFW, NMFS, Central Valley Water Board, and U.S. Army Corps of Engineers. As such, construction of fish screens would not interfere with the movement of native residential or migratory fish species and associated migratory corridors, or impede the use of nursery sites because any work done in the water would occur during June to October when fish are not spawning or migrating. Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce potentially significant impacts on special-status biological resources from construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The surrounding habitat on river banks may include riparian vegetation and/or wetlands. Riparian vegetation may have to be removed to facilitate heavy equipment movement and wetlands may also be disturbed during construction activities. This would result in a temporary significant effect on riparian habitat and wetlands. Under operations, riparian habitat and wetlands would not be affected. Removal and/or disturbance of riparian and wetlands habitats would be compensated for at a ratio appropriate for the disturbance per standard permit requirements or conditions from the U.S. Army Corps of Engineers and Central Valley Water Board. This compensation would reduce and minimize impacts on fish and wildlife species and their habitats. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
	construction of fish screens. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Operation of fish screens would change aquatic habitat by installing riprap near the intakes and changing velocity near the fish screen. Velocities will be measured at the screen to ensure they fall into the correct range for the fish species that will be present near the fish screen (CDFW 2016). Overall, the project may have beneficial long-term effects. Operation of fish screens would keep fish from entering agricultural fields or other areas of diversion, therefore increasing survival. This impact would be less than significant. • While construction may result in temporary localized adverse effects on special-status species, plants, and habitat, construction activities are highly unlikely to result in population level adverse effects for any species. As such, these activities are not expected to conflict with habitat conservation plans such as the SJR Wildlife Refuge CCP or the SJMSCP, which are meant to provide protection at the population level. In addition, conflicts with local policies as a result of construction would be less than significant because of the temporary and localized nature of the effects. Because fish screens are expected to produce beneficial results for special-status fish species, they would not conflict with local policies protecting biological resources or conflict with provisions of an adopted habitat conservation plan or natural community conservation plan, such as the SJR Wildlife Refuge CCP or the SJMSCP. This impact would be less than significant.
Cultural Resources	• Construction and operation of fish screens would be within existing river banks and channels at the location of existing diversions. River banks could be excavated for installation of structures during construction. It is unknown if cultural resources (significant historical, archaeological, or paleontological resources) or human remains exist in these locations. Typically the river channels have had high levels of disturbance because of hydraulic conditions and the fish screen sites would have been previously disturbed to install diversions. As such, there is a low potential for significant cultural resources to exist within the river banks. Operation of fish screens would have a very low potential to affect cultural resources because operation would be along the river bank and channels. It is reasonable to assume that where construction within areas that may contain cultural resources cannot be avoided, an assessment would be conducted of the potential for damage to cultural resources or human remains prior to construction. This may require hiring a qualified cultural resources specialist to determine the presence of significant cultural resources. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant effects on cultural resources associated with construction of fish screen projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.

<table>
<tr><th colspan="2">Potential Environmental Effects of Fish Passage Improvements—Fish Screens</th></tr>
<tr><th>Resource</th><th>Discussion</th></tr>
<tr><td>Geology and Soils</td><td>

The locations of new fish screens could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, construction or operation of fish screens would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, soil erosion, loss of topsoil, or landslides. Impacts would not occur.
Construction would likely take place along rivers and in riparian areas where erosion can take place depending on the soil characteristics, geology, and area of disturbance. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant erosion or sediment effects associated with construction of fish screens. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 175091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.
Fish screens would not bring people to the risk of earthquakes or geologic hazards, meaning the operation of the areas would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur.

</td></tr>
<tr><td>Greenhouse Gas Emissions</td><td>

Similar to the discussion in Table 16-12, construction of fish screen projects would generate GHG emissions because heavy equipment would be used for a period of up to 6 months. While construction activities would be limited, it is likely that construction could result in a potentially significant GHG impact beyond SJVAPCD’s ZEL. Depending on the level of construction activities and the potential operational lifespan of the project, construction-related GHG emissions could exceed these values and result in a potentially significant impact. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
During operation, some vehicles may be needed for monitoring or maintenance of the fish screens. However, the trips would be limited, of very short duration, and over a long period of time (e.g., one trip every year). As such, they would likely result in extremely small quantities of GHG emissions. However, GHG emissions may still exceed SJVAPCD’s ZEL. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions.

Adopt early action measures to reduce GHGs.
Establish a statewide GHG emissions cap for 2020 based on 1990 emissions.
Adopt mandatory report rules for significant GHG sources.

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Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
	○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Hazards and Hazardous Materials	• Construction and operation of fish screens would not be a hazard or trigger safety concerns to public or public use airports or private airstrips because the structures would be constructed and operated within the river banks and channels and would not involve structures that could impede, interfere, or otherwise create a safety hazard to airports or air traffic. As such, construction and operation of fish screens would not result in a safety hazard for people residing or working in or near the project area. Impacts would not occur. • Construction and operation of fish screens would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road within the river banks and channels. Impacts would not occur. • Construction and operation of fish screens would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur. • Construction of fish screens could involve the temporary use of small amounts of hazardous materials, such as fuel to power construction equipment. There is a low potential for a hazardous materials spill associated with construction equipment given the limited duration of construction and the generally small number of construction equipment that would be used. However, since construction work would occur within river channels, Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts due to hazards and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The precise location of fish screens would be constructed is not yet known; however, these projects could be constructed within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Additionally, depending on the location of construction, remediation may be needed to address soil contamination during excavation activities. Table 16-39 lists potential

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
	mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • Lists of hazardous materials site are compiled by different state agencies under Government Code, § 65962. These sites are also known as Cortese Sites. There were no sites identified on the Hazardous Waste and Substance Site List compiled into the EnviroStor online database managed by the DTSC for Calaveras, Tuolumne, or Mariposa Counties (CalEPA 2016). There were a total of 17 sites identified for Merced, San Joaquin, and Stanislaus Counties. In addition to these sites identified by the EnviroStor database, CalEPA also identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facilities where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action for these counties (CalEPA 2016). There are approximately 500 leaking underground storage tanks designated as open in these counties (CalEPA 2016). There are approximately 55 facilities in these counties that have received CDOs/CAOs not identified as non-hazardous wastes, domestic wastewater, or domestic sewage (CalEPA 2016). The active and open leaking underground storage tank cases and the CDO/CAO facilities are located throughout these counties. Although it is not yet known precisely where fish screens would be constructed, if construction were to occur on a Cortese Site, because construction activities would likely entail some ground disturbance (e.g., excavation), there would be potential for release of existing soil or groundwater contaminants. Were this to occur, impacts could be significant. Table 16-39 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • Construction of fish screens could require excavation. Utilities may be underneath the sites or adjacent to a site and may need to be relocated or avoided. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potential hazards associated with excavation around utilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
Hydrology and Water Quality	• Construction of fish screens may temporarily affect hydrology and water quality due to grading along the river banks and channels. Turbidity resulting from construction activity on-bank and instream could cause a temporary exceedance of applicable water quality standards. Placing and anchoring the fish screens using pile driving or a crew in the water placing a screen, armoring the channel and banks with riprap and driving heavy equipment in and near the river channel could result in temporary turbidity. Due to the placement activities during the dry season, to avoid impacts on sensitive fish species, and isolation of the areas from surface water with cofferdams or some other means, it is expected that water quality impacts would be less than significant with mitigation incorporated. Turbidity should be monitored for Basin Plan objectives compliance during construction, reducing the impacts on water quality. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of fish screens would not deplete groundwater supplies or interfere substantially with groundwater recharge because these projects would not require groundwater supply and would not result in a substantial increase in impervious surfaces. Impacts would not occur. • Operation of the fish screens could alter the existing drainage pattern of the site or area but is not expected to cause an increase in substantial erosion or siltation, substantial runoff or result in flooding on- or offsite. Design would take into account existing hydrology and channel geomorphology and installation of the structures would be done so erosion or flooding would be controlled or would not occur. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of fish screens would not substantially increase the number of people exposed to the risk of flooding because these activities would not draw people to flood hazard locations. As such, construction and operation of fish screens would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Construction and operation of fish screens would not involve the construction of housing, and therefore this activity would not place housing within a 100-year flood hazard area. Impacts would not occur. • Construction and operation of fish screens would not impede or redirect flood flows because lead agencies would be required to comply with the requirements of USACE and the Central Valley Flood Protection Board to avoid increased flood potential. Impacts would be less than significant. • Construction of fish screens would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems because most activities would take place in the stream channel within a cofferdam. Impacts would not occur.

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
	• Operation of fish screens would not create or contribute runoff water or provide substantial additional source of polluted runoff. Most of the fish screen would be in the river channel, and although there may be some impervious surfaces on land associated with the screen it would not be expected to increase runoff volume or contribute polluted runoff. Maintenance of fish screens would be expected to be periodic would likely primarily entail cleaning the screens of debris from the river, which would not increase runoff volume or contribute polluted runoff. Impacts would not occur. • Construction of fish screens is not expected to provide substantial additional sources of polluted runoff because these activities would occur primarily within the stream channel. However, construction equipment would likely be working from the river bank and, as a result, hazardous materials (e.g., fuels, lubricants, diesel) would be used during construction. While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it result in a significant impact. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts on water quality associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction of fish screens is not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of fish screens could result in a substantial degradation of water quality.
Land Use and Planning	• Construction and operation of fish screens would not physically divide an established community because they would be located within existing river banks and channels where communities are not established. Impacts would not occur. • Construction and operation of fish screens would occur in existing river banks and channels and would not conflict with land use designations or zoning because the activities would take place at an existing diversion already allowed by local policies or plans. In addition, these areas may be designated natural resource or open space areas by land use plans and fish screens would be consistent with those designations because they would enhance existing habitat for fish and wildlife species. Impacts would be less than significant. • The SJMSCP covers parts of the San Joaquin, Stanislaus, and Tuolumne Rivers. This plan protects special-status species within the San Joaquin, Stanislaus, and Tuolumne Rivers. As described in the Biological Resources section of this table, there could be some temporary construction impacts on adjacent riparian and/or wetland areas, but lead agencies would mitigate these temporary impacts through measures identified in Table 16-39. As such, no conflicts are expected with habitat conservation plans, natural community conservation plans, or other plans, policies, and

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
	regulations. Furthermore, the fish screens would help protect designated fish species that are identified within the habitat conservation plan as needing protection (e.g., splittail), and would ultimately support the purpose of the plan to protect these species. Impacts would be less than significant.
Mineral Resources	• Construction and operation of fish screens would not result in the removal or inability to access state or locally designated mineral resource areas. Fish screens would be located in areas that have already been modified by water diversions and there is a very low potential for mineral resources to exist. Impacts would not occur.
Noise	• Construction of fish screens would create noise related to the use of heavy construction equipment. The sites would be located within river banks and channels where people do not live. Of the 324 diversions that could be screened, the majority of them, 226, are located in areas with a population density of 0–100 people per square mile. Generally this would indicate they are located in fairly remote and sparsely populated areas, with a low likelihood of sensitive receptors to be located immediately adjacent to a project site. As such, for these diversions, it is unlikely people would be permanently exposed to noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies due to the small nature of the projects and the remote location of these projects. Excessive ground-borne vibration or ground-borne noise levels are also not expected, unless pile driving is needed. If pile driving is needed it is not expected to cause excessive vibrations that would disturb sensitive receptors because of the remote location of the projects. Of the 324 diversions that could be screened, 104 are located in areas with a medium population density of 101–1,000 people per square mile and 2 are located in areas with a high population density of greater than 1,000 people per square mile. These are located in more urban areas and, as such, have a greater likelihood of having sensitive receptors located within relative close proximity to project site locations. As such, there may be temporary elevated noise in excess of standards established in local general plans, noise ordinance, or applicable standards that may affect sensitive receptors. These potential elevated noise levels would primarily occur during the day because construction is not expected to occur at night and for short periods of time within the day over a short duration (e.g., several weeks to several months, but generally less than 6 months). Given the potential for 106 locations to have sensitive receptors within relative close proximity, and the potential for pile driving, lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant effects associated with construction noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Operation of fish screens would not create noise. There may be some maintenance activities, but they would not create a permanent increase in ambient noise and impacts would be less than significant. • Projects would not be constructed near airports or airstrips so people would not be exposed to excessive noise levels. Impacts would not occur.

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
Population and Housing	• The construction and operation of fish screens would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Furthermore, it would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people. Impacts would not occur. • The construction and operation of fish screens would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere because the sites would be located within river banks and channels. No homes or people would be displaced. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, and other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, the construction and operation of fish screens would not involve an increase in population or housing. In addition, these actions would not include new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.
Recreation	• Construction of fish screens would occur within river banks and channels. It is possible that recreational facilities would be located in areas where fish screens would be constructed. If recreational facilities were located within very close proximity, construction of fish screens may affect them; however, it is unlikely that there would be significant impacts on recreational facilities because construction would be temporary and limited (e.g., several weeks to several months, but generally less than 6 months). Construction and operation of fish screens would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Construction of fish screens could result in some additional trips associated with construction workers. Depending on the location of the site, there could be an increase in traffic from construction workers. The temporary increased traffic during construction would likely not exceed local or regional road trip thresholds, because the number of construction workers that fish screen projects typically require is 5–10 people. This would be a less-than-significant impact. • Operation of fish screens would not generate additional trips beyond those needed to maintain the sites. If maintenance activities during operation are needed, they would be temporary in nature and would not affect traffic. Impacts would not occur. • Construction and operation of fish screens would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.

Potential Environmental Effects of Fish Passage Improvements—Fish Screens	
Resource	Discussion
Utilities and Service Systems	• Construction and operation of fish screens would not exceed wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of wastewater. Impacts would not occur. • Construction and operation of fish screens would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. Impacts would not occur. • The construction and operation of fish screens would not need the construction of additional storm water drains because the screens would be built within river channels and would not generate storm water. Impacts would not occur. • Construction and operation of fish screens would not generate an increase in solid waste because the activities would not generate large quantities of solid waste. Impacts would not occur. • Construction and operation of fish screens would not require a water supply. Impacts would not occur.

16.3.7 Fish Passage Improvements – Physical Barrier in the Southern Delta

Initiated by DWR in 1991, the South Delta Temporary Barriers Program (TBP) consists of seasonal installation of three rock barriers (Old River Near Tracy, Middle River, Grant Line Canal) designed to facilitate pumping by agricultural water diversions in the southern Delta, and a fourth barrier (Head of Old River [HOR]) designed to benefit SJR salmon and steelhead by improving attraction flows and passage conditions for adults in the fall, and survival of out-migrating smolts in the spring by blocking entry of smolts into Old River (See Section 16.4.5, *South Delta Temporary Barriers,* for more information regarding this program). Studies conducted by the Vernalis Adaptive Management Program (VAMP) demonstrated that increasing the volume of flow in the mainstem SJR and preventing smolts from entering Old River was effective in improving survival of SJR smolts through the Delta. Installation of the HOR barrier was prohibited in 2008 in response to a court order to protect delta smelt. In 2009 and 2010, USBR and DWR investigated the effectiveness of a non-physical barrier (bio-acoustic fish fence) in deterring juvenile salmonids from entering Old River. A permanent operable barrier at the HOR is currently proposed as part of the California WaterFix to prevent out-migrating salmonids from entering Old River in the spring and improve adult passage conditions and water quality (dissolved oxygen [DO]) in the SJR (particularly the Stockton Deep Water Ship Channel) in the fall. This section evaluates the construction and operation of a permanent operable barrier at HOR. It assumes the other temporary barriers under the TBP in the southern Delta would continue to be implemented as described in Section 16.4.5 as part of addressing the impacts of the CVP/SWP export operations on water levels and flow conditions that might affect salinity.

Cost Evaluation

DWR (2015a) produced a report in response to requirements of the NMFS 2009 Biological Opinion on the long-term operations of the CVP and SWP, discussing engineering solutions to reduce diversion of emigrating salmonids. This report discusses the potential engineering solutions for HOR and four other areas in the Delta. The HOR gate is estimated to cost $43,200,000 for construction and $200,000 for operation and maintenance.

Environmental Evaluation

The primary sources of information for the following description of physical barriers in the southern Delta and associated environmental impacts were NMFS's Biological Opinion for the 2012 South Delta Temporary Barriers Project (NMFS 2012), San Joaquin River Group Authority (SJRGA) Annual Technical Reports (2009, 2011), and the publicly available California WaterFix Draft Biological Assessment (USBR and DWR 2016).

Summary of Potential Action

As described in Section 16.4.5, *South Delta Temporary Barriers*, continued implementation of the TBP is currently part of baseline hydrologic, water quality, and biological conditions of the southern Delta. Because DWR would continue to work with the permitting and resource agencies to obtain the appropriate permits and conditions to operate the temporary barriers, there would be no change from baseline conditions or additional environmental assessment or regulatory requirements with future installation and operation of the temporary barriers. The barriers are typically installed in the spring and operated April–November. In general, installation of the barriers requires stockpiling of quarry rock on the waterside of the levee crown and use of heavy equipment (e.g., front loaders, dump trucks, excavators, cranes) to place the stockpiled rock and other structures (e.g., culverts, flashboard structures, concrete reinforcing mats) into the channel. As the rock barrier is extended into the channel, heavy equipment can use the top of the barrier to move farther into the channel to place additional material. Construction typically takes 1–3 weeks. The barriers are removed in the fall by reversing the installation procedure. The TBP includes a fish monitoring program employing the use of acoustic telemetry to assess the survival of salmon and steelhead with the south Delta barriers in place, and gain a better understanding of survival, migration behavior, and predator-prey interactions in the south Delta under various structural and operational water management conditions.

Foreseeable future barrier projects in the south Delta include the construction and operation of a permanent operable barrier at the HOR. The HOR is in San Joaquin County near the town of Lathrop. Currently proposed as part of the California WaterFix, the HOR gate would consist of five water control gates; a fish passage structure; a boat lock; and associated control, operations, and navigation facilities. Typical construction equipment for this type of project would include excavators, graders, cranes, pile drivers, bulldozers, dump trucks, and front-end loaders. The fish passage structure would be designed according to guidelines established by NMFS and USFWS. The barrier would be constructed with reinforced concrete within the confines of the existing channel with no levee relocation. To ensure stability of the levee, a sheet pile retaining wall would be installed in the levee where the operable barrier connects to it. Dredging of Old River and the placement of rock slope protection would be required upstream and downstream of the proposed structure. Cofferdams would be installed to create a dewatered area for construction of the foundation. Construction may last up to 3 years and may be conducted in two phases with half of the structure constructed in the first phase and the other half constructed in the second phase. A temporary work area would be established for storage and stockpiling of construction materials, fabrication of structural components, and construction of other temporary facilities and equipment. The operable barrier construction site, including the temporary work area, would be located in areas that were previously disturbed by construction and operation of the temporary rock barrier. Long-term operations and maintenance activities may include regular or periodic inspections, repairs, cleaning, and sediment and debris management to ensure the effectiveness of the barrier over the design life of the facility.

Potential Environmental Effects

Construction of the physical barrier in the southern Delta may result in temporary and localized effects typically associated with construction activities, including a change in water quality, air quality effects, and ground and channel disturbance. Placement of riprap and grading along the banks for the future HOR permanent barrier could change fish habitat in the area. Dredging would temporarily decrease macroinvertebrate density in the area of the barrier, resulting in a loss of prey for fish. Cofferdam placement and dewatering could result in special-status fish species becoming stranded within the cofferdam area. A rescue and relocation of all fish species would be needed within the isolated areas. The cofferdam and the rescue and relocation could result in injury or mortality of special-status fish species. Pile driving may be needed for structure and/or cofferdam installation. Noise levels could exceed injury/mortality ranges determined by NMFS and affect special-status fish species. Aquatic resources would likely be the most affected for a temporary period of time by the construction of the new HOR permanent operable barrier. Operation of the physical barrier could increase predation on juvenile special-status fish species (i.e., Chinook salmon and steelhead), but is also expected to benefit special-status fish species by directing them toward better migratory habitat. The new operable barrier would require maintenance. Maintenance would occur when needed and would include cleaning the barrier and regular or periodic inspections. Maintenance activities would be short term and not expected to have long-term effects on fish or other aquatic organisms.

It is reasonable to assume that the permanent physical barrier would be professionally installed by contractors familiar with such projects. Construction of the permanent barrier could last up to 3 years and may be conducted in two phases. Construction activities would occur during the dry season (typically June–October) when anadromous fish or other special-status fish species such as delta smelt would not be migrating or spawning. BMPs for controlling sediment and contaminant release into waterbodies would be used and minimize potential effects associated with water quality and hazardous materials. Mitigation measures to minimize stranding and protect against pile driving generated noise would be implemented. Operation of the permanent barrier would result in changes to hydraulics and aquatic habitats by the addition of riprap around the structure. They could also cause an increase in predation of special-status fish species due to the attraction of predatory fish to structures. Overall, operation of the barrier would help guide fish into better migratory habitat and increase survival. This is expected to benefit both special-status fish species and native fish species.

Table 16-21, *Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta*, summarizes the potential environmental effects associated with improving fish passage by use of a physical barrier in the southern Delta. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of this non-flow measure and is referenced in Table 16-21 where appropriate.

Table 16-21. Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta

Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta	
Resource	Discussion
Aesthetics	• Construction and operation of a physical barrier would not be expected to significantly affect scenic vistas because it would be located at the current site of the TBP at HOR and there are no scenic vistas identified in the San Joaquin County general plan (San Joaquin County 2014a). Construction may be observable for a temporary period of time when heavy equipment is used to grade banks, move sediment, and install structures around the project site. Operation would have limited impacts on the aesthetics of the area as it would be similar to the temporary barrier that can already be viewed within the existing channel. The barrier would generally not be near residential or roadway areas so no sensitive receptors would be present if lighting was used during construction for a temporary period of time. Impacts would be less than significant.
Agriculture and Forestry Resources	• Construction and operation of physical barriers would not be expected to be located on lands used for agriculture or forestry but within the footprint of where the barrier is currently located (i.e., in Old River). Some temporary disturbance of area along the channel or behind the levee may be required for construction equipment and storage. However, there would be no permanent conversion of farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural use, conflict with existing zoning for agriculture use or a Williamson Act contract, conflict with existing zoning of forest land, or conversion of forest land to non-forest use. Impacts would be less than significant.
Air Quality	• Construction of physical barrier would likely result in emissions associated with construction equipment and construction worker vehicles, as well as fugitive dust emissions from ground disturbance. The quantity, duration, and the intensity of construction activities have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Since construction of physical barriers wells does not require lengthy construction activities, (i.e., multiple years) the potential for significant environmental effects is minimal. Further, construction emissions generated would need to comply with the SJVAPCD regulations and established thresholds. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on air quality associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction of a physical barrier in the southern Delta would be inconsistent with applicable air quality plans or local general plans. A project is deemed

Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta	
Resource	Discussion
	inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The construction of a physical barrier in the southern Delta would not result in population or employment growth because this project is intended only to benefit special-status fish species through improvement of fish passage. Therefore, construction a physical barrier in the southern Delta would not result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Impacts would not occur. • The physical barrier would operate passively and, as such, would not result in emissions. However, the barrier would require regular or periodic inspections and repairs, which would entail a limited number of maintenance personnel vehicle trips. Given the limited number of trips expected annually and the fact that they would be spread over time and be of short duration, this impact would be less than significant. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). Construction and operation of a physical barrier in the southern Delta would not create objectionable odors affecting a substantial number of people. Impacts would not occur.
Biological Resources	• Construction and operation of the physical barrier would be located in the Old River, which supports special-status fish species such as Chinook salmon and steelhead. This area is expected to have high potential for special-status plant species, animal species, and habitat, and support biological resources. It is reasonable to assume that in-water work of constructing the physical barrier would occur during the least sensitive periods of special-status species life stages, (i.e., during the dry season, June–October), because this would reduce and minimize impacts on aquatic species. As such, construction of the physical barrier would not interfere with the movement of native residential or migratory fish species and associated migratory corridors, or impede the use of nursery sites because any work done in the water would occur June–October when fish are not spawning or migrating. However, Table 16-39 lists potential mitigation measures the lead agency can and should implement to reduce potentially significant environmental effects of construction and operations on special-status biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Construction of the physical barrier would release sediment and possibly hazardous materials (e.g., oil or fuel from construction equipment) into waterbodies, affecting water quality. Release of sediment can bury macroinvertebrates which are prey for fish and other aquatic species, coat or bury eggs from frogs and fish, and fill in pool habitat. Water quality measures such as monitoring turbidity to ensure compliance with Basin Plan water

Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta	
Resource	Discussion
	quality objectives and construction BMPs would be implemented. To ensure this, lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and installation of cofferdams can injure or kill fish by noise generated through pile driving and stranding, if special-status fish species become trapped inside a dewatered area. Pile driving can create noise impacts harmful to fish, resulting in injury or death. Fish rescue in the dewatered area (seining, electrofishing) could injure or kill fish. This would result in take and be a significant and unavoidable impact. Water quality measures such as monitoring turbidity to ensure compliance with Basin Plan water quality objectives and construction BMPs should be implemented per Table 16-39. Measures for reducing stranding and pile driving noise would also be followed. Furthermore, a monitoring plan assessing the movements of salmonids around the barriers would be enforced after the barriers are completed, which is part of permitting requirements and conditions by resource agencies (e.g., NMFS, Central Valley Water Board). Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction of the physical barrier. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. Even with mitigation measures, significant and unavoidable impacts may occur if the potential for take cannot be avoided or reduced or take occurs during construction. • Operation of the physical barrier would change aquatic habitat by installing riprap and changing hydraulics near the barrier. The change in hydraulic conditions would be assessed before construction to ensure velocities would not cause a change that would be detrimental to special-status fish species. The barrier itself could increase predation of juvenile salmonids by attracting predatory fish, but predation effects are unknown. Overall, the project would be expected to have beneficial long-term effects by guiding fish toward better migratory habitat. Operation of the physical barriers would keep fish from entering poor habitat and direct them toward better migratory and spawning habitat, therefore increasing survival. This impact would be less than significant. • The HOR permanent barrier would be constructed in the same area that has already been used for the temporary barriers so disturbance of riparian vegetation or wetlands is not anticipated. Additionally, this area has been continuously disturbed by installing and removing the temporary barriers. However, the lead agency can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction and operation of physical barriers. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.

Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta	
Resource	Discussion
	• While there is not specific language in either the SJMSCP or the SJR Wildlife Refuge CCP about barriers, these documents do identify that San Joaquin County would work with CDFW and other agencies to promote restoration for anadromous fish. The physical barrier is expected to produce beneficial results for migrating special-status fish species and, as such, construction and operation would not conflict with local policies protecting biological resources or conflict with provisions of an adopted habitat conservation plan or natural community conservation plans. Impacts would be less than significant.
Cultural Resources	• Construction and operation of the physical barrier would be within an area that has been regularly disturbed for the installation and removal of the temporary barrier. Because this area has been previously disturbed by the TBP installation, there is a low potential for significant cultural resources (significant historical, archaeological, or paleontological resources) and human remain presence. However, Table 16-39 lists potential mitigation measures the lead agency can and should implement to reduce potentially significant environmental effects of construction on cultural resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, its likely impacts could be mitigated to less than significant once mitigation measures were implemented given the low potential for cultural resources. • Operation of a permanent physical barrier would have a very low potential to affect cultural resources because operation would be in the same footprint as the TBP. This impact would be less than significant.
Geology and Soils	• Construction or operation of the barrier would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, loss of topsoil, or landslides. Impacts would not occur. • Given construction and operation would occur in close proximity to existing waterways and within a waterway, the proposed project site would be evaluated before construction begins for the potential of soil erosion under construction and operating conditions. Depending on soil conditions and the design and construction of the barrier, erosion could occur. The lead agency can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant erosion effects associated with construction and operation of the barrier. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The physical barrier would not bring people to the risk of earthquakes or geologic hazards, meaning the operation of the physical barriers would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur.

Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta	
Resource	Discussion
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-12, construction of the physical barrier would generate GHG emissions because heavy equipment would be used for a period of time over 3 years. While construction activities would be limited, it is likely that construction could result in a potentially significant GHG impact beyond the SJVAPCD's ZEL. Depending on the level of construction activities and the potential operational lifespan of the project, construction-related GHG emissions could exceed these values and result in a potentially significant impact. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • During operation of the barrier, vehicles may be needed for monitoring and maintenance. The trips are expected to be limited, of very short duration, and over a long period of time (e.g., one trip every year). As such, they would likely result in extremely small quantities of GHG emissions. However, GHG emissions may still exceed SJVAPCD's ZEL. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. • Adopt early action measures to reduce GHGs. • Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. • Adopt mandatory report rules for significant GHG sources. • Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. • Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs. • AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

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Resource	Discussion
Hazards and Hazardous Materials	• Construction and operation of the physical barrier would not be a hazard or provide a safety concern to public or public use airports or private airstrips because the structure would be constructed and operated within river banks and channels and would not involve structures that could impede, interfere, or otherwise create a safety hazard to airports or air traffic. As such, construction and operation of the physical barrier would not result in a safety hazard for people residing or working in the project area. Impacts would not occur. • Construction and operation of the physical barrier would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road within river banks and channels. Impacts would not occur. • Construction and operation of the physical barrier would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur. • Construction of in the physical barrier could involve the temporary use of small amounts of hazardous materials, such as fuel to power construction equipment. Given the in-water location of the barriers and the potential for a spill, this impact would be significant. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts due to hazards and hazardous materials. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • There are no schools within one-quarter mile of the barrier. Therefore, there would be no hazardous materials impact on schools related to construction or operation of the HOR physical barrier. • The location at which the barrier would be constructed and operated is not a Cortese Site. Therefore, construction and operation of a physical barrier at this location would not create a significant hazard to the public or the environment. Impacts would not occur.
Hydrology and Water Quality	• Construction of the physical barrier may temporarily change water quality due to the placement of rock, dredging, and grading near and at the river's banks and channels. Turbidity resulting from construction activity on-bank and instream could cause a temporary exceedance of applicable water quality standards. Placing and anchoring the barrier structures and driving heavy equipment in and near the channel could result in a temporary increase in turbidity. Following the isolation of construction areas from surface water with cofferdams or other means, it is not expected that water quality standards will be violated. Turbidity should be monitored during construction for compliance with Basin Plan requirements, minimizing the potential impacts on water quality, per Table 16-39. Operation of the physical barriers would change the hydrology of the river and may also affect water quality (i.e., turbidity). It is likely water quality would be monitored when the HOR permanent barrier is operable. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines

Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta	
Resource	Discussion
	Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of the physical barrier would not deplete groundwater supplies or interfere substantially with groundwater recharge because this project would not require a water supply during construction or operation and would not result in a substantial increase in impervious surfaces. Impacts would not occur. • Operation of the physical barrier could alter the existing drainage pattern of the site or area but is not expected to cause an increase in substantial erosion or siltation, substantial runoff, or result in flooding on- or offsite. Site design would be modeled before installation and would take into account existing hydrology and channel geomorphology. Installation of the structure would be done so no erosion or flooding would occur. Table 16-39 lists potential mitigation measures that the lead agency can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Operation of the physical barrier would not create or contribute runoff water because the barrier would be within the river channel. Therefore, operations would not would exceed the capacity of existing or planned storm water drainage systems. Impacts would not occur. • Construction of the physical barrier is not expected to provide substantial additional sources of polluted runoff because these activities would occur primarily within the stream channel. However, construction equipment and construction vehicles would be working from the river bank and, as a result, hazardous materials (e.g., fuels, lubricants, diesel) may be used during this activity. While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it result in a significant impact. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts on water quality associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • Construction and operation of the physical barrier would not substantially increase the number of people exposed to the risk of flooding because these activities would not draw people to flood hazard locations. As such, construction and operation of the physical barrier would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur.

Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta	
Resource	Discussion
	• Construction and operation of the physical barrier would not involve the construction of housing, and therefore this activity would not place housing within a 100-year flood hazard area. Impacts would not occur. • Construction and operation of the physical barrier would not impede or redirect flood flows within a 100-year flood hazard area. A physical barrier would be within the river channel and not built within the floodplain, i.e., not within the actual flood hazard area. Lead agencies would be required to comply with the requirements of USACE and the Central Valley Flood Protection Board to avoid increased flood potential. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction and operation of the physical barrier would not occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of the physical barrier could result in a substantial degradation of water quality.
Land Use and Planning	• Construction and operation of the physical barrier would not physically divide an established community because it would be located within existing river banks and channels where communities are not established. Impacts would not occur. • Operation of the physical barrier would occur in existing river banks and channels and would not conflict with land use designations or zoning. It would occur within the general area that the current temporary barrier is installed and removed. The zoning in the area is shown as water, with city limits of Lathrop on one side and general agriculture on the other side within the county limits, which provides for natural open space area. Construction laydown areas may result in a temporary disturbance to existing land uses and but would not result in a permanent change or conflict with existing land uses or zoning. Impacts would be less than significant. • No conflicts are expected with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations because the land use designation is general agriculture and associated support uses are natural open space and the barrier would support natural open spaces uses (San Joaquin County 2014b). Impacts would not occur.
Mineral Resources	• Construction and operation of the physical barrier would be constructed in an area previously used for this purpose. This area is not used to extract state or locally designated mineral resources. Therefore, construction and operation of permanent physical barrier would not affect state or locally designated mineral resources or result in the removal or inability to access state or locally designated mineral resource areas. Impacts would not occur.

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Resource	Discussion
Noise	• Construction of the physical barrier would create noise related to the use of construction heavy equipment. The site is located within river banks and channels where people do not live. It is unlikely people would be permanently exposed to noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies due to the remote location of the project from populous areas. Excessive ground-borne vibration or ground-borne noise levels are also not expected, unless pile driving is needed. If pile driving is needed it is not expected to cause excessive vibrations that would disturb sensitive receptors because of the remote location of the project. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts due construction noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the limited exposure of potential sensitive receptors to this potential temporary impact and low likelihood of potential sensitive receptors to exist because of the remoteness. • Operation of the physical barrier would not create noise. There would be maintenance activities required during operation, but they would not create a permanent increase in ambient noise. This impact would be less than significant. • The barrier would not be constructed near airports or airstrips so people would not be exposed to excessive noise levels. Impacts would not occur.
Population and Housing	• Construction and operation of the physical barrier would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Further, it would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people. Impacts would not occur. • The construction and operation of the physical barrier would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere because the site is located within river banks and channels. No homes or people would be displaced. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, or other public facilities and schools) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, the construction and operation of the physical barrier would not involve an increase in population or housing. In addition, these actions would not include new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.

Potential Environmental Effects of Fish Passage Improvements—Physical Barrier in the Southern Delta

Resource	Discussion
Recreation	• Construction of the physical barrier would occur within river banks and channels and block access to boaters in certain areas depending on the needs of construction, duration of construction, and timing of construction. Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce effects on recreation during construction and operation of the barriers. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Construction and operation of the physical barrier would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Construction of the physical barrier could result in additional trips associated with construction workers. The location of the site is along existing levee roads away from major roadways so even with an increased number of trips, it is unlikely traffic would exceed existing level of service standards. Heavy construction equipment may damage dirt levee roads, so maintenance of the roads may be necessary during or after construction is complete. This impact would be less than significant. • Operation of the physical barrier would not generate additional trips beyond those needed to maintain the barrier. If maintenance activities are needed, it would be temporary in nature and would not increase traffic. Impacts would not occur. • Construction and operation of the physical barrier would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Construction and operation of the physical barrier would not exceed wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of wastewater. Impacts would not occur. • Construction and operation of the physical barrier would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. Impacts would not occur. • Construction and operation of the physical barrier would not need the construction of additional storm water drains because the barrier would be built within the river and would not generate storm water. Impacts would not occur. • Construction and operation of the physical barrier would not generate an increase in solid waste because the proposed activities would not generate large quantities of solid waste. Impacts would not occur. • Construction and operation of the physical barrier would not require a water supply. Impacts would not occur.

16.3.8 Fish Passage Improvements – Removal or Modification to Human-Made Barriers to Fish Migration

Blockage of migration of anadromous fish to historical habitat by dams and other human-made barriers is recognized as a major reason for historical declines and current status of ESA-listed salmon, steelhead, and sturgeon in the Central Valley (Moyle and White 2002, Lindley et al. 2007, NMFS 2014a). In the SJR system, NMFS identified re-establishment of steelhead in historic habitat upstream of impassable mainstem dams as a Priority 1 recovery action on the Stanislaus, Tuolumne, and Merced Rivers (NMFS 2014a). Such actions present unique technological challenges that require extensive engineering, biological, and environmental studies to evaluate the feasibility of potential fish passage methods as well as the suitability and potential capacity of upstream habitat to support the life history and habitat needs of the target species. Conceptual alternatives for adult fish passage at dams include fishways, ladders, lifts and locks, and trap and haul operations (DWR 2013b). Feasibility studies of downstream passage alternatives for juveniles and post-spawning adults (steelhead) at large dams and reservoirs typically focus on methods for capturing downstream migrants above the reservoirs and transporting these fish to release sites below the dam.

Implementation of fish passage or re-introduction programs that restore passage of anadromous salmonids to reaches above impassable dams on the SJR tributaries would not likely occur within an effective timeframe to contribute to the State Water Board's implementation program or other non-flow measures that may be implemented in the foreseeable future to improve anadromous fish production in the currently accessible reaches below the dams (e.g., floodplain and riparian habitat restoration). Therefore, the following evaluation addresses only the pre-project planning and evaluation actions that would be required to support implementation of such a program in the future.

Cost Evaluation

The primary goal of a feasibility study is to demonstrate the project is economically viable if it is designed, constructed, and operated in accordance with the concepts set forth in the study. The cost of a feasibility study can be expected in the range of 1.5–4 percent of the project costs (Mackenzie and Cusworth 2007).

Environmental Evaluation

The primary source of information for the following summary of fish passage planning and evaluation actions was DWR (2007, 2013b).

Summary of Potential Action

Fish passage or re-introduction programs typically include pre-project engineering feasibility studies, fish passage and barrier assessments, hydrologic and water quality monitoring, habitat surveys and suitability assessments, environmental and economic analyses, and evaluations of the potential effectiveness of the program (measured in terms of achieving the biological goals of the program) based on the quantity and quality of potential habitat above the dams and other factors that could limit the success of the program. Based on these studies, an experimental or pilot re-introduction program may be recommended prior to implementation of any long-term re-introduction program.

Potential Environmental Effects

Pre-project planning, evaluation actions, and habitat assessments that would be required to support implementation of fish passage or re-introduction programs that restore passage of anadromous salmonids to reaches above impassable dams are not likely to result in any significant effects on special-status species or other resources (e.g., aesthetics, transportation, air quality). CEQA allows categorical exemptions for classes of projects which have been determined not to have a significant effect on the environment (Pub. Res. Code, § 21084). Specifically, information collection is exempt from CEQA review under a Class 6 categorical exemption. The Class 6 categorical exemption consists of basic data collection, research, experimental management, and resource evaluation activities which do not result in a major disturbance to an environmental resource. These may be strictly for information gathering purposes or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded. (Pub. Res. Code, § 21084.) In addition, a Class 7 categorical exemption consists of actions taken by regulatory agencies to assume the maintenance, restoration, or enhancement of natural resources where the regulatory process involves procedures for protection of the environment. (Pub. Res. Code, § 21084.) Examples include, but are not limited to, wildlife preservation activities by CDFW. Construction activities are not included in a Class 7 categorical exemption and the types of evaluation and feasibility studies would not require construction. As such, many of the field studies involving fish passage and barrier assessments and hydrologic and water quality monitoring may be exempt under Class 6 or Class 7 categorical exemptions.

Access to river banks and channels is necessary for implementing the studies but would not result in effects on special-status species or their habitats because a crew of several people could do the surveys and the work would only cause a small disturbance for a limited period of time (e.g., several days to several weeks). Several persons would use one to two vehicles to access monitoring sites. Emissions from the vehicles would not conflict with an applicable air quality plan or violate air quality standards because there would be very few vehicles traveling during short periods of time. Water quality could be affected if activities included in-water work. However, it would be short term and only one or two persons would be in the river channel. The assessments would not alter the existing drainage pattern of the site or area or alter the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or offsite. There would be no impacts on traffic because the activities would require less than 10 people and vehicles. Other resources such as aesthetics, agriculture, and others would not be affected by field studies because the field studies would not alter or substantively change these types of resources when compared to existing conditions. It is reasonable to assume that field studies would be implemented or supervised by professional biologists who are familiar with such studies and projects. The biologists would recognize special-status aquatic and terrestrial species and avoid them if encountered during the field studies. These studies would provide the data to assess the possibility of introducing anadromous salmonids above impassable dams. As such, impacts on biological resources would be less than significant. The other studies such as pre-project engineering feasibility studies and suitability assessments, environmental and economic analyses, and evaluations of the potential effectiveness of the program (measured in terms of achieving the biological goals of the program), would be desk-top studies and based on data collected in the field.

16.3.9 Predatory Fish Control

The primary purpose of predatory fish control is to increase the survival of migrating salmonids and other native fishes through localized reductions of targeted predatory fishes and/or elimination or modification of habitat for predatory fishes at locations of high predation risk (*hotspots*). Predation by non-native striped bass, largemouth bass, and other warm-water species is identified as a major stressor for juvenile salmonids in the three eastside tributaries and mainstem LSJR (NMFS 2014a, McBain and Trush 2002, Brown 2000, FishBio 2013). Sites within the Delta that are currently considered hotspots of predator aggregation or activity, and which may contribute to high mortality rates of migrating smolts, include HOR, Old and Middle Rivers, Clifton Court Forebay, CVP intakes, and Georgiana Slough (Gingras 1997, Clark et al. 2009, Castillo et al. 2012, Bowen et al. 2009, Bowen and Bark 2010). Predation by non-native fishes has been identified as a likely contributor to low survival of Chinook salmon smolts in the interior Delta (Perry et al. 2010). In addition, considerable variability in smolt survival and an apparent shift in the relationship between smolt survival and flow in the southern Delta since 1997 (SJRGA 2009) suggests changes in biological factors such as predation (Hankin et al. 2010). However, a literature review of predation effects in the Delta by Grossman et al 2013, indicates that, "Although it is assumed that much of the short-term (<30 d) mortality experienced by these fish is likely due to predation, there are few data establishing this relationship. Juvenile salmon are clearly consumed by fish predators and several studies indicate that the population of predators is large enough to effectively consume all juvenile salmon production. However, given extensive flow modification, altered habitat conditions, native and non-native fish and avian predators, temperature and limitations, and overall reduction in historical salmon population size, it is not clear what proportion of juvenile mortality can be directly attributed to fish predation."

Acceptable strategies for predatory fish control include direct removal methods and habitat modifications to reduce predator habitat. Direct removal methods include electrofishing, hook-and-line fishing, passive trapping (e.g., fyke nets, hoop nets, gillnets), and active capture methods (e.g., trawls, beach seines). Habitat modifications that may reduce local aggregations of predators or their feeding efficiency include the removal or modification of abandoned structures (e.g., dams, bridge piers, docks), water diversion facilities (e.g., water intakes, forebays), scour holes, and invasive aquatic vegetation. Varying the location and/or timing of releases or routing of fish that are salvaged or bypassed at water intake or pumping facilities may also reduce predation losses associated with fixed release sites.

Cost Evaluation

As discussed above, predatory fish control can be accomplished through direct removal, or the elimination/modification of habitat conducive to predators. Using the method of direct removal of predators is generally less expensive than the elimination/modification of habitat as described below.

No long-term predator removal programs are in effect in the Delta; however, such programs have been implemented in rivers located in the western United States. For example, the Upper Colorado Endangered Fish Recovery Program (Recovery Program), established in 1988, is a partnership of local, state, and federal agencies, water and power interests, and environmental groups working to recover endangered fish in the Upper Colorado River Basin (Upper Colorado River Endangered Fish Recovery Program 2016). The Recovery Program implements long-term non-native fish management by removing the most problematic non-native fish predators from rivers. Among the non-native fish management projects funded within the Recovery Program are the middle Yampa River northern pike and smallmouth bass removal and evaluation project and the removal of smallmouth bass in the Upper Colorado River between Price-Stubb Dam near Palisade, Colorado, and Westwater, Utah project (Upper Colorado River Endangered Fish Recovery Program 2016). The total annual cost of each project from 2010 to 2015 was between $157,000 and $214,000[16] (Upper Colorado River Endangered Fish Recovery Program 2010a, 2011a, 2012a, 2013a, 2014a, and 2015a; Upper Colorado River Endangered Fish Recovery Program 2010b, 2011b, 2012b, 2013b, 2014b, and 2015b).

The costs of the habitat modification projects discussed above, designed to reduce predator habitat in the Delta and upstream tributaries, have been estimated as part of several recovery programs including: the Golden Gate Salmon Association Salmon Rebuilding Plan, the NMFS Final Recovery Plan (Recovery Plan)[17] (NMFS 2014a), the Habitat Restoration Plan for the Lower Tuolumne River Corridor (USFWS 2000), and the San Francisco Estuary Project 2007 Comprehensive Conservation and Management Plan (SFEP 2007). The various projects are site specific, and are dependent on the extent of the modifications needed and can vary in cost from $100,000–$300,000 per site for reducing predator habitat at large screen structures, to over $4.6 million for filling a gravel pit to reduce/eliminate habitat favored by predatory bass species, and replacing with high quality Chinook salmon habitat (McBain and Trush 2000, SFEP 2007, GGSA 2013, NMFS 2014a). On a broader scale, the Recovery Plan estimated implementing projects to minimize predation at weirs, diversions, and related structures in the Delta at $50 million over a period of 50 years[18] (NMFS 2014a).

Environmental Evaluation

Summary of Potential Action

Acceptable predator reduction methods likely would be limited to active and passive capture methods such as electrofishing, hook-and-line fishing, nets, and traps. These methods are preferred because they have no water quality impacts, minimal effects on non-target organisms, a higher degree of feasibility in open channel environments compared to other fish population control measures (e.g., chemical treatment, dewatering), and a lower level of risk of unintended ecological consequences. Limitations include high levels of effort and funding to achieve meaningful or measurable benefits, and significant uncertainty associated with the complexities of predator–prey interactions (e.g., compensatory responses by other piscivores) (Ward and Zimmerman 1999, Finlayson et al. 2010, Cavallo et al. 2012, also see Hubbs 1940 and other cited literature). Recreational reward fisheries using hook-and-line methods may be a relatively cost-effective means of reducing local predator densities and improving survival of migrating salmonids by concentrating intensive angling pressure on targeted predatory fish species at key location and times (Rieman and Beamsderfer 1990, Ward and Zimmerman 1999).

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[16] These costs are described in the Colorado River Recovery Program Annual Reports for 2010–2015.

[17] The National Marine Fisheries Service Final Recovery Plan targets the evolutionarily significant units of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and the distinct population segment of California Central Valley steelhead.

[18] This action originated from the Bay Delta Conservation Plan Administrative Draft (DWR 2013a), available: http://baydeltaconservationplan.com/Library/DocumentsLandingPage/BDCPDocuments.

Structural modifications aimed at reducing predator hotspots such as the removal or modification of human-made structures (e.g., removal of old pier pilings) and other forms of predator habitat (e.g., invasive aquatic vegetation) could result in effects on native fish and wildlife species, vegetation, soils, streambed substrates, and water quality. Structural modifications for predatory fish control do not include fish screen modifications which are discussed above in Section 16.3.6, *Fish Passage Improvements – Fish Screens*. The severity and magnitude of the impacts would vary depending on the timing, extent, and duration of these modifications; site conditions (e.g., presence of other sensitive resources); and the biological responses of individuals and populations to short- and long-term habitat changes. Potential construction activities include clearing of vegetation to construct temporary roads and staging areas; placement of temporary barriers or other structures to isolate active construction areas (e.g., cofferdams); and mechanical demolition, excavation, and extraction methods. Construction equipment may include excavators, hydraulic hammers, pile extractors, and cranes. Depending on the size of the structure to be removed or modified, construction could take between 6 months and 2 years. Common environmental commitments or BMPs to avoid, minimize, or offset potential construction-related effects may include seasonal work windows, preconstruction biological surveys; biological monitoring during construction; construction noise and light reduction measures; traffic control; SWPPP; spill prevention, control, and countermeasure plan; and turbidity compliance monitoring.

While there have been many studies determining the rate of predation on salmonids in the Central Valley and Delta (Clark et al. 2009, Garcia 1989, Gingras 1997, Holbrook et al 2009, Grossman et al 2013) the efficacy of predator control measures as an aid to rebuilding threatened and endangered salmonid populations and other native fish species remains unclear (Propst et al 2014, Grossman et al 2013). Recommended approaches to addressing these uncertainties and increasing the likelihood of desired outcomes include an experimental pilot program and an evaluation and refinement of the proposed measures.

Potential Environmental Effects

Active and passive capture methods are not expected to have significant impacts on aquatic or terrestrial sensitive-species habitat because the activities (hook-and-line fishing, nets, traps) would not modify habitat. However, if special-status fish species were caught with the active or passive capture methods, that could result in injury or mortality (i.e., *take*). Active and passive capture methods would harm individual non-native, predatory fish, because the purpose of the active and capture methods is to remove the predator fish once they are captured. Timing of the active or passive predatory control would vary depending on the species targeted and the design of the removal. It is reasonable to assume that active and passive capture methods would be done or supervised by professional fisheries biologists familiar with predatory fish and special-status species presence/absence in areas that would be fished.

CEQA allows categorical exemptions for classes of projects which have been determined not to have a significant effect on the environment. (Pub. Res. Code, § 21084.) Specifically, modification or demolition of existing structures can be exempt under a Class 1 categorical exemption. The Class 1 categorical exemption consists of the minor alteration of existing public or private structures, facilities, topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" listed in the exemption are not intended to be all-inclusive of the types of projects which might fall within a Class 1 categorical exemption. The key to the consideration of this class of categorical exemptions is whether the project involves negligible or no expansion of an existing use. As structural modifications or removals for predatory control (e.g., removal of old pier pilings) would not expand an existing use, this type of predatory control may be eligible for a Class 1 categorical exemption depending on the project-specific circumstances. Structural modifications/removals of human-made structures could result in temporary and localized effects typically associated with construction activities, including water quality impacts and ground and channel disturbance. Depending on the size of the structure to be removed, placement of temporary barriers or other structures (e.g., cofferdams) may be required. This placement and dewatering could result in special-status fish species becoming stranded within the cofferdam area. A rescue and relocation of all fish species would be needed within the isolated areas if these types of construction activities are needed to remove structures. This could result in injury or mortality of special-status fish species. River banks or channels may need to be graded after removal of human-made structures in areas that support special-status fish species such as Chinook salmon and steelhead. Aquatic resources would be the most affected by structural modifications/removals. There would be no operation and maintenance activities for predatory fish control. For the structural modifications/removals, activities would be professionally done by contractors familiar with such projects. BMPs for controlling sediment and contaminant release into waterbodies would be used and minimize potential effects on water quality associated with sediment and hazardous materials. Mitigation measures to minimize stranding would be implemented.

Table 16-22, *Potential Environmental Effects of Predatory Fish Control*, summarizes the potential environmental effects associated with predatory fish control. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of this non-flow measure and is referenced in Table 16-22 where appropriate.

Table 16-22. Potential Environmental Effects of Predatory Fish Control

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
Aesthetics	• Passive and active capture methods would not significantly affect scenic vistas because construction would not be required and because activities would be limited to people in the rivers passively or actively removing fish. This would not result in a permanent or even temporary alteration of river views. Impacts would not occur. • Removal or modification of human-made structures would be located within existing river channels and may alter views if the structure is located within a scenic vista or view. For modification/removal of a structure, construction may be observable for a temporary period of time when heavy equipment is used to grade banks, move sediment, and remove structures around the project site. This impact would be less than significant. • Lighting is not expected to be used during passive and active capture methods or removal of human-made structures—all activities would occur during the day. Impacts would not occur.
Agriculture and Forestry Resources	• Predatory fish control, both passive and active control and removal of structures, would not be expected to be located on lands used for agriculture or forestry but within existing river channels or immediately adjacent to them. There would be no conversion of farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural use, conflict with existing zoning for agriculture use or a Williamson Act contract, conflict with existing zoning of forest land, or conversion of forest land to non-forest use. Impacts would not occur.
Air Quality	• Predatory fish control would likely result in emissions associated with the removal or modification of human-made structures which would involve construction equipment and construction worker truck trips, as well as fugitive dust emissions from ground disturbance. The quantity, duration, and the intensity of construction activities have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Since removal of the structures would not require lengthy construction activities, the potential for significant environmental effects is minimal. Further, construction emissions generated would need to comply with the SJVAPCD regulations and established thresholds. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects on air quality associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean implementation of predatory fish control projects would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
	estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The implementation of predatory fish control projects would not result in population or employment growth because these projects are for the benefit of special-status fish species through improvement of fish passage. Therefore, predatory fish control projects would not result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Impacts would not occur. • Passive or active predator fish control or the removal of in-water structures, would likely result in monitoring vehicle trips on a periodic schedule. Given the limited number of vehicles over a longer timeframe, emissions from the vehicles would not prevent compliance with regulations or exceed thresholds established by SJVAPCD, conflict with or obstruct implementation of the applicable air quality plan, violate any air quality standard, contribute substantially to an existing or projected air quality violation, result in a net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standards, or create objectionable odors. Impacts would not occur.
Biological Resources	• Removal or modification of human-made structures would be located in river reaches that support special-status fish species such as Chinook salmon and steelhead. These areas are expected to have high potential for special-status plant species, animal species, and habitat, and support biological resources. It is reasonable to assume that removal or modification of human-made structures would occur during the least sensitive periods of special-status species life stages, (i.e., during the dry season, June–October), because this would reduce and minimize impacts on aquatic species. However, passive and active capture techniques could occur during any time of the year and this could result in interference with movement of native residential or migratory fish species and associated migratory corridors. Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce potentially significant environmental effects of removal or modification of human-made structures and passive and active capture techniques on special-status biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Removal or modification of human-made structures would release sediment and possibly hazardous materials (e.g., oil or fuel from construction equipment) into waterbodies, potentially affecting water quality. Release of sediment can bury macroinvertebrates which are prey for fish and other aquatic species, coat or bury eggs from frogs and fish, and fill in pool habitat. Water quality measures such as monitoring turbidity to ensure compliance with Basin Plan water quality objectives and construction BMPs would be implemented. To ensure this, lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with construction of fish screens. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
	15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Depending on the type of structure and location of structure to be removed or modified, removal or modification of human-made structures could require installation of cofferdams. Cofferdams can injure or kill fish by noise generated through pile driving and stranding, if special-status fish species become trapped inside a dewatered area. Fish rescue in the dewatered area (e.g., seining, electrofishing) could injure or kill fish. Passive and active capture methods could capture special-status fish species if they are present in the targeted sampling area. These methods could injure or cause mortality of fish. As such, construction of cofferdams, and passive and active capture methods could result in take of special-status fish species. Removal of predatory fish is targeted toward removing non-native fish (e.g., striped bass, largemouth bass, smallmouth bass). If non-native predatory fish are captured, they would be removed and killed. It is anticipated that the removal may have localized effects, but would not overall reduce the population of the non-native fish given their general prevalence and resilience (Cavallo et al. 2012). Given the need for evaluation and refinement of predatory control programs, a monitoring program would be implemented to determine if survival is increased by the removal of predatory fish and to determine the effectiveness of the programs (Ward and Zimmerman 1999, Finlayson et al. 2010, Cavallo et al. 2012). Overall, the project may have temporary significant impacts during the removal or modification of human-made structures, but beneficial long-term effects by allowing fish to access more and better habitat and decreasing predation. Removal or modification of structures are not expected to have a substantial adverse effect, either directly or through habitat modifications, on special-status species. Measures for reducing stranding and pile driving noise would also be followed. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with removal or modification of human-made structures and passive and active capture methods. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. Even with mitigation measures, significant and unavoidable impacts may occur if the potential for take cannot be avoided or reduced or take occurs during construction. • Passive capture methods would not result in disturbance or removal of riparian vegetation or wetlands as these methods would be implemented within existing river channels and would not temporarily or permanently remove habitat. No impact would occur.

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
	• Removal or modification of human-made structures could affect riparian vegetation and/or wetlands. This is because the surrounding habitat on river banks may include riparian vegetation and/or wetlands. Riparian vegetation may have to be removed to facilitate heavy equipment movement and wetlands may also have to be disturbed during removal activities. This would result in a temporary significant impacts on riparian habitat and wetlands. Under operations, riparian habitat and wetlands would not be affected. Removal and/or disturbance of riparian and wetlands habitats would be compensated for at a ratio appropriate for the disturbance per standard permit requirements or conditions from the U.S. Army Corps of Engineers and the Central Valley Water Board. This compensation would reduce and minimize impacts on fish and wildlife species and their habitats. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with installation, removal, or modification of human-made structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The SJR NWR Comprehensive Conservation Plan includes activities that would benefit steelhead and Chinook salmon. It is unknown how effective the removal or modification of human-made structures are in reducing predatory fish and the potential benefits to special-status species. Overall, installation, removal, or modification of human-made structures to benefit special-status fish species would not conflict with local policies protecting biological resources or conflict with provisions of an adopted habitat conservation plan or natural community conservation plan. This would be a less-than-significant impact.
Cultural Resources	• Passive and active capture methods would not affect cultural resources (significant historical, archaeological, or paleontological resources) or human remains because they would not involve ground-disturbing activities or other construction activities that may disturb unknown cultural resources or human remains. Impacts would not occur. • Removal or modification of human-made structures would be within existing banks and channels or immediately adjacent. Typically river banks and channels have experienced a high level of disturbance as a result of hydrologic events and man-made alterations, resulting in a generally low likelihood of intact cultural resources or human remains. However, it is unknown if cultural resources or human remains exist in these locations, and river banks could be excavated for removal or modification of structures that contain unknown cultural resources or human remains. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on historic cultural resources during the removal or modification of existing structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • There would be no operational changes for either the removal or modification of the structures or passive and active capture methods and no ground-disturbing activity so there would be no impacts on cultural resources or human remains from operations. Impacts would not occur.

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
Geology and Soils	• Removal or modification of human-made structures and passive and active capture methods would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, soil erosion, loss of topsoil, or landslides. Impacts would not occur. • The removal or modification of human-made structures and passive and active capture methods would not bring people to the risk of earthquakes or geologic hazards, and there would be no operational changes for the removal or modification of human-made structures and passive and active capture methods so they would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because the activities would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur.
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-12, removal or modification of human-made structures would result in increased GHG emissions because heavy construction equipment would be used. While construction activities would be limited, between 6 months and up to 2 years, it is likely that removal of structures could result in a potentially significant GHG impact beyond the SJVAPCD's ZEL. Depending on the level of construction activities and the potential operational lifespan of the project, construction-related GHG emissions could exceed these values and result in a potentially significant impact. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Passive and active control methods would not result in GHG emissions because there would be a very limited number of vehicles used to transport personnel to remove the predatory fish and the actions of removing the predatory fish do not produce GHGs. Some vehicles may also be needed for monitoring areas. However, the trips would be limited, of very short duration, and occur over a long period of time (e.g., one trip every year). As such, they would likely result in extremely small quantities of GHG emissions. However, GHG emissions may still exceed SJVAPCD's ZEL. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions.

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
	○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Hazards and Hazardous Materials	• Passive and active capture methods would not be a hazard or provide a safety concern to public and public use airports or private airstrips because the structures would be removed or modified within river banks and channels and would not involve structures that could impede, interfere, or otherwise create a safety hazard to airports or air traffic. As such, passive and active capture methods would not result in a safety hazard for people residing or working in the project area. Impacts would not occur. • Removal or modification of human-made structures may release hazardous materials if the structures themselves contain hazardous materials (i.e., creosote pilings). It would be expected that any suspected structures would be tested prior to removal and disposed of in a proper facility. Additionally, fuel would be used in heavy equipment. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts associated with releasing hazardous materials by removing or modifying existing structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The precise location of where existing in-stream structures would be removed or modified is not yet known; however, these projects could be constructed within one-quarter mile (0.25 miles) of a school. Hazardous materials (e.g., fuels, lubricants, diesel) may be used during construction (i.e., grading near river banks and channels). While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction.

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
	• Lists of hazardous materials site are compiled by different state agencies under Government Code, § 65962. These sites are also known as Cortese Sites. There were no sites identified on the Hazardous Waste and Substance Site List compiled into the EnviroStor online database managed by the DTSC for Calaveras, Tuolumne, or Mariposa Counties (CalEPA 2016). There were a total of 17 sites identified for Merced, San Joaquin, and Stanislaus Counties. In addition to these sites identified by the EnviroStor database, CalEPA also identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facilities where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action for these counties (CalEPA 2016). There are approximately 500 leaking underground storage tanks designated as open in these counties (CalEPA 2016). There are approximately 55 facilities in these counties that have received CDOs/CAOs not identified as non-hazardous wastes, domestic wastewater, or domestic sewage (CalEPA 2016). It is not yet known precisely where removal of or modification to structures would occur and removal or modification would require excavation. However, if it occurred on a Cortese Site and required excavation there would be potential for release of existing soil or groundwater contaminants because of the ground disturbance. Were this to occur, impacts could be significant. Table 16-39 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • Removal or modification of human-made structures and passive and active capture methods would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road within river banks and channels. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur. • Removal or modification of human-made structures could require excavation. Utilities may be underneath the sites or adjacent to a site and may need to be relocated or avoided. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potential hazards associated with excavation around utilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented.

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
Hydrology and Water Quality	• Removal or modification of human-made structures may temporarily affect water quality as a result of increased turbidity due to the removal of in-water structures and any grading near the banks and channels. Driving heavy equipment in and near the channel could result in temporary turbidity. Turbidity resulting from these activities could cause a temporary exceedance of applicable water quality standards. Due to the removal or modification activities limited to the dry season and isolation of the areas from surface water with cofferdams or some other means, significant impacts on water quality are not anticipated. Turbidity should be monitored during construction to ensure compliance with Basin Plan water quality objectives and construction BMPs would be implemented to minimize potential impacts on water quality. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Active capture methods could disturb substrate and potentially affect water quality depending on the method used. Active capture methods require people to enter the water and set up nets and then retrieve the nets. These methods can result in a slight disturbance of the substrate; however given the limited number of people that would be in the water and the limited ability of people to disturb substantial amounts of substrate impacts on water quality would be less than significant. • Removal or modification of human-made structures and passive and active capture methods would not deplete groundwater supplies or interfere substantially with groundwater recharge because these projects would not require groundwater and would not result in an increase in impervious surfaces. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would not alter the existing drainage pattern of the site or area and are not expected to cause an increase in substantial erosion or siltation or result in flooding on- or offsite. This would be a less-than-significant impact. • Removal or modification of human-made structures and passive and active capture methods would not substantially increase the number of people exposed to the risk of flooding because these activities would not draw people to flood hazard locations. As such, predatory fish control would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would not involve the construction of housing, and, therefore this activity would not place housing within a 100-year flood hazard area. Removal or modification of human-made structures and passive and active capture methods would not impede or redirect flood flows within a 100-year flood hazard area. Impacts would not occur. • Passive and active capture methods would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff because these activities would occur primarily within the stream channel. Impacts would not occur.

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
	• Removal or modification of human-made structures would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff because these activities would occur primarily within the stream channel. However, some grading near the banks and channels may be required and, as a result, hazardous materials (e.g., fuels, lubricants, diesel) may be used during this activity. While it is expected that these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it result in a significant impact. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts on water quality associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Removal or modification of human-made structures is not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which predatory fish control projects could result in a substantial degradation of water quality.
Land Use and Planning	• Removal or modification of human-made structures and passive and active capture methods would not physically divide an established community because they would be located within existing river banks and channels, where communities are not established. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would occur in existing banks and channels and would not conflict with land use designations or zoning. Frequently these areas are designated natural resource or open space areas by land use plans and the removal or modification of human-made structures would be consistent with those designations because it would enhance existing habitat for fish and wildlife species. Impacts would not occur. • As discussed in the Biological Resources section of this table, no conflicts or changes with land use are expected due to the removal or modification of human-made structures or passive and active capture methods with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations. This impact would be less than significant.

Potential Environmental Effects of Predatory Fish Control

Resource	Discussion
Mineral Resources	• Passive and active control methods would not result in a loss or lack of access to a state or locally designated mineral resource because river channels would not be disturbed. Impacts would not occur. • Removal or modification of human-made structures would not have the potential to result in the removal or inability to access state or locally designated mineral resource areas. This is because the structures that would be removed or modified already exist and are either currently preventing access to a state or locally designated mineral resource or are not in the area of mineral resources. If these structures were removed, there may be the potential to access state or locally designated mineral resources when compared to current conditions. Impacts would not occur.
Noise	• Passive and active capture methods would not generate noise. Additionally, sensitive receptors would likely not be present in the area (i.e., in the middle of a river). Impacts would not occur. • Removal or modification of human-made structures would create noise related to the use of heavy construction equipment. The sites would be located within river banks and channels where people do not live. It is unlikely people would be permanently exposed to noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies due to the small nature of the projects and the remote location of the project from populous areas. Excessive ground-borne vibration or ground-borne noise levels are also not expected unless pile driving is needed if a cofferdam needs to be put in place. If pile driving is needed it is not expected to cause excessive vibrations that would disturb sensitive receptors. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts due construction noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the limited exposure of potential sensitive receptors to this potential temporary increase in noise and low likelihood of potential sensitive receptors to exist because of the remoteness. • Removal or modification of human-made structures and passive and active capture methods would not be done near airports or airstrips so people would not be exposed to excessive noise levels. Impacts would not occur.
Population and Housing	• Removal or modification of human-made structures and passive and active capture methods would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Furthermore, they would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere because the sites would be located within banks and channels. No homes or people would be displaced. Impacts would not occur.

Potential Environmental Effects of Predatory Fish Control	
Resource	Discussion
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, removal or modification of human-made structures and passive and active capture methods would not involve an increase in population or housing. In addition, these actions would not include new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.
Recreation	• Removal or modification of human-made structures and passive and active capture methods would occur within river banks and channels. It is possible that recreational facilities would be located in areas where the human-made structures and passive and active capture methods would be located. If recreational facilities were located within very close proximity, removal or modification of human-made structures may affect them; however, it is unlikely that there would be significant effects on recreational facilities because removal or modification of structures and passive and active capture methods would be limited in scope and duration. This would be a less-than-significant impact. • Removal or modification of human-made structures and passive and active capture methods would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would not occur. • Removal or modification of human-made structures and passive or active capture methods would likely target recreational and sport fish species, including striped bass. While it is unknown the number of fish that might be removed through predatory control, the removal of these species from the rivers could result in a reduction in recreational and sport fishing opportunities for fishermen. However, a few selected areas (i.e., below dams, areas where juvenile hatchery fish are released) would be targeted for predatory removal and they could easily move back into the area (Cavallo et al. 2012). It is highly unlikely to affect sport fish on a population level. This would be a less-than-significant impact.

Potential Environmental Effects of Predatory Fish Control

Resource	Discussion
Transportation and Traffic	• Removal or modification of human-made structures could result in additional vehicle trips associated with construction workers. Depending on the location of the site, there could be an increase in traffic from construction workers. The temporary increased traffic during removal or modification would likely not exceed local or regional road trip thresholds, because the typical number of construction workers that would be involved in this activity is less than 30. Passive and active capture methods would require only a few people to perform the surveys so an increase in traffic is not expected. This impact would be less than significant. • There are no operational activities associated with either the removal or modification of human-made structures or passive and active capture methods so no additional trips would be generated. Impacts would not occur. • Removal or medication of human-made structures and passive or active capture methods would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Removal or modification of human-made structures and passive and active capture methods would not exceed wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of wastewater. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would not require the construction of additional storm water drains because the activities would occur within river channels and would not generate storm water. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would not generate an increase in solid waste because they would limit modification to the river banks and channels and those activities do not generate large quantities of solid waste. Impacts would not occur. • Removal or modification of human-made structures and passive and active capture methods would not require a water supply. Impacts would not occur.

16.3.10 Invasive Aquatic Vegetation Control

Invasive aquatic vegetation control measures include actions to prevent the introduction and control the spread of invasive aquatic species. Invasive aquatic vegetation represents a major threat to native fish species because of its large-scale ecosystem effects on aquatic habitat and biological communities in the Delta and estuary (Toft et al. 2003, Baskerville-Bridges et al. 2004, Nobriga et al. 2005, Nobriga and Feyrer 2007, Anderson 2008, Santos et al. 2009, Hestir 2010, Huenemann et al. 2012). Current methods for control of Brazilian waterweed (*Egeria densa*), water hyacinth (*Eichhornia crassipes*), and other invasive plant species include small-scale and large-scale applications of herbicides and mechanical removal depending on the target species, site conditions, and objectives (DBW 2006, 2008). The primary goal of these programs is control rather than eradication because of the widespread distribution of these species. Relevant ongoing research includes investigations of potential biological control methods, and restoration design studies that provide useful insights into the natural properties of riverine and estuarine environments (e.g., flow velocity, salinity) that can be manipulated to reduce invasion risk (Hestir 2010).

Cost Evaluation

The California Department of Boating and Waterways (DBW) implements an Aquatic Weed Control Program, which includes a water hyacinth control program (WHCP). Established in 1982, the California state legislature designated DBW as the lead state agency to cooperate with other state, local, and federal agencies in controlling water hyacinth in the Delta, its tributaries, and Suisun Marsh (DBW 2016a). The WHCP uses chemical and physical control (mechanical and hand removal) as control methods for water hyacinth (DBW 2016b). The DBW also operates an *Egeria densa* control program (EDCP) that uses chemical control (DBW 2016b). The EDCP was authorized by law in 1997, and treatment began in 2001 (DBW 2016a). The total annual cost of DBW's Aquatic Weed Control Program (both the WHCP and EDCP) for the years of 2001 through 2007 was between $6.2 and $7.9 million dollars (DBW 2006, CDFW 2008). These programs are actively implemented today; however, cost information is only readily available through 2007.

Environmental Evaluation

The primary sources of information for the following general description of invasive aquatic vegetation control projects and associated environmental impacts were USDA and DBW (2012a, 2012b). Additional references are cited below.

Summary of Potential Action

General methods and techniques of invasive aquatic vegetation control programs include early detection and response; application of chemical, mechanical, or biological control methods; monitoring of treatment efficacy; and research and development of new control methods.

Chemical control (herbicide applications) is the most feasible and effective control method because herbicides can be used to rapidly control invasive aquatic plants over large areas (hundreds or thousands of acres). However, a major concern is the potential for toxic effects on other aquatic plants and animals and on riparian plants adjacent to treated waterbodies. All herbicides currently in use by DBW have been approved for aquatic use and are subject to permit restrictions on timing, application methods, and concentrations to avoid or minimize potential adverse effects on water quality and federally listed fish and wildlife species. An initial EIR was written and distributed in 2001 and an addendum was written in 2003 to incorporate the use of the aquatic herbicide Sonar Precision Release. The 2001 EIR proposed a 5-year program and one of the requirements of the EIR was to submit supplemental environmental documentation in 2006 to support continued operations. The second addendum written in 2006 discussed the environmental monitoring results. Currently, annual reports for *Egeria densa* and water hyacinth are submitted detailing the monitoring results of aquatic vegetation control. Permits from NMFS, USFWS, and the Central Valley Water Board are required every 5 years. Biological opinions from USFWS and NMFS are required under the federal Endangered Species Act (ESA) before herbicide application as well as a National Pollutant Discharge Elimination System (NPDES) permit from the Central Valley Water Board. These permits also require extensive water quality monitoring and toxicity research.

Physical control, which can be successful at relatively small scales, involves the removal of invasive aquatic vegetation by hand or machine and disposal on land. Machine removal requires a mechanical harvester that cuts and collects aquatic plants. Cut plants are removed from the water by a conveyor belt system and stored on the harvester until ready for disposal. Removal and disposal of large amounts of aquatic vegetation can become prohibitive because of transportation costs and land requirements for disposal.

Biological control methods involve the release of organisms (typically invertebrates or pathogens that target invasive aquatic vegetation) into the environment with the goal of establishing sufficient numbers to reduce or limit the growth of the target species. Laboratory and limited field evaluations are underway to determine the efficacy of these organisms and the potential risk they pose to non-target species.

Implementation plans for invasive aquatic vegetation control programs will likely require compliance and effectiveness monitoring, research actions, and adaptive management.

Potential Environmental Effects

Invasive aquatic vegetation control programs could include early detection and response; application of chemical, mechanical, or biological control methods; monitoring of treatment efficacy; and research and development of new control methods. Application of chemical, mechanical, or biological control methods would result in effects on special-status fish species and existing aquatic habitat. Application of chemical controls would result in an effect on water quality and aquatic species if applied during the wrong time of year or concentrations are too high. Mechanical removal of aquatic vegetation would result in temporary and localized water quality effects including a change in water quality and ground and channel disturbance. Mechanical removal of certain species (e.g., *Egeria densa*) can also worsen infestations through dispersal and colonization by plant fragments. Small fish, invertebrates, amphibians, and turtles can be entrained and injured or killed. Also if the harvester is not properly disinfected, new exotic species could be introduced (Washington State Department of Ecology n.d.). Biological control methods, early detection and response to invasive aquatic species, and monitoring of treatment efficacy are not expected to affect special-status species because these methods would not involve herbicides, mechanical harvesters, or disturbance to waterbodies. Aquatic resources would be the most affected by invasive aquatic vegetation control programs because they are applied in the aquatic environment. Attempts to control aquatic invasive vegetation also can have a significant impact on the health and well-being of salmonids within the affected water systems. For example, the control programs for the invasive water hyacinth and Brazilian waterweed plants in the Delta must balance the toxicity of the herbicides applied to control the plants to the probability of exposure to listed salmonids during herbicide application. In addition, the control of the nuisance plants have certain physical parameters that must be accounted for in the treatment protocols, particularly the decrease in DO resulting from the decomposing vegetation left by plants that have died from the chosen control method (NMFS 2014a). After implementation of the invasive aquatic vegetation control programs, compliance monitoring, research actions, and adaptive management would be applied to the sites. This would require additional trips to the sites but are not expected to affect aquatic species or resources.

It is reasonable to assume that invasive aquatic vegetation control programs would be done by professionals that are familiar with control methods for invasive aquatic vegetation. It is likely that invasive aquatic vegetation would be targeted between June 1 and October 15 when anadromous fish or other special-status fish species would not be migrating or spawning. BMPs for controlling sediment and contaminant release into waterbodies would be used to minimize potential significant impacts on water quality associated with sediment and hazardous materials. Chemical spraying would be done and closely monitored by licensed professionals to ensure native aquatic species are not harmed. To determine if removing aquatic vegetation is successful, compliance monitoring, research actions, and adaptive management would be implemented.

Table 16-23, *Potential Environmental Effects of Invasive Aquatic Vegetation Control*, summarizes the potential environmental effects associated with invasive aquatic vegetation control. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, at the end of this chapter, lists potential mitigation measures associated with the construction and operation of this non-flow measure and is referenced in Table 16-23 where appropriate.

Table 16-23. Potential Environmental Effects of Invasive Aquatic Vegetation Control

Potential Environmental Effects of Invasive Aquatic Vegetation Control	
Resource	Discussion
Aesthetics	• Invasive aquatic vegetation control is not be expected to significantly affect scenic vistas because invasive aquatic vegetation removal may be observable for a temporary period of time if a mechanical harvester is used to extract aquatic plants at the project site. Operation would not affect the aesthetics of the area because compliance monitoring activities would be of short duration and would not change the aesthetics of a channel. However, removal of aquatic vegetation could change the visual character of a location because the aquatic vegetation would no longer be there to be viewed by sensitive receptors. While this is a change to visual character, it would likely not be significant as the existing channel would be restored to its previous open water condition. Lighting is not expected to be used during invasive aquatic vegetation control or monitoring—all activities would occur during the day. This impact would be less than significant.
Agriculture and Forestry Resources	• Invasive aquatic vegetation control is not be expected to be located on lands used for agriculture or forestry but within or adjacent to existing water channels. There would be no conversion of farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural use, conflict with existing zoning for agriculture use or a Williamson Act contract, conflict with existing zoning of forest land, or conversion of forest land to non-forest use. Impacts would not occur.
Air Quality	• Removal of invasive aquatic vegetation would likely result in emissions associated with mechanical harvesters, disposal trucks, and worker vehicle trips. The quantity, duration, and the intensity of removal activities have an effect on the amount of emissions and related pollutant concentrations occurring at any one time. However, it is anticipated that, given the type of equipment that would be used and low level of activity associated with removal of aquatic vegetation, emissions would not likely prevent compliance with regulations or exceed thresholds established by SJVAPCD. In addition, activities would be required to implement measures to reduce or minimize removal-related emissions. Impacts would be less than significant. • General plan assumptions of local jurisdictions inform local air quality plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. Removal of invasive aquatic vegetation would not result in population or employment growth and therefore would not result in a conflict with or obstruct implementation of the applicable air quality plan because activities that are associated with population growth (e.g., housing development, business centers, etc.) would not be implemented as a result. Impacts would not occur. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing

Potential Environmental Effects of Invasive Aquatic Vegetation Control	
Resource	Discussion
	facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). Removal of invasive aquatic vegetation would not create objectionable odors affecting a substantial number of people. Impacts would not occur.
Biological Resources	• Invasive aquatic vegetation control could release sediment and possibly hazardous materials (e.g., oil or fuel from equipment and herbicides) into waterbodies, affecting water quality. Release of sediment can bury macroinvertebrates which are prey for fish and other aquatic species, coat or bury eggs from frogs and fish, and fill in pool habitat, and potentially temporarily interfere with the movement of native resident or migratory fish species and associated migratory corridors, and impede the use of nursery sites. Herbicides can kill aquatic plant species, and if the plants are not removed, decompose and decrease DO in the water. Overall, implementing invasive aquatic vegetation control may have temporary significant impacts during plant removal, but beneficial long-term effects by allowing fish to access more and better habitat, and decrease predation. Removal of invasive aquatic vegetation is not expected to have a substantial adverse effect, either directly or through habitat modifications on special-status species. Timing restrictions, water quality measures such as monitoring turbidity and chemicals during removal and other water quality BMPs should be followed. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with invasive aquatic vegetation control. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The surrounding habitat on river banks may include riparian vegetation and/or wetlands. Riparian vegetation may be removed to facilitate equipment movement and wetlands may also be disturbed during vegetation removal activities. This would result in a temporary significant impact on riparian habitat and wetlands. Under operations, riparian habitat and wetlands would not be affected. Permanent removal and/or disturbance of riparian and wetlands habitats would be compensated for at a ratio appropriate for the disturbance per standard permit requirements or conditions from the U.S. Army Corps of Engineers, the Central Valley Water Board, and other conditioning agencies. This compensation would reduce and minimize impacts on fish and wildlife species and their habitats. Lead agencies can and should implement potential mitigation measures identified in Table 16-39 to reduce potentially significant environmental effects associated with implementing invasive aquatic vegetation removal projects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Invasive aquatic vegetation control would be conducted in channel reaches that support special-status fish species such as Chinook salmon and steelhead. These areas are expected to support biological resources. It is reasonable to assume that invasive aquatic vegetation control would occur during the least sensitive periods of special-status species life stages, (i.e., between June 1 and October 15), because this would reduce and minimize impacts on aquatic species. Table 16-39 lists potential mitigation measures lead agencies can and should implement to reduce

Potential Environmental Effects of Invasive Aquatic Vegetation Control

Resource	Discussion
	potentially significant environmental effects of invasive aquatic vegetation control on special-status biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Because invasive aquatic vegetation control is expected to produce beneficial results for special-status fish species, this activity would not conflict with local policies protecting biological resources or conflict with provisions of an adopted habitat conservation plan or natural community conservation plan. Impacts would be less than significant.
Cultural Resources	• Invasive aquatic vegetation control and compliance monitoring would not involve limited ground-disturbing activities to set up equipment adjacent to channels and therefore would have a very low potential for disturbing any unknown existing cultural resources (significant historical, archaeological, or paleontological resources) or human remains. Impacts would be less than significant.
Geology and Soils	• Invasive aquatic vegetation control would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, soil erosion, loss of topsoil, or landslides. No impact would occur. • Invasive aquatic vegetation control would not bring people to the risk of earthquakes or geologic hazards, and compliance monitoring would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because the activities would not draw people to earthquake areas or hazard locations not already frequented. No impact would occur.
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-12, invasive aquatic vegetation control would result in increased GHG emissions because heavy construction equipment would be used. Given the limited duration of removal activities (up to 1 week) and limited amount of equipment associated with invasive aquatic vegetation control, these activities would likely not exceed the SJVAPCD's ZEL. During compliance monitoring, trips would be by vehicle and of very short duration over a long period of time and would likely result in extremely small quantities of GHG emissions. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources.

Potential Environmental Effects of Invasive Aquatic Vegetation Control	
Resource	Discussion
	○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Hazards and Hazardous Materials	• Invasive aquatic vegetation control would not be a hazard or provide a safety concern to public and public use airports or private airstrips because it would not involve structures that could impede, interfere, or otherwise create a safety hazard to airports or air traffic. As such, invasive aquatic vegetation control would not result in a safety hazard for people residing or working in the project area. Impacts would not occur. • Invasive aquatic vegetation control would not physically interfere with an adopted emergency response plan or emergency evacuation plan because the sites would be located off-road within river banks and channels. Impacts would not occur. • Invasive aquatic vegetation control would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur. • As discussed in the Biological Resources section of this table, there are specific regulations regarding spraying of herbicides for controlling aquatic vegetation. Table 16-39 in the Biological Resources section, discusses mitigation measures that minimize impacts from herbicide application. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • The precise location(s) of where aquatic vegetation control would occur is not yet known; however, this activity could occur within one-quarter mile (0.25 miles) of a school. Hazardous materials (i.e., herbicides) may be used to control aquatic vegetation. While it is expected herbicides would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Table 16-39 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to that minimize impacts from herbicide application. Until such time that these potential mitigation measures are implemented, the

Potential Environmental Effects of Invasive Aquatic Vegetation Control	
Resource	Discussion
	impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented. • Aquatic vegetation control could entail limited ground disturbing activities (e.g., grading, excavation) in some circumstances, depending on the vegetation being controlled and the type of control mechanism selected. Lists of hazardous materials site are compiled by different state agencies under Government Code, § 65962. These sites are also known as Cortese Sites. There were no sites identified on the Hazardous Waste and Substance Site List compiled into the EnviroStor online database managed by the DTSC for Calaveras, Tuolumne, or Mariposa Counties (CalEPA 2016). There were a total of 17 sites identified for Merced, San Joaquin, and Stanislaus Counties. In addition to these sites identified by the EnviroStor database, CalEPA also identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facilities where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action for these counties (CalEPA 2016). There are approximately 500 leaking underground storage tanks designated as open in these counties (CalEPA 2016). There are approximately 55 facilities in these counties that have received CDOs/CAOs not identified as non-hazardous wastes, domestic wastewater, or domestic sewage (CalEPA 2016). It is not yet known precisely where invasive aquatic vegetation control would occur and removal would require excavation or ground disturbing activities. However, if it occurred on a Cortese Site and required excavation there would be potential for release of existing soil or groundwater contaminants because of the ground disturbance. Were this to occur, impacts could be significant. Table 16-39 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed.
Hydrology and Water Quality	• Invasive aquatic vegetation control may temporarily affect water quality due to the mechanical removal of aquatic plants within an active channel. Mechanical removal involves using a harvester and the harvester can hit the substrate and increase surface water turbidity. If aquatic vegetation is controlled with herbicides, water quality would be affected and water quality standards could potentially be violated. As a result, aquatic species including fish and invertebrates could be adversely affected. This is a significant impact. The DBW is the only agency authorized to use herbicides on invasive aquatic vegetation and they must receive biological opinions from USFWS and NMFS before applying herbicides. In addition, the Central Valley Water Board requires compliance with a statewide NPDES permit for residual aquatic pesticide discharges to surface waters from aquatic vegetation control application. The two biological opinions (USFWS and NMFS) and the NPDES permit requires a water monitoring program which involves a minimum of 10 percent of all treatment sites be sampled to collect and analyze Delta water quality data, and results of chemical residue and toxicity tests after applying herbicides (DBW 2009). Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts on water quality. Until such time that these potential mitigation measures are implemented, the

Potential Environmental Effects of Invasive Aquatic Vegetation Control	
Resource	Discussion
	impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Invasive aquatic vegetation control would not deplete groundwater supplies or interfere substantially with groundwater recharge because these projects would not require groundwater and would not result in an increase in impervious surfaces. Impacts would not occur. • Invasive aquatic vegetation control would not alter the existing drainage pattern of the site or area and is not expected to cause an increase in substantial erosion or siltation or result in flooding on- or offsite. Impacts would not occur. • Invasive aquatic vegetation control would not substantially increase the number of people exposed to the risk of flooding because these activities would not draw people to flood hazard locations. As such, Invasive aquatic vegetation control would not expose people to significant loss, injury, or death related to flooding. Impacts would not occur. • Invasive aquatic vegetation control would entail the application of chemical, mechanical, or biological control methods. Accordingly, this activity would not place housing within a 100-year flood hazard area or impede or redirect flood flows within a 100-year flood hazard area. Impacts would not occur. • Invasive aquatic vegetation control would not create or contribute runoff water, and therefore this activity would not exceed the capacity of existing or planned storm water drainage system. Impacts would not occur. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Invasive aquatic vegetation control is not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which aquatic vegetation control projects could result in a substantial degradation of water quality.
Land Use and Planning	• Invasive aquatic vegetation control would not physically divide an established community because aquatic plants would be located within existing river banks and channels where communities are not established. Impacts would not occur. • Invasive aquatic vegetation control would occur in existing river banks and channels and would not conflict with land use designations or zoning. Frequently these areas are designated natural resource or open space areas by land use plans and the removal of aquatic vegetation would be consistent with those designations because it would enhance existing habitat for fish and wildlife species. Impacts would not occur. • No conflicts are expected with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations. Impacts would not occur.

Potential Environmental Effects of Invasive Aquatic Vegetation Control	
Resource	Discussion
Mineral Resources	• Invasive aquatic vegetation control would not result in the removal or inability to access state or locally designated mineral resource areas. This is because the removal of aquatic species would not involve activities that would limit access to or remove important locally or state designated mineral areas. Impacts would not occur.
Noise	• Invasive aquatic vegetation control would create noise related to the use of a mechanical harvester. However, the sites would be located within river banks and channels where people do not reside. It is unlikely people would be permanently exposed to noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies due to the small nature of the projects and the remote location of the project from highly populated areas. Excessive ground-borne vibration or ground-borne noise levels are also not expected due to the type of equipment that would be used for mechanical or herbicide removal activities. While there may be temporary elevated noise in excess of standards established in local general plans, noise ordinance, or applicable standards, it would occur during the day because vegetation control activities are not expected to occur at night. Table 16-39 lists potential mitigation measures that lead agencies can and should implement to reduce potentially significant impacts due construction noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the limited exposure of potential sensitive receptors to this temporary noise increase and low likelihood of potential sensitive receptors to exist because of the remoteness. • Compliance monitoring would not create noise because only a few people would be performing the monitoring and sensitive receptors would not be present in the area. • Invasive aquatic vegetation control would not be done near airports or airstrips so people would not be exposed to excessive noise levels. Impacts would not occur.
Population and Housing	• Invasive aquatic vegetation control would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Furthermore, it would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people. Impacts would not occur. • Invasive aquatic vegetation control would not displace substantial numbers of people or existing housing or necessitate the construction of replacement housing elsewhere because the sites would be located within river banks and channels. No homes or people would be displaced. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, libraries, parks, schools, or other public facilities) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. Invasive aquatic vegetation control would not involve an increase in population or housing. In addition, these actions would not include proposals for new housing and would not generate students or increase demands for school services or facilities. Impacts would not occur.

Potential Environmental Effects of Invasive Aquatic Vegetation Control	
Resource	Discussion
Recreation	• Invasive aquatic vegetation control would occur within river banks and channels. It is possible that areas may be temporarily restricted for recreational activities during primary application of chemicals or during mechanical removal; however, access would be restored and as such, significant effects on recreational facilities are not expected. Removal of thick aquatic vegetation may allow increased boat access to areas that previously were not accessible. Compliance monitoring would not affect recreational facilities because only a few people would be involved in the monitoring activities. This would be a less-than-significant impact. • Invasive aquatic vegetation control would not increase the use of existing parks or recreational facilities and would not result in the construction of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Invasive aquatic vegetation control could result in a very few limited additional vehicle trips associated with workers. Depending on the location of the site, there could be a slight increase in traffic from workers. The temporary increase in traffic during aquatic vegetation control activities would likely not exceed local or regional road trip thresholds, because the number of workers that would be involved in these activities is less than 30. This would be a less-than-significant impact. • Invasive aquatic vegetation control would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Invasive aquatic vegetation control would not exceed wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of wastewater. Impacts would not occur. • Invasive aquatic vegetation control would not involve construction or expansion of new or existing wastewater treatment facilities or water treatment facilities. Impacts would not occur. • Invasive aquatic vegetation control would not need the construction of additional storm water drains because the activity would occur within river channels and would not generate storm water. Impacts would not occur. • Invasive aquatic vegetation control would not generate an increase in solid waste because it involves activities that do not generate large quantities of solid waste. Impacts would not occur. • Invasive aquatic vegetation control activities would not require a water supply. Impacts would not occur.

16.4 Southern Delta Water Quality Alternatives – Reasonably Foreseeable Methods of Compliance

To achieve compliance with the numeric salinity objectives identified in the SDWQ alternatives, the Central Valley Water Board, in adopting or amending NPDES permits for point-source dischargers into the southern Delta (e.g., WWTPs), would have to implement the numeric objective (e.g., 1.0 deciSiemens per meter [dS/m] or 1.4 dS/m). This means that WWTPs with discharges that have a reasonable potential to cause or contribute to an excursion above the numeric objective would have effluent limitations in their NPDES permits to meet the revised objective.[19] In Chapter 13, *Service Providers*, it was identified that under SDWQ Alternative 2, the Cities of Tracy and Stockton, and Mountain House CSD may need to implement changes to their facilities. The regulated community (e.g., service providers of wastewater treatment services) who cannot comply with the revised effluent limitations may seek and obtain a variance for up to 10 years pursuant to Central Valley Water Board Resolution R5-2014-0074, which has the effect of delaying compliance. Ultimately, however, these service providers would have to comply and may choose to do one or a combination of actions to achieve compliance with potential NPDES permit changes as a result of the SDWQ alternatives. The reasonably foreseeable methods of compliance that service providers may take to comply with salinity requirements of SDWQ Alternative 2 are:

- Developing new source water supplies such that they have less salt
- Implementing salinity pretreatment programs that require CII facilities or residential salinity source controls, which would reduce the amount of salts that are discharged to the sewer system
- Implementing an effluent desalination process at the WWTP before treated effluent is discharged to the southern Delta

In addition, the Central Valley Water Board could adopt, revise or reissue waste discharge requirements (WDRs) or it could use the Irrigated Lands Program to require compliance with either SDWQ Alternative 2 or 3. As such, implementing salinity removal through agricultural return salinity control is considered a method of compliance.

Under the program of implementation for SDWQ Alternative 2 or 3, continued operations of the agricultural barriers at Grant Line Canal, Middle River, and Old River at Tracy, could occur to address the impacts of the CVP or SWP export operations on water levels and flow conditions that might affect salinity. This analysis assumes the existing temporary barriers would likely continue to operate in the southern Delta under the program of implementation because DWR determined it is essential to continue barrier installations to protect salmon migrating through the Delta, and to provide an adequate agricultural water supply for southern Delta farmers. The program of implementation for both SDWQ Alternatives 2 and 3 also requires additional studies and monitoring of the southern Delta circulation and water levels. It is possible that additional studying and monitoring would determine the need for modifications of the temporary barriers. If this

[19] Municipal WWTPs in the southern Delta are currently not subject to the existing numeric objective as a result of a superior court decision in *City of Tracy v. California State Water Resources Control Board*, Sacramento Superior Court, Case No. 34-2009-80000392.

determination is made by the State Water Board, DWR may be required to install low lift pumping stations at the temporary barriers as a method of compliance.

The regulated community (e.g., agriculture users or DWR) may choose to do one or a combination of many actions to achieve compliance related to either a reissuance of WDRs or the Irrigated Lands Program and the program of implementation. As such, the reasonably foreseeable methods of compliance for SDWQ Alternatives 2 and 3 are:

- Implementing salinity removal through agricultural return flow salinity control before treated effluent is discharged to the southern Delta
- Continuation of temporary barriers program
- Implementing low lift pumping stations in the southern Delta

The cost and environmental impacts of the actions associated with the methods of compliance that service providers, agricultural users, and DWR may implement are evaluated below. It should be noted that the regulated community could implement one or more than one of the methods of compliance evaluated. Because it is unknown which members of the regulated community would decide on which method(s) of compliance, for the purposes of this discussion, the methods of compliance are analyzed separately.

16.4.1 New Source Water Supplies

Water supplies with high salinity content can contribute to elevated salinity discharges to the southern Delta. Generally, water purveyors in the plan area (e.g., the Cities of Tracy and Stockton) rely on a combination of surface water and groundwater to meet potable water demand. Groundwater is typically more saline than surface water in the San Joaquin Basin.

Cost Evaluation

One method to reduce salinity discharges is to use more high-quality water (i.e., surface water) to meet water demands. To use more surface water, a water purveyor may need to enlarge existing structures (water intake, treatment facility, pipelines, and pumps), or build new structures.

One comparable project is the Davis-Woodland Water Supply Project (DWWSP). The DWWSP will construct a surface water intake, water treatment plant, pump stations, storage tanks, and associated transmission lines to develop 45,000 AF/y of new, high quality water from the Sacramento River. The DWWSP is in the construction phase, which began in April 2014, and is estimated to be completed in September 2016. The estimated project costs are detailed in Table 16-24, *Design and Construction Costs for the Davis-Woodland Water Supply Project and Delta Water Supply Project*.

The City of Stockton has completed its Delta Water Supply Project (DWSP) which will divert water pursuant to Water Code Section 1485. Water Code Section 1485 allows any municipality disposing of treated wastewater into the SJR to seek a water right to divert a like amount of water, less losses, from the river downstream of the point of its wastewater discharge. The DWSP will develop 33,600 AF/y of new water resources in the Delta. The DWSP has completed construction of a new surface water intake, water treatment plant, pump stations, and pipelines. The estimated project costs are also detailed in Table 16-24, *Design and Construction Costs for the Davis-Woodland Water Supply Project and Delta Water Supply Project*.

Table 16-24. Design and Construction Costs for the Davis-Woodland Water Supply Project and Delta Water Supply Project

Cost Category	DWWSP (millions)	DWSP (millions)
Design and Construct Intake	$15.6	$22.3
Design and Construct Treatment Facilities and Pipelines	$236.9	$176.6
Project Administration[a]	$33.1	$14.2
Other Local Costs[b]	$51.4	$21.6
Total	$337.0	$234.7

Sources: Woodland-Davis Clean Water Agency 2011; Price pers. comm.

Note: All costs are in in 2010 dollars.

DWWSP = Davis-Woodland Water Supply Project.

DWSP = Delta Water Supply Project.

[a] Project Administration includes environmental and construction permitting, land acquisitions, rights of way, pre-design, agency administration and contingency, program management, water rights permits, and water supply acquisition.

[b] Other Local Costs includes costs to the water purveyor not included in the project, but necessary to integrate the project into the existing infrastructure.

Based on information available for these two projects, it could cost $234.7–$337 million to plan, design, manage, and construct the required facilities to develop 33,600–45,000 AF/y of new surface water resources in the Delta.

Environmental Evaluation

Summary of Potential Action

Procuring and providing alternate low-salinity water source(s) to water users in a service area would reduce the salinity in the potable water used, ultimately lowering the salinity in the wastewater and treated effluent discharged from the WWTP. This action would require municipalities and/or water districts that serve customers in the southern Delta to obtain a new source of low-salinity water (e.g., purchasing surface water diversions from senior surface water users) and would likely require modifications to existing water supply distribution system(s) or the construction and operation of new water supply distribution system(s). The water supply distribution system(s) would take the new source of low-salinity water and distribute it within the water district service area. Municipalities and/or water districts with service areas within the southern Delta or that provide water to customers who ultimately discharge treated effluent into the southern Delta and could implement changes to their distribution system(s) include: City of Tracy, Mountain House CSD, and City of Stockton. These municipalities provide both water supply and wastewater treatment services.

The location, timing of construction, details of operation, and source of low-salinity water are all unknown. In addition, the size and scale of the facilities is unknown. These unknown factors would influence the type, magnitude and severity of impacts that could occur during construction and operation. It is expected that obtaining an alternative source of low-salinity water would require the construction and operation of underground pipelines and/or above-ground canals and pump stations to distribute water from one unknown location to another. Underground pipes would be typically located within existing road rights-of-way, adjacent to existing utility lines and approximately 3–8 ft below ground surface. If canals were to be used, the location and number of canals are unknown. If pump stations are used, they would likely be located adjacent to the canals or the pipelines, but the locations are unknown.

Potential Environmental Effects

Construction of new source water supply facilities would likely result in temporary and highly localized effects typically associated with similar construction activities, such as air quality effects and ground disturbance. As noted above, it is likely that such facilities would be constructed in areas that are already disturbed by urban development, and most facilities would be located within existing facility footprints and road rights-of-way. Depending on the precise location, new diversion facilities could have the potential to affect aquatic resources during construction and operation, which would need to be evaluated and mitigated as part of the project level analysis. Construction and operation of such facilities are highly regulated, and the project would be required to comply with applicable regulations. In addition, because such facilities are owned by water supply purveyors and service districts or WWTP service districts[20] and subject to CEQA review, any new projects would undergo project-level analysis under CEQA and other required regulatory compliance at the time they are proposed. Implementation of these potential methods of compliance would improve salinity conditions in the southern Delta.

Table 16-25, *Potential Environmental Effects of New Source Water Supply Facilities*, summarizes the potential environmental effects associated with new source water supply facilities. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Additional Compliance and Other Indirect Actions*, at the end of this chapter, lists potential mitigation measures associated with the construction or operation of the methods of compliance and is referenced in Table 16-25 where appropriate.

[20] Note: Cities or water districts that do not treat wastewater would have no obligation to try to reduce the salt levels in the water they provide.

Table 16-25. Potential Environmental Effects of New Source Water Supply Facilities

Potential Environmental Effects of New Source Water Supply Facilities	
Resource	Discussion
Aesthetics	• New source water supply facilities would require the construction of new infrastructure including pipelines, canals, small lift or pump stations, and tie-in stations to existing water treatment plant intakes. Construction of the new source water supply facilities could result in temporary impacts on the visual character or quality of the chosen sites and surroundings, likely within San Joaquin County, due to ground disturbance. Ground-disturbing construction activities would have the potential to disturb or remove mature vegetation (i.e., landscaping) and create dust clouds, which could affect views. In addition, construction may involve nighttime lighting for safety and potentially 24-hour construction. The severity of these impacts would depend on the location of sensitive receptors and scenic vistas relative to the construction site. For example, San Joaquin County has no designated scenic vistas and as such an impact may not occur (San Joaquin County 2014a). However, if 24-hour construction occurs, light and glare could be produced that could affect sensitive receptors. Table 16-38 identifies potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant environmental effects day and nighttime views associated with light and glare and aesthetics. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented depending on the possible location of potential sensitive receptors and the ability to reduce light and glare. • Operation of new source water supply facilities would not be expected to significantly affect the visual character or quality of the area in which it would likely occur (i.e., San Joaquin County) Generally, the infrastructure associated with new water supply facilities would be unobtrusive structures, with low profiles and a low potential to adversely affect the daytime view of existing sensitive receptors (e.g., residents or recreationists). However, if new intakes were operated on a waterway, the siting of concrete infrastructure could result in a substantial change to the visual character and quality of the area, depending on where the area is located (e.g., adjacent to a river). Furthermore, Certain facilities, such pump stations, may require permanent outdoor lighting, which could adversely affect viewers in rural areas where there is relatively limited outdoor lighting at night. Design and operation of lights would be expected to follow lighting guidelines and lighting plans of local jurisdictions approving the construction and operation of new source water supply facilities. Many of the facilities (such as pipelines) would likely be located below ground and, once operational, would not affect the visual quality or character of an area. Table 16-38 identifies potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant environmental effects day and nighttime views associated with aesthetics and light and glare. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant

Potential Environmental Effects of New Source Water Supply Facilities	
Resource	Discussion
	once mitigation measures were implemented depending on the possible location of potential sensitive receptors, the visual character and quality of the surrounding area, and the ability to reduce light and glare. • There are two state-designated scenic highways in San Joaquin County, Interstate 5 (I-5) and I-580 (San Joaquin County 2014a). Depending on the location, construction of new source water supply facilities may be visible from portions these highways and temporarily alter the existing views. However, because permanent water supply facility structures would be visually unobtrusive and because travelers on the interstates would be traveling at relatively high speeds, they are generally considered to have low visual sensitivity to changes in views. Moreover, it is not expected that the construction and operation of new source water supply facilities would substantially damage scenic resources (including trees, rock outcroppings, and historic buildings) within I-5 or I-580. Impacts would be less than significant.
Agriculture and Forestry Resources	• Construction and operation of new source water supply facilities such as pipelines, small lift or pump stations, and tie-in stations, would not be expected to be located on agricultural lands (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) because they are expected to be located along the rights-of-way of existing roads or close to existing water supply infrastructure. If canals are constructed and operated, there is the potential for canals to remove some amount of agricultural lands from production; however, the amount cannot be quantified in this analysis because the location of the canals is unknown. The extent of the impact would depend on the total acres removed from agricultural use, whether it was permanent removal, and whether they were in Williamson Act contracts. But it is expected that agricultural uses in the southern Delta would benefit from the reduction in salinity discharges provided by the new source water supplies and potentially offset any agricultural land that might be indirectly affected by the new source water supplies. Lead agencies can and should implement potential mitigation measures identified in Table 16-38 to mitigate for significant environmental effects associated with the potential permanent removal or conversion of agricultural lands. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Construction and operation of new source water supply facilities would not be expected to be located on forest land or timberland because these resources are limited in the southern Delta and because these facilities are expected to be located along the rights-of-way of existing roads or close to existing water supply infrastructure. Accordingly, there would be no conflict with existing zoning for, or cause rezoning or loss of these resources. Impacts would not occur.
Air Quality	• Construction and operation of new source water supply facilities would likely be located in the SJVAB, which generally covers San Joaquin, Stanislaus, Merced, and Madera Counties. USEPA has classified SJVAB as an extreme nonattainment area for the federal 8-hour ozone standard and a nonattainment area for the federal PM2.5 standard. For the federal CO standard, USEPA has classified most major population centers of the SJVAB as maintenance areas and rural areas of the SJVAB as unclassified/attainment areas. The SJVAB is classified as a serious maintenance area with regards to the federal PM10 standards. ARB has classified the SJVAB as a severe nonattainment area for the state 1-hour ozone standard and a nonattainment area for the state 8-hour ozone,

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	PM10, and PM2.5 standards. ARB has classified the SJVAB as an attainment area for the state CO standard. SJVAPCD's published guidelines, *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002) do not require the quantification of construction emissions. Rather, the guidelines require implementation of effective and comprehensive feasible control measures to reduce PM10 emissions (SJVAPCD 2002). SJVAPCD considers PM10 emissions to be the greatest pollutant of concern when assessing construction-related air quality impacts and has determined that compliance with its Regulation VIII, including implementation of all feasible control measures specified in its *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002), constitutes sufficient mitigation to reduce construction-related PM10 emissions to less-than-significant levels and minimize adverse air quality effects. All construction projects must abide by Regulation VIII. Since the publication of its guidance manual, SJVAPCD has revised some of the rules comprising Regulation VIII. Guidance from SJVAPCD staff indicates that implementation of a Dust Control Plan would satisfy all of the requirements of Regulation VIII (Siong pers. comm.). Further consultation with SJVAPCD staff indicates that, though explicit thresholds for construction-related emissions of ozone precursors are not enumerated in the *Guide for Assessing and Mitigating Air Quality Impacts*, SJVAPCD considers it to be a significant impact when construction or operational emissions of ROG or NO_X exceed 10 tons per year or if PM10 or PM2.5 emissions exceed 15 tons per year (Siong pers. comm.). SJVAPCD's CEQA Guidelines indicate their numeric thresholds are project-level and cumulative: "Any proposed project that would individually have a significant air quality impact…would also be considered to have a significant cumulative air quality impact" (SJVAPCD 2002). Construction of new source water supply facilities would likely result in emissions associated with construction equipment and construction worker vehicle trips, as well as fugitive dust emissions from ground disturbance. Construction activities would temporarily increase emissions of ozone precursors and particulate matter. The quantity, duration, and intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations that occur at any one time. More emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Depending on the level of construction activities and amount of infrastructure built, construction of new source water supply facilities could exceed air quality thresholds established by SJVAPCD, which would be a significant impact. Implementation of measures to help reduce or minimize construction-related emissions and comply with regulations would be required. Lead agencies (e.g., municipalities or municipal water purveyors) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on air quality associated with construction emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the regulatory requirement to implement all required feasible measures to reduce emissions during construction and the potential for the duration and frequency of activities during construction to reduce overall emissions (e.g., diluting emissions over time).

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	• Operation of new source water supply facilities could include facility inspection and maintenance activities, similar to the maintenance of existing water supply facilities. The need for additional energy to distribute the new water supply could result in increased criteria pollutant emissions at other power facilities. However, the power facilities that would compensate for the additional power are already built and permitted to emit a maximum amount of criteria pollutants. These facilities are required to offset additional power generation by the use of pollution credit. Therefore, if additional emissions are generated, they would be generated by facilities that are permitted to do so. Operation of new source water supplies may use nonelectric back up during intermittent emergency situations and their cumulative operation could result in exceedances of SJVAPCD's thresholds and potentially result in a cumulatively considerable net increase in criteria pollutants for which SJVAB is in nonattainment, as SJVAPCD's CEQA Guidelines indicate their numeric thresholds are project-level and cumulative: "Any proposed project that would individually have a significant air quality impact…would also be considered to have a significant cumulative air quality impact (SJVAPCD 2002)". However, the potential short term increase in criteria pollutant emissions during intermittent emergency situations would be potentially offset by reductions in the use of electric or fuel pumps being used to lift water into canals or pipelines. Operations could include periodic facility inspection and maintenance activities. However, emissions generated once operational would be minimal and are not anticipated to exceed SJVAPCD thresholds. Impacts would be less than significant. • SJVAPCD generally defines a sensitive receptor as a facility that houses or attracts children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants, and where there is a reasonable expectation of continuous human exposure according to the averaging period for National ambient air quality standards (AAQSs [e.g., 24-hour, 8-hour, or 1-hour]) (SJVAPCD 2002). Sensitive receptors are primarily concentrated in urbanized areas and their proximity to construction or operational activities, the type of activity, and duration of activity, determines their potential exposure to pollutants. If criteria pollutant standards are exceeded during construction, and sensitive receptors are in proximity, mitigation measures identified in Table 16-38 would serve to reduce potentially significant effects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. It is not anticipated that operation of the facilities would expose sensitive receptors to substantial pollutant concentrations because operations would not generate toxic or diesel exhaust. If diesel generators were used, they would be limited in operation and would likely be subject to air district permitting requirements that would minimize health risks. In addition, operation of these facilities would not create objectionable odors. Impacts on sensitive receptors related to new source water supply facility operations would be less than significant. • The ARB traditionally has established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving State Implementation Plan, as required by the Clean Air Act, provisions. Responsibilities of local air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories. SJVAPCD has adopted an air quality improvement plan that addresses

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	NO_X and ROGs, both of which are ozone precursors and contribute to the secondary formation of PM10 and PM2.5. The air quality improvement plan specifies that regional air quality standards for ozone and PM10 concentrations can be met through the use of additional source controls and trip reduction strategies. It also establishes emission budgets for transportation and stationary sources. Those budgets, developed through air quality modeling, reveal how much air pollution can be present in an area before AAQSs are violated. General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction and operation of new source water supply facilities would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with an air quality plan if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air quality plan(s). The construction and operation of new source water supply facilities would not result in growth because it would serve to provide alternate low-salinity water source(s) to water users and would not serve to satisfy an increase in demand or an increase in need. The construction and operation of new source water supply facilities would not result in population or employment growth that would result in a conflict with or obstruct implementation of the applicable air quality plan because they would not require activities that are associated with population growth (e.g., housing development, business centers, etc.). Accordingly, this impact is less than significant. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). New source water supplies are not included in one of these categories. Therefore, construction and operation of salinity source controls would not create objectionable odors affecting a substantial number of people. Impacts would be less than significant.
Biological Resources	• Construction and operation of new source water supply facilities, such as pipelines, lift pumps, and tie-ins, would primarily be underground, in the public rights-of-way in existing roads, or adjacent to existing water supply facilities, and are expected to have a low potential to disturb habitat (potentially including established native resident or migratory wildlife corridors, federally protected wetlands, riparian habitat, or other sensitive natural communities) or candidate, sensitive or special-status species (including interfering substantially with the movement of any native resident or migratory fish or wildlife species) above ground. It is unlikely construction and operation of these underground facilities would impede the use of native wildlife nursery sites given where the facilities would likely be located. Further, because new source water facilities would likely be located in the public rights-of-way in existing roads, or adjacent to existing water supply facilities, they are not likely to conflict

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	with local policies or ordinances protecting biological resources, or conflict with an adopted natural community conservation plan or habitat conservation plan. Impacts would be less than significant. • If canals are constructed and operated as part of new source water supply facilities, there is the potential for the canals to disturb habitat (potentially including federally protected wetlands, riparian habitat or other sensitive natural communities) and/or candidate, sensitive, or special-status species depending on the location of the canals. Similarly, if new intakes constructed and operated, there would be a high potential to affect these resources depending on its location and proximity to a waterway. However, the extent of potential disturbance cannot be quantified in this analysis because the locations of the canals are unknown. Construction and operation of canals associated with new source water supply facilities, depending on the location, could conflict with local policies or ordinances protecting biological resources. Further, construction and operation of canals or a new intake, depending on the location, could impede the use of native wildlife nursery sites. As specific source water supply facilities are designed, lead agencies (e.g., municipalities or municipal water purveyors) would be required to evaluate construction effects of new source water supply facilities, such as the potential for direct and indirect impacts on jurisdictional waters, habitat, and candidate, sensitive, or special-status species on a case-by-case basis in subsequent CEQA documents. Table 16-38 lists potential mitigation measures lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant environmental effects of construction and operation of new source water supply facilities on biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. If habitat is permanently removed as a result of constructing canals or a new intake, it is likely that impacts could not be mitigated and would remain significant and unavoidable. • Construction and operation of new source water supply facilities could occur within the SJMSCP Plan Area. The SJMSCP is administered by the San Joaquin Council of Governments (SJCOG), a non-profit corporation established by San Joaquin County and the cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton and Tracy. Implementation of new source water supply facilities may be considered a covered activity under SJMSCP—a determination which would be made by SJCOG, in consultation with the lead agency. If an activity is determined to be covered, participation in the SJMSCP is voluntary except when conditioned to participate by a Permittee (i.e., SJCOG, Inc. San Joaquin County, and the cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton and Tracy). If an activity is not covered, the lead agency can request coverage using one of the following four options: (1) payment of a fee, which is assessed depending on habitat type within which the project is located; (2) dedicate habitat lands as a conservation easement or fee title; (3) purchase mitigation bank credits from a SJCOG-approved mitigation bank; and (4) propose an alternative mitigation plan, consistent with the goals of the SJMSCP and equivalent in biological value. Participation in the SJMSCP fulfills ESA, CESA, NEPA, and CEQA requirements, provides mitigation and guarantees no additional mitigation, excepting for Incidental Take Minimization Measures required in limited cases (SJCOG 2016a). If the lead agency participates in the SJMSCP, construction and operation of the new source water supply facilities would not be considered in conflict with the SJMSCP, and impacts would be less than

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	significant. If the lead agency chooses to opt out of participation in the SJMSCP, that agency or agencies (e.g., municipalities or municipal water purveyors) can and should implement the mitigation measures identified in Table 16-38 to reduce potentially significant impacts on biological resources and to avoid conflict with the SJMSCP. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. If habitat is permanently removed as a result of constructing or operating new source water supply facilities, it is likely that impacts could not be mitigated and would remain significant and unavoidable. However, it is likely impacts could be reduced once mitigation was implemented because once a lead agency opts in or determines its action is covered, consistency would be determined and impacts would be less than significant. • Direct and indirect impacts on candidate, sensitive, or special-status biological resources or habitat are unlikely to occur during operation because the new source water supply facilities would primarily be underground and would convey water supplies from a currently unknown source to the water district or municipality water treatment plant. Further, since the water would likely come from an existing senior water right holder, it is assumed the senior water right holder is using the water for another purpose and, therefore, a change in use of the water for municipal purposes would not result in direct or indirect impacts on candidate, sensitive, or special-status species and habitat. Finally, lead agencies (e.g., municipalities or municipal water purveyors) would evaluate the operation of the new source water supply facilities and the potential for direct impacts on jurisdictional waters, habitat, and candidate, sensitive, or special-status species on a case-by-case basis in subsequent CEQA documents. Table 16-38 lists potential mitigation measures lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts on biological resources related to new source water supply facilities operations. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Cultural Resources	• Construction of the new water supply facilities could include installing pipeline generally along the rights-of-way of existing roads, new lift stations, and tie-ins to existing water supply facilities. There is the potential to encounter significant unknown buried cultural resources (significant historical, archeological, or paleontological resources) during construction because it is unknown if these resources are currently present within these sediments. At this time, no specific projects have been proposed, and the foreseeable future new source water supply facilities are unknown. Even so, given that most of the construction would occur within highly developed public rights-of-way or where much of the sediments have been previously disturbed, the potential to encounter significant buried cultural resources is greatly reduced. Construction of new water supply facilities such as canals or new intakes may involve the disturbance of ground not within the rights-of-way of existing roads, or the footprint of existing facilities, and could result in excavation at varying depths below ground surface; however, the location is unknown at this time and, therefore, it the potential to uncover unknown significant cultural resources cannot be determined. Lead agencies (e.g., municipalities or municipal water purveyors) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on cultural

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	resources associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • As described above, new water supply facilities would primarily be located within the rights-of-way of roads or at existing facilities. Therefore, it is highly unlikely human remains, would be disturbed during construction, because these areas have already been highly disturbed. However, canals may be located outside the rights-of-way of public roads and at varying depths below ground surface. In the event human remains are uncovered during construction, compliance with the State Health and Safety Code would be required. As specified by Section 7050.5 of the Health and Safety Code, and described in Table 16-38, no further disturbance would occur until the county coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If such a discovery occurs, excavation or construction would halt in the area of the discovery, the area would be protected, and consultation and treatment would occur as prescribed by law. If the coroner recognizes the remains to be Native American, he or she would contact the NAHC, who would appoint the Most Likely Descendent. Additionally, if the human remains are determined to be Native American, a plan would be developed regarding the treatment of human remains and associated burial objects, and the plan shall be implemented under the direction of the Most Likely Descendent. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Geology and Soils	• The locations of the new source water supply facilities could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, these facilities would not bring people to the risk of earthquakes or geologic hazards, meaning the construction and operation new water supply facilities would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur. • New facilities would be required to follow all appropriate building codes and would be designed to withstand seismic-related activities as identified by the building codes. Geologic studies would also be required, and design guidelines would be incorporated into the design and build that would reduce the geologic risk to the structures. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to geology and soils associated with new structures. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the need to follow the building code and other state and federal building requirements. • Construction of the new source water supply facilities would result in limited ground-disturbing activities, which could cause soil erosion or loss of topsoil; however, ground-disturbing activities would be limited in duration and geography. Furthermore, ground-disturbing activities of 1 acre or greater would require the water district or

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	municipality to prepare and implement a SWPPP, as required by the Central Valley Water Board. The SWPPP would require soil and erosion control mechanisms to reduce the effects of soil, erosion, and runoff that may be generated during construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to soil erosion and storm water runoff associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given construction would be temporary. • The construction and operation of new source water supply facilities would not involve constructing or operating septic tanks and, therefore, septic tanks would not be affected by soils incapable of supporting the use of them or other alternative wastewater disposal systems. Impacts would not occur.
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-7, because construction and operation of new source water supply facilities would likely result in increased use of electricity and fuels there would be an increase in GHG emissions. However, the overall increased electrical demand would be small compared to the existing electrical demand and it is unlikely to require the construction of major new power generation or transmission facilities. Regardless, it is anticipated that this increased electricity-related GHG emissions could exceed applicable SJVAPCD ZEL threshold and result in a potentially significant impact. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs • AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be

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	inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
Hazards and Hazardous Materials	• Construction of new water supply facilities would be short term and may involve the limited transport, storage, use, and disposal of hazardous materials such as fuel and lubricating grease for motorized heavy equipment. Some examples of typical hazardous materials handling are fueling and servicing construction equipment on the site and transporting fuels, lubricating fluids, solvents, and bonding adhesives. These types of materials are not acutely hazardous, and storage, handling, and disposal of these materials are regulated by local, county, and state laws. Furthermore, the quantities of these materials used during construction would be small (e.g., less than 100 gallons) because construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because construction and the use of hazardous materials would be temporary and relatively short in duration over the course of construction. • There are eight sites within San Joaquin County that are identified on the Hazardous Waste and Substance Site List (Cortese Site list) as being hazardous materials sites under Government Code, § 65962) (CalEPA 2016). Construction and operation of new source water supply facilities are not likely to be located on these eight sites or interfere with these sites because the construction and operation of new source water supply facilities would not involve activities at the sites on this list (e.g., Lawrence Livermore National Lab, McCormick and Baxter Creosoting Company). CalEPA identifies leaking underground storage tank sites, sites that have received CDOs or clean up and abatement orders, and hazardous waste facility sites where DTSC has taken corrective Action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action in San Joaquin County (CalEPA 2016). As such, construction of new source water supply facilities would not affect them. There are approximately 244 leaking underground storage cases in San Joaquin County designated as open (CalEPA 2016). Sixteen facilities in San Joaquin County have received CDOs or CAOs and have active cases, but may not be necessarily related to hazardous waste (CalEPA 2016). The location of construction of new source water supply facilities is unknown, but it is not anticipated to be located directly on these sites because they include locations such as gas stations, car washes, private lands with underground storage tanks. However, construction could occur along the rights of way of existing roads that could be in proximity to these sites. During excavation or soil disturbance potentially contaminated soil could be encountered. As such, Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and

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	should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • San Joaquin County has 14 school districts and more than 200 schools (San Joaquin County Office of Education n.d.). The location of construction of new surface water facilities is unknown; however, construction could be located within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected these materials would be handled, used, and stored properly in accordance with local, state, and federal laws and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Additionally, depending on the location of construction, remediation may be needed to address soil contamination during excavation activities. As such, if a school existed within close proximity to construction of new source water facilities, those mitigation measures identified Table 16-38 applied to project-specific construction needs would reduce potentially significant impacts during construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction • Construction of new source water supply facilities, such as pipelines, lift stations, or tie-ins, would not physically interfere with an adopted emergency response plans or emergency evacuation plans since they would likely be located in the existing rights-of-way of public roads or within the footprint of other existing water supply infrastructure. During construction, road shoulders or lanes may be closed, but traffic construction workers would be employed to direct and control traffic as is typical during construction work that occurs in the rights-of-way of public roads. Road shoulders or lanes may be closed as a result of construction of canals if the canals are adjacent to roads or cross roads. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with traffic and potential conflicts with emergency response. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given construction would be temporary. • Once new source water supply facilities are operational, they would either be underground, adjacent to existing water supply infrastructure, or contained in a canal and would not physically interfere with an emergency

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	response plan or emergency evacuation plan because they would not prevent road access. Furthermore, operation does not involve an increase in population that would necessitate reconsideration of how to evacuate people in an emergency. • Assuming construction and operation of new source water supply facilities would be located in San Joaquin County, there are six public access airports within the county (SJCOG n.d.[a]). The Stockton Metropolitan Airport and San Joaquin County Airport have approved Airport Land Use Compatibility Plans, which prescribe safety requirements and ensure land uses would not pose a safety hazard to the airports in accordance with the Federal Aviation Administration. Other airports, such as the City of Tracy, have either airport master plans or other planning documents outlining safety requirements and ensuring land uses would not pose a safety hazard, consistent with FAA requirements (City of Tracy 1998). The location of construction or operation of new source water supply facilities is unknown and could occur within 2 miles of an airport. However, construction and operation new source water supply facilities would not be a hazard or cause safety concerns to airports since the facilities would be relatively low profile and/or underground. Impacts would not occur. • Construction and operation of new source water supply facilities would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur.
Hydrology and Water Quality	• Construction of new source water supply facilities could result in temporary changes to storm water drainage, existing drainage patterns, erosion, or runoff associated with typical construction activities such as grading or preparation of land. As discussed earlier in this table (Geology and Soils), soil disturbance of over 1 acre would require water districts or municipalities to prepare and implement a SWPPP, which would include specific types and sources of storm water pollutants, determine the location and nature of potential impacts, and specify appropriate control measures to eliminate any potentially significant impacts from storm water runoff on receiving waters. In addition, as discussed in this table for Hazards and Hazardous Materials, construction of new source water supply facilities may involve the limited transport, storage, use, and disposal of hazardous materials, which, if spilled, could have adverse effects on water quality depending on the location and magnitude of the spill. However, storage, handling, and disposal of these materials is regulated by local, county, and state laws, and the quantities of these materials used during construction would be small (e.g., less than 100 gallons) and construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained and, as such, violations of water quality standards are not expected to occur. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given construction would be temporary and the need to follow existing regulations requiring the handling, use and disposal of hazardous materials, and the need to prepare SWPPPs.

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	• Under operating conditions of a new source water supply facility, a water district or municipality would need to purchase water from a source such as an irrigation district. The source would have a water right to obtain water from various locations and allocate the amount of water as allowed by its water right(s). Therefore, impacts on hydrology and water quality are not expected to occur under operating conditions of new source water supplies because the water district or municipality could not obtain water from a source that was out of compliance with its water right. Impacts would be less than significant. • It is unknown if new source water supply facilities would be located in a 100-year flood hazard area. However, the new source water supply facilities would not substantially increase the number of people exposed to the risk of flooding because they would not draw people to flood hazard locations or result in the construction of housing in a flood hazard area. Accordingly, new source water supply facilities would not expose people to significant loss, injury, or death related to flooding. Construction of new source water supply facilities would not result in flooding or otherwise cause flooding, including flooding as a result of the failure of a levee or dam. The new source water supply facilities are expected to be low in profile and/or underground and would, therefore, not impede or redirect flood flows. Impacts would be less than significant. • Construction and operation of new source water supply facilities would not result in a substantial depletion of groundwater supplies because surface water would be the supply source. The operation of the facilities and any impervious surfaces needed would be minimal from a regional groundwater basin perspective; therefore, new source water supply facilities would not interfere with groundwater recharge. Further, new source water supplies could actually reduce the amount of groundwater pumped because typically groundwater is saline, and the use of it increases the salinity concentration in the treated effluent discharged into the southern Delta. Impacts would be less than significant. • Construction and operation of new source water supply facilities would primarily be located in areas of relatively flat relief because pipelines and canals are typically not located on the side of steep slopes. Therefore, these locations would not support mudflows, which typically need very steep slopes and large amounts of precipitation to occur. Furthermore, these areas would not be adjacent to the ocean and, therefore, they would not be affected by tsunamis. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction and operation of new source water supply facilities are not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of new source water supply facilities could result in a substantial degradation to water quality.

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Land Use and Planning	• Construction and operation of new source water supply facilities would not physically divide an established community because the facilities would be located either underground or on land likely designated for infrastructure. Impacts would not occur. • Typically, general land use designations and zoning designations allow for the development of infrastructure, such as pipelines or pumping stations. It is not anticipated that the construction or operation of the new source water supply facilities would result in a conflict with land use designations or zoning. If the new source water supply facilities were inconsistent with applicable land use plans, policies, or regulations, an amendment or variant from the local jurisdiction approving the discretionary action associated with the facilities would be required by the project proponent (e.g., water district or municipality) prior to project approval and construction. If no discretionary action were to occur as a result of the construction or operation of the facilities, it is assumed it would not result in a conflict with local land use plans, policies or regulations. Impacts would be less than significant. • Construction and operation of new source water supply facilities would likely take place in the Delta and may be considered covered activities under the Delta Plan. Only the lead CEQA state or local agency may determine whether that plan, program, or project is a covered action of the Delta Plan. If an action is covered, consistency with the Delta Plan would be determined. The consistency determination would include implementing mitigation from the Mitigation Monitoring or Reporting Program of the Delta Plan, as appropriate. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to consistency with the Delta Plan. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely impacts could be reduced once mitigation was implemented because once a lead agency determines an action is covered and complies with the Mitigation Monitoring or Reporting Program, consistency would be determined and impacts would be less than significant. • Potential conflicts with habitat conservation plans, natural community conservation plans, or other plans, policies and regulations protecting biological species and resources are evaluated in the Biological Resources section of this table.
Mineral Resources	• The California Surface Mining and Reclamation Act (SMARA) requires the State Geologist to classify land into mineral resource zones (MZ), according to the known or inferred mineral potential of existing land. The primary goal of mineral land classification is to ensure that the mineral potential of land is recognized by local government decision-makers and considered before land-use decisions are made that could preclude mining. Local general plans, specific plans, and other local plans refer to and use the information produced by the State Geologist, to identify mineral resources because they are specialized evaluations and because the California Geologic Survey is the designated agency to perform these surveys under SMARA. MZ are identified by the State to identify inferred mineral potential of an area. Areas designated MZ-1 have adequate information to determine no significant mineral resources exist, or indicate a very low likelihood; areas designated MZ-2 have adequate information to

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	identify significant mineral deposits or indicate a high likelihood of presence; and areas designated MZ-3 have inadequate information to determine significance of mineral deposits, but contain mineral deposits. Some gravel, sand, and aggregate resources (identified as MZ-1 or MZ-2) are found in close proximity to waterways and the LSJR in San Joaquin County (San Joaquin County 1998, City of Tracy 2005). Most of the city of Stockton is designated as MZ-1, with a small area of MZ-3 (City of Stockton 2007). Other mineral resources, such as gold or peat, have been previously extracted from the county (San Joaquin County 1998). • Construction and operation of new source water supply facilities would have a very low potential to 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 or result in the loss of availability of a locally designated mineral resource recovery site. This is because the new source water supply facilities would likely be located within the rights-of-way of existing public roads or adjacent to water supply facilities. Additionally, if the new source water supply facilities are located within a state or locally designated mineral resource area, construction and operation of the facilities would not permanently remove access to a mineral resource as there would be other locations around the facilities that could provide access to the mineral resource. Impacts would be less than significant.
Noise	• Construction would potentially take place in San Joaquin County, and the cities of Tracy and Stockton depending on the location of water supply facilities. But it could also take place within one of the other multiple cities within San Joaquin County, depending on whether the construction of pipelines or canals would occur and their specific location(s). Each of these jurisdictions have noise requirements in their general plans or zoning ordinances for construction and operation based on land use designations and timing restrictions. Noise requirements are typically based on land uses that are considered more sensitive to ambient noise levels than others due to noise exposure. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, and outdoor recreation or natural areas are typically more sensitive to noise than are commercial or industrial land uses. Therefore, local noise standards are typically more stringent for sensitive land uses in terms of level of noise generated, duration, and frequency than less sensitive uses. Given the wide ranges of land uses throughout San Joaquin County, noise levels can range from louder high density residential and industrial uses or roadway uses to more quiet open space and agricultural areas (San Joaquin County 1992). Frequently, the most common and loud noise generating activity in San Joaquin County affecting the overall permanent ambient noise setting is freeway traffic on I-5, I-205, and SR-4 and along railroads and in heavy industrial areas (e.g., Port of Stockton) or around airports (San Joaquin County 1992). It is unknown where construction or operation of the new source water supply facilities would take place, so it is unknown if construction or operation would occur within or in close proximity to a noise sensitive land use (e.g., residences) or in an area less sensitive to noise (e.g., industrial area). • The City of Tracy and the City of Stockton regulate generation of construction noise by restricting the timing that construction can occur (e.g., operating construction requirement from 10pm to 7pm is prohibited) and the land use or adjacent land uses under which the noise generating activity occurs (City of Stockton n.d., City of Tracy n.d.). San Joaquin County exempts noise sources associated with construction, provided they do not take place before 6am or after 9pm (San Joaquin County n.d.) Other local jurisdictions also either exempt construction noise from

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	noise standards or have restrictions as to when it can occur. Construction of new source water supplies could generate temporary noise and as such could expose people to noise levels in excess of standards. Construction of the new source water supply facilities could exceed noise standards established in local general plans or noise ordinances, depending on the location of sensitive receptors, the type of construction equipment used, and the duration of construction. As such, could result in the temporary increase in ambient noise levels and expose persons to noise levels in excess of applicable noise standards. While construction would generally occur within rights-of-way along public roads; however, it is unknown where certain facilities, such as canals, would be located. They could be located in residential neighborhoods or within immediate proximity to other sensitive receptors (e.g., schools, hospitals, parks). If sensitive receptors were adjacent to construction activities and experienced construction noise, construction would likely be temporary and it would be required to follow existing local noise ordinances limiting the timing of construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Construction activities that typical result in ground-borne vibrations or ground-borne noise are activities such as pile driving, where the ground is repeatedly struck and vibrations or noise can be generated. Given the nature of the facilities constructed (e.g., canals, pump stations, pipelines), it is likely that construction activities such as digging, excavating, and more standard practices and less vibration producing activities, would be used as opposed to pile driving. Furthermore, some local agencies (e.g., San Joaquin County) exempt vibrations associated with construction provided it is occurring within certain hours (San Joaquin County n.d). However, if pile driving is used, and there are sensitive receptors to noise (e.g., homes, hospitals, schools) within close proximity, Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant noise impacts related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, depending on the potential location of possible sensitive receptors the duration of the particular noise generating activities over the course of construction. • Once operational, the new source water supply facilities would be located underground and may include some lift stations. Although the location of the lift pump stations is unknown, it is unlikely they would generate sufficient permanent noise to exceed noise standards established by a local general plan or noise ordinance. This is because they would likely be enclosed for security purposes by some type of enclosed structure or fencing that would reduce noise generated. As such, a permanent increase in ambient noise under operating conditions is not expected. Impacts would be less than significant. • Assuming construction and operation of new source water supply facilities would be located in San Joaquin County, there are six public access airports within the county (SJCOG n.d.[a]). The Stockton Metropolitan Airport, San Joaquin County Airport have approved Airport Land Use Compatibility Plans, which identifies noise contours

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	and where noise exposures may take place as a result of aircraft flight patterns consistent with Federal Aviation Administration requirements (SJCOG n.d.[a]). Other airports, such as the City of Tracy, have either airport master plans or other planning documents (e.g., general plans) that outline noise contours consistent with FAA requirements (City of Tracy 1998). While it is unknown where construction or operation of new source water supply facilities might occur, the construction and operation of new source water supply facilities would not bring new or additional people within close proximity to an airport or private airstrip or expose people to noise generated by air traffic on a regular basis. This is because new source water supply facilities would not result in an increased permanent work force cited within proximity to an airport or private airstrip. Nor would new source water supply facilities result in a population increase that would be exposed to airport noise. Impacts would not occur.
Population and Housing	• The construction and operation of new source water supply facilities would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area because the new water supply would be in lieu of higher-salinity water and would not result in a greater supply of water (i.e., source water supply facilities would not be constructed and operated to increase capacity to serve new users). New source water supply facilities would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people to the southern Delta. In addition, construction and operation of new source water supply facilities would not displace existing housing because the facilities would be located either underground or on land likely designated for infrastructure. Impacts would be less than significant.
Public Services	• The need for additional public services (e.g., fire protection, police protection, parks, libraries, schools) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, construction and operation of new source water supply facilities would not involve an increase in population or housing. In addition, construction and operation of new source water supply facilities would not include proposals for new housing and would not generate students or increased demands for school services or facilities. Impacts would not occur.
Recreation	• Construction of new source water supply facilities would likely occur in the rights-of-way of public roads or adjacent to water supply infrastructure. If recreational facilities were located within very close proximity to construction, recreation could be affected by noise levels or other temporary construction activities. An increase in use of existing recreational facilities is typically associated with a substantial increase in the population to accommodate new recreationists. Construction or operation of new source water supply facilities would not result in a substantial increase in population because it would not result in the development of housing or other population-inducing development (e.g., job centers). The purpose of the construction and operation of new source water supply facilities would be to comply with water quality objectives. Construction and operation of these facilities would satisfy existing demand, not meet new projected demand for wastewater treatment (Sections 16.4.2, *Salinity Pretreatment Programs*, and 16.4.3, *Desalination*) or water supply. If construction occurs within

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	close proximity to existing recreational resources, Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to construction noise, traffic, or air quality, if those types of impacts occur within close proximity to existing recreational facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, depending on the construction timeframe and the location of potential sensitive receptors and recreational resources, and also because construction if certain components (e.g., segments of pipelines) would generally temporary and relatively short in duration. • Construction and operation of new source water supply facilities would not include recreational facilities or require the construction or expansion of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Assuming construction and operation of new source water supplies would be located within San Joaquin County, projects would be subject to the SJCOG Regional Congestion Management Program (SJCOG 2016b). A total of 103 intersections have been designated as part of San Joaquin County Council of Governments Regional Congestion Management Program (SJCOG n.d.[b]). Designation of RCMP intersections allows for congestion monitoring and appropriately focuses attention at locations where operational constraints are typically experienced on arterial roadways (SJCOG n.d.[b]). As described in the Regional Congestion Management Program, projects are subject to a tiered review process, unless exempt from CEQA or unless considered as part of a previously. Projects that trigger 125 or more vehicle trips during weekday AM or PM peak-hours or 500 or more total vehicle daily trips on any day of the week would be required to perform a quantitative regional traffic analysis. The Regional Congestion Management Program provides for mitigation to reduce effects approved project (SJCOG 2016b) if trips occur at those levels. Trips that are exempted from the RCMP standards, and are removed from calculations of LOS standards under the RCMP include trips resulting from construction (SJCOG 2013). Regional deficiencies have been identified on portions of congestion management program roadway segments in San Joaquin County, including Intrastate-5 and State Routes (SR) 4, 88, 99, and 120 because they are operating at a level of service (LOS)[21] of E or F (Table 2 in Dowling Associates 2010). Several congestion management program roadway segments are also operating at LOS D (Table 3 in Dowling Associates 2010). Of approximately 1,500 congestion management roadway segment miles, 245 operate at LOS D, with approximately half of these in the County, and the remaining in the cities of Stockton, Lathrop, and Manteca and Tracy (Table 4 in Dowling Associates 2010). There are approximately 92 miles of CMP lanes operating at LOS E or F, with more than half located in county areas, and 16 percent in Stockton (Table 4 in Dowling Associates 2010). Operation of new source water supply

[21] Level of Service is a standard transportation evaluation term and is a qualitative measure of traffic operating conditions or system adequacy. It is typically defined on a scale using the letters A through F (best to worse). LOS A is free flowing conditions with little or no delay and LOS E is flow conditions at traffic volumes at or near design capacity. LOS F represents unstable forced flow exceeding capacity, resulting in greatly reduced travel speeds.

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	facilities would likely not generate additional trips beyond those required to maintain the existing facilities and would likely not exceed the thresholds identified in the RCMP (e.g., 125 or more vehicle trips during weekday AM or PM peak-hours or 500 or more total vehicle daily trips on any day of the week). This is because would be unlikely that operation of the facilities would result in a substantial increase in the number of water district or municipality employees. Therefore, construction and operation of new source water supply facilities is expected to comply with the RCMP. Impacts would be less than significant. • Construction and operation of new source water supply facilities could result in some additional trips. These facilities may be located in urban and suburban areas that could already experience some congestion on existing roadways. It is unknown the number of construction and operational trips that might be needed for these facilities and the location of these trips, but it is anticipated that construction would be relatively limited in duration and the number of operational trips would be limited, given a substantial increase in the number of water district or municipality employees is not expected. Typically, construction activities are exempt from local road trip thresholds because construction is considered temporary; however, depending on the quantity of trips, and the duration, a temporary increase in traffic during construction or under operating conditions could exceed local road trip thresholds (either vehicle miles traveled or level of service[22]). Projects would be required to evaluate trip generating activities through the respective jurisdiction traffic impact analysis guidelines, depending on the location and number of trips generated (City of Stockton n.d.). Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts of transportation and traffic related to construction or operation. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because construction impacts would be temporary and because operations are not expected to result in a substantial increase in employees. • Construction of new source water supplies is not expected to result in hazards to, or on, roadways because they would primarily be constructed within existing footprints of facilities or along the rights-of-way of roads. The development of project-specific construction traffic management plans, as identified in Table 16-38 would reduce potentially significant impacts if hazards on the roadway were temporarily created during construction due to

[22] In January of 2016, the Office of Planning and Research (OPR) prepared a revised proposal on updates to State CEQA Guidelines for evaluating transportation impacts. The proposed methodology to evaluate transportation impacts includes replacing the standard level of service (LOS) evaluation with vehicle miles traveled (VMT) as identified in Senate Bill 743 (Steinberg, 2013). In the proposal, OPR recommends the new procedures and methods remain optional for a two-year period. This would allow agencies that are ready to switch from LOS to VMT to do so, but gives time to other agencies that may need to adjust protocols and data sources. OPR formally closed comment period on the proposal at the end of February 2016. OPR will submit a draft of the proposed revisions based on vehicle miles traveled to the Natural Resources Agency, which would then commence with a formal rule making process. (OPR 2016.)

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	lane closures or other types of construction related activities. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts of transportation and traffic related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because construction impacts would be temporary. • Similar to the discussion in Hazards and Hazardous Materials, it is not expected that construction of new source water supplies to result in inadequate emergency access, given the location of the construction work would primarily be on the rights-of-way of roads or within the existing footprint of water supply facilities. However, Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with traffic and potential conflicts with emergency response. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. It is likely that impacts would be mitigated to less than significant once mitigation measures were implemented given construction would be temporary. • The Regional Congestion Management Program identifies multimodal corridors within the county where the operational performance of pedestrian, bicycle, transit passengers, and motorists are considered holistically (SJCOG 2012a). In addition, the Regional Congestion Management Program identifies a regional bikeway network throughout the county with existing and planned bikeways (SJCOG 2012b). Construction of new source water supplies may temporarily conflict with public transit or bicycle or pedestrian facilities if lane closures are required during construction. Depending on the location, this could temporarily remove these types of facilities, if construction activities need to occur immediately adjacent to them. However, the project-specific congestion management plans identified in Table 16-38 would include details of transit facility closures or relocations, and procedures for re-routing pedestrian or bicycle traffic, based on the particular circumstance of the project-specific location and construction activity. As such, Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts associated with public transit facilities, bicycle facilities, or pedestrian facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given construction would be temporary. • Construction and operation of new source water supplies would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and is not related to air traffic or airports. Impacts would not occur. • Operation of new source water supply facilities is not expected to result in a permanent substantial increase in hazards due to a design feature or incompatible use, permanent inadequacy of emergency access, or a permanent

Potential Environmental Effects of New Source Water Supply Facilities	
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	change that would decrease the performance or safety of public transit facilities, public biking facilities, or public pedestrian facilities because it is anticipated that some of the new source water supply facilities would be underground in operating conditions. For those facilities that would be above ground, they would comply with safety requirements and local building requirements ensuring access and safety. Impacts would be less than significant.
Utilities and Service Systems	• Construction and operation of new source water supply facilities is not be expected to exceed wastewater treatment requirements of the Central Valley Water Board because it would not involve the discharge of treated effluent. Instead, it would actually help comply with effluent limitations for salinity because it is expected the lower-salinity source water would result in lower-salinity treated effluent discharged into the southern Delta. Additionally, it would not increase the volume of wastewater delivered to the WWTP or result in a determination by the wastewater treatment provider that it has inadequate capacity to meet the service area's demand for wastewater treatment. Impacts would be less than significant. • Construction and operation of new source water supply facilities would not involve the construction of wastewater treatment facilities. Impacts would not occur. • Construction and operation of new source water supply facilities does involve the construction of water supply infrastructure. Environmental effects associated with water supply infrastructure are discussed earlier in this table (Aesthetics through Transportation and Traffic). Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant construction and operation impacts related to all environmental resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Construction and operation of new source water supply facilities are not expected to require construction of additional storm water drains because the facilities would either be underground (e.g., pipelines) or be conveyance canals that would not generate substantial volumes of runoff. Existing storm water infrastructure is expected to be sufficient. Impacts would be less than significant. • In order to operate the new source water supply facilities municipalities may need to enter into contracts to purchase surface water from senior surface water users. It is anticipated that the new source water would come from existing entitlements and either purchased through different contracted vehicles, or potentially transferred, to municipalities. As such, it is not expected new entitlements for surface water would be needed. Impacts would be less than significant. • Construction and operation of new source water supply facilities would be unlikely to generate substantial amounts or increase solid waste. The new source water supply facilities would move water from one location to another and would not generate solid waste. Solid waste generated during construction would be disposed of at landfills and would comply with all applicable laws related to construction debris recycling and solid waste disposal in California. Impacts would be less than significant.

16.4.2 Salinity Pretreatment Programs

A salinity pretreatment program would target salinity loading in a wastewater service provider's wastewater collection system from domestic (residential) and CII sources. It would provide salinity source controls at different locations within a service district to reduce the overall salt loading into the sewer system.

Domestic water similar to that found in the southern Delta may have a high concentration of minerals (typically magnesium and calcium). Water softeners are frequently used in residences to remove these minerals. During a water softener's recharge cycle, brine is used to clean the system and remove magnesium and calcium that accumulate in the mineral exchange tank. The recharge water, with suspended minerals, is then discharged to the wastewater collection system. This brine[23] and mineral solution is rarely treated at a wastewater treatment facility. By removing self-regenerating (or "automatic") water softeners, there would be a reduction of salinity discharged to the wastewater collection system, and as a result, salinity in the effluent discharged in the southern Delta would be reduced. Many wastewater treatment agencies operate a water softener buy-back program to remove water softeners from domestic use.

Salts also can enter the wastewater collection system as a byproduct commercial activities, industrial processes, and food preparation activities. CII dischargers can contribute to elevated salt loads entering the wastewater collection system and discharging into the southern Delta. Some CII sources of salinity are commercial laundry facilities, food processing operations, and industrial fabrication shops. To address salinity loading by CII dischargers, many wastewater treatment agencies prohibit CII users from discharging to the wastewater collection system or strictly regulate the quality of wastewater entering the wastewater collection system. To reduce the wastewater salt concentration from CII sources, a variety of pollution-control methods can be used, such as BMPs and desalination devices, depending on the activities conducted by the CII discharger. These methods are typically applied at the CII source generating the wastewater.

Cost Evaluation

Many wastewater treatment agencies offer rebate programs for removal of water softeners. Currently, the Inland Empire Utilities Agency (IEUA) and the Los Angeles County Sanitation Districts (LACSD) offer $206–$2,000 to homeowners to remove water softeners (Proctor pers. comm., Ghuman pers. comm.). Rules for each agency's programs differ, but in general, once a homeowner certifies that the water softener is removed (and it is later verified by the wastewater treatment agency), the wastewater treatment agency will reimburse the homeowner for the cost of removal.

To operate a water softener buy-back program, a wastewater treatment agency must advertise the program, coordinate inspections, process rebate claims, and conduct verification inspections. In some cases, the wastewater treatment agency will hire a plumber to remove water softeners. The administrative support for an in-home water softener rebate program varies. Table 16-26, *Inland Empire Utilities Agency Water Softener Buy-Back Program Costs*, and Table 16-27, *Los Angeles County Sanitation Districts Water Softener Buy-Back Program Costs,* offer general program costs for IEUA and LACSD.

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[23] Brine is the saline solution prevented from traveling through an RO filter.

High and low estimates for water softener buy-back program costs were obtained by dividing the amount each entity spent on rebates by the upper and lower bounds of the eligible rebate amounts, which provided a high and low estimate of the number of rebates issued. The total program cost was divided by the estimated number of rebates issued to obtain a per rebate cost.

Table 16-26. Inland Empire Utilities Agency Water Softener Buy-Back Program Costs

	Cost
Program Duration	4 years
Total Program Cost	$639,541
Total Amount Spent on Rebates	$307,453
Eligible Range of Rebate	$300–$2,000
Number of Rebates Actually Issued	463
Low Estimate – Program Cost Per $300 Rebate Issued	$620
High Estimate – Program Cost Per $2,000 Rebate Issued	$4,160
Actual Cost – Program Cost Per Rebate Issued	$1,380
Source: Proctor pers. comm.	

Table 16-27. Los Angeles County Sanitation Districts Water Softener Buy-Back Program Costs

	Cost
Program Duration	7 years
Total Program Cost	$ 5,931,388
Total Amount Spent on Rebates	$ 2,631,667
Eligible Range of Rebate	$206–$2,000
Number of Rebates Actually Issued	NA
Low Estimate – Program Cost Per $206 Rebate Issued	$460
High Estimate – Program Cost Per $2,000 Rebate Issued	$4,510
Actual Cost – Program Cost Per Rebate Issued	NA
Source: Ghuman pers. comm.	
NA = not applicable.	

Based on the information presented in Table 16-26, *Inland Empire Utilities Agency Water Softener Buy-Back Program Costs* and Table 16-27, *Los Angeles County Sanitation Districts Water Softener Buy-Back Program Costs*, if a wastewater treatment agency anticipates replacing 2,000 water softeners over 5 years, the agency can reasonably expect to pay $920,000–$9,020,000 over a period of 5 years.

Processes to pretreat CII wastewater vary due to discharger type and source. In some cases, an activity can be modified to reduce the amount of salts discharged to the wastewater collection system. Some general examples of BMPs that a wastewater treatment agency's pretreatment program could implement to reduce salinity are to conserve water, pretreat water, install a desalination device, reduce water runoff, use process water for landscape irrigation, or dispose of solids in landfills instead of in the wastewater collection system.

The costs of some BMPs (e.g., disposing of solids in landfills) have nominal costs (e.g., higher garbage removal cost). Other BMPs may save the CII discharger money (e.g., using process water for landscape irrigation could reduce the user's monthly water bill).

When a CII discharger decides to install a desalination device, costs vary based on what is being discharged, the volume, and the desired wastewater salt concentration entering the wastewater collection system. Some light commercial reverse osmosis (RO) filtration systems cost as little as $1,000 to install and $200 per year to operate. These systems would treat the domestic water supply for the specific discharger, but the waste brine from the RO process must be thrown away in a landfill and not discharged to the wastewater collection system. Other systems cost millions to install and tens of thousands to operate per year, per user. In some areas, the wastewater treatment agency will bear the cost of procuring and installing a CII pretreatment device; in other areas, the costs will be split between the CII discharger and the wastewater treatment agency.

Environmental Evaluation

Summary of Potential Action

Salinity pretreatment programs would provide salinity source controls at residential homes or existing CII facilities within a wastewater treatment service provider's service area. It is anticipated that the following municipalities and wastewater treatment service providers that discharge into the southern Delta could implement such programs: City of Tracy, City of Stockton, and Mountain House CSD. The decision to implement pretreatment programs would include many variables, such as the type and number of CII wastewater dischargers in the service area of each service provider and the availability of funding to implement a residential home program.

For residential homes, the program would request or compensate residential users to modify their activities. For CII users, a salinity pretreatment program would be expected to modify existing CII processes and/or require the construction and operation of salinity source controls, such as RO. These salinity source controls would be located at existing CII facilities. The location, timing of construction, and details of operation of CII salinity source controls is unknown. However, any new salinity source controls at an existing CII facility would likely be constructed and operated within an existing CII facility footprint or within close proximity. This is because salinity source controls would have to be integrated with the CII water supply connection or wastewater discharge to capture and treat the water either prior to the CII process or capture and treat it prior to discharge into the sewer system. It is expected that the CII facility would be located in urban areas with other CII uses because generally land uses such as these are located in appropriately designated and zoned areas of municipalities. It is anticipated these salinity source controls at CII facilities would not require additional employees and would not modify or change the volume of CII wastewater discharged into the sewer system. However, it is anticipated the salt concentration of the wastewater would be lower as the salinity source controls would reduce the salinity of the wastewater.

Potential Environmental Effects

For CII users, a salinity pretreatment program would be expected to modify existing CII processes and/or require the construction and operation of salinity source controls, as described above. These salinity source controls would be located at existing CII facilities because salinity source controls would have to be integrated with the CII water supply connection or wastewater discharge to capture and treat the water either prior to the CII process or capture and treat it prior to discharge into the sewer system. Depending on the scale and magnitude of the changes to CII facilities they could meet the requirements of a categorical exemption under CEQA. CEQA allows categorical exemptions for classes of projects which have been determined not to have a significant effect on the environment. (Pub. Res. Code, § 21084.) Specifically, the following types of facilities and activities are exempt under a Class 1 or Class 3 categorical exemption.

- Minor alterations of the existing public or private structure without expanding existing uses.
- Installation of small new equipment and facilities.

In addition, Class 2 categorical exemptions allow for the replacement or reconstruction of existing facilities where the new structure will be located on the same site and will have the same purpose and capacity as the structure replaced. Some fish screen projects could meet the requirements for this exemption.

If salinity control measures at CII facilities do not meet the requirements of a categorical exemption, depending on the size of disturbance, construction may result in temporary and localized effects typically associated with construction activities. As such, installation of salinity control equipment at existing CII facilities could involve short-term construction-related effects, such as air quality and ground-disturbing effects. Any construction of new facilities at existing CII locations would not be likely to affect natural or cultural resources (significant historical, archaeological, or paleontological resources) as those locations because these areas are already highly disturbed. Programs involving residential users would be expected to have less-than-significant environmental effects. There may be some highly concentrated salt waste as a result of the operation of the pretreatment salinity source controls. This concentrated waste could not be disposed of in the sewer and would likely need to be trucked offsite and disposed of in an appropriate landfill depending on the waste classification and in compliance with all applicable laws, ordinances, and regulations. To the extent such programs were successful in reducing salinity in the southern Delta, agricultural uses and aquatic resources would benefit.

Table 16-28, *Potential Environmental Effects of Salinity Source Controls*, summarizes the potential environmental effects associated with salinity source controls at CII facilities. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* at the end of this chapter, lists potential mitigation measures associated with the construction or operation of the methods of compliance and is referenced in Table 16-28 where appropriate.

Table 16-28. Potential Environmental Effects of Salinity Source Controls

Potential Environmental Effects of Salinity Source Controls	
Resource	Discussion
Aesthetics	• Construction and operation of salinity source controls at existing CII facilities would not be expected to substantially degrade the visual character or quality of areas, have a substantial adverse effect on a scenic vista, or substantially damage scenic resources within the state-designated scenic highways in San Joaquin County, I-5 and I-580, because the facilities would be located within the existing footprint of other CII facilities. The salinity source controls would be either much smaller than the existing CII facilities or similar in size and scale as the existing facilities so the wastewater generated by the CII process can be targeted and treated. Construction and operation of salinity source controls may involve operational and safety lights. Impacts associated with lighting would depend on the location of sensitive receptors to potential lighting; however, lights would be expected to follow lighting guidelines and lighting plans of local jurisdictions approving the construction and operation of the salinity source controls. In addition, as stated above, the salinity source controls would likely be within existing CII facilities and infrastructure, which may already have operational and safety lighting, and thus it would likely not be necessary to add additional lighting. If sensitive receptors are present, Table 16-38 identifies potential mitigation measures lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant environmental effects associated with lighting. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented depending on the possible location of potential sensitive receptors and the ability to reduce light and glare
Agriculture and Forestry Resources	• Construction and operation of salinity source controls would not be expected to be located on lands used for agriculture or directly or indirectly convert agricultural lands (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) to nonagricultural uses because the salinity source controls would be located within the footprint of existing CII facilities. Because salinity source controls would likely not be located on agricultural lands, there would not be a conflict with existing zoning for agricultural use, or a Williamson Act contract. Additionally, it is expected that agricultural uses in the southern Delta would benefit from the reduction in salinity and potentially offset any agricultural land that might be indirectly affected by the salinity source controls. Impacts would not occur. • Construction and operation of salinity source controls would not be expected to be located on forest land or timberland or result in the conversion of those resources because these resources are limited in the southern Delta, and because the salinity source controls would be located within the footprint of existing CII facilities. Therefore salinity source controls would not conflict with existing zoning for, or cause rezoning or loss of these resources. Impacts would not occur.
Air Quality	• CII facilities that would implement salinity source controls would likely be constructed and operated within the SJVAB, which generally covers San Joaquin, Stanislaus, Merced, and Madera Counties. USEPA has classified SJVAB as an extreme nonattainment area for the federal 8-hour ozone standard and a nonattainment area for the federal PM2.5 standard. For the federal CO standard, USEPA has classified most major population centers of the SJVAB as maintenance areas and rural areas of the SJVAB as unclassified/attainment areas. The SJVAB is classified as a serious maintenance area with regards to the federal PM10 standards. ARB has classified the SJVAB as a severe nonattainment area for the state 1-hour ozone standard

Potential Environmental Effects of Salinity Source Controls	
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	and a nonattainment area for the state 8-hour ozone, PM10, and PM2.5 standards. ARB has classified the SJVAB as an attainment area for the state CO standard. SJVAPCD's published guidelines, *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002) do not require the quantification of construction emissions. Rather, the guidelines require implementation of effective and comprehensive feasible control measures to reduce PM10 emissions (SJVAPCD 2002). SJVAPCD considers PM10 emissions to be the greatest pollutant of concern when assessing construction-related air quality impacts and has determined that compliance with its Regulation VIII, including implementation of all feasible control measures specified in its *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002), constitutes sufficient mitigation to reduce construction-related PM10 emissions to less-than-significant levels and minimize adverse air quality effects. All construction projects must abide by Regulation VIII. Since the publication of SJVAPCD's guidance manual, the district has revised some of the rules comprising Regulation VIII. Guidance from SJVAPCD staff indicates that implementation of a Dust Control Plan would satisfy all of the requirements of SJVAPCD Regulation VIII (Siong pers. comm.). Further consultation with SJVAPCD staff indicates that, though explicit thresholds for construction-related emissions of ozone precursors are not enumerated in the *Guide for Assessing and Mitigating Air Quality Impacts*, SJVAPCD considers it a significant impact when construction or operational emissions of ROG or NO_X exceed 10 tons per year or if PM10 or PM2.5 emissions exceed 15 tons per year (Siong pers. comm.). SJVAPCD's CEQA Guidelines indicate their numeric thresholds are project-level and cumulative: "Any proposed project that would individually have a significant air quality impact…would also be considered to have a significant cumulative air quality impact (SJVAPCD 2002)" • Construction of salinity source controls would likely result in emissions associated with construction equipment, construction worker vehicle trips, and fugitive dust emissions from ground disturbance. The quantity, duration, and intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations that occur at any one time. More emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Depending on the level of activities and amount of infrastructure built, construction of salinity source controls could exceed air quality thresholds established by SJVAPCD and would be required to implement measures to help reduce or minimize construction-related emissions. Lead agencies (e.g., CII facilities or municipalities) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on air quality associated with construction emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the regulatory requirement to implement all required feasible measures to • reduce emissions during construction and the potential for the duration and frequency of activities during construction to

Potential Environmental Effects of Salinity Source Controls	
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	reduce overall emissions (e.g., diluting emissions over time). • Prior to a project dealing with a stationary source of emissions (such as a CII facility), it is required to receive an ATC from SJVAPCD. The project is subject to the requirements of SJVAPD Rule 2201. As stated under Sections 1.1 and 1.2 of Rule 2201[24]: *The purpose of this rule is to provide for the following:* *1.1 The review of new and modified Stationary Sources of air pollution and to provide mechanisms including emission trade-offs by which Authorities to Construct such sources may be granted, without interfering with the attainment or maintenance of Ambient Air Quality Standards;* *1.2 No net increase in emissions above specified thresholds from new and modified Stationary Sources of all nonattainment pollutants and their precursors.* Rule 2201 applies to new stationary sources and all modifications to existing stationary sources that are subject to permit requirements and may emit one or more affected pollutant after construction. • Operation of salinity source controls could include facility inspection and maintenance activities, similar to the maintenance of existing CII facilities. Operation of salinity source controls would likely be electric because of their expected locations in urban and suburban areas and the expected location within the footprint of a CII facility. Salinity source controls may use nonelectric backup intermittently for emergency circumstances. Operations could include facility inspection and maintenance activities and are expected to be similar to or fewer activities than inspection and maintenance of existing wastewater treatment facilities. The need for additional energy could result in increased criteria pollutant emissions at other power facilities. However, the power facilities that would compensate for the additional power are already built and permitted to emit a maximum amount of criteria pollutants. These facilities are required to offset additional power generation by the use of pollution credit. Therefore, if additional emissions are generated, they would be generated by facilities that are permitted to do so. There would be an increased number of truck trips associated with the disposal of salt concentrate at landfills, and these trips would produce emissions. The number of truck trips would depend on the salinity of the wastewater, which is a function of the quality and volume of the influent and the CII process, which is unknown at this time, and therefore cannot be quantified in this analysis. However, depending on the amount of materials that would require disposal and number of haul trucks that would be required, operational activities associated with material hauling could result in exceedances of SJVAPCD's thresholds, as SJVAPCD's CEQA Guidelines indicate their numeric thresholds are project-level and cumulative: "Any proposed project that would individually have a significant air quality impact…would also be considered to have a significant cumulative air quality impact (SJVAPCD 2002)". This could result in a potentially significant impact. Lead agencies (e.g., CII facilities or municipalities) can and should implement potential mitigation

[24] Sources whose primary function is permitted by SJVAPCD through Rules 2010 and 2201 are not subject to SJVAPCD Rule 9510 (Indirect Source Review). Projects subject to Rule 9510 are required to quantify and reduce indirect (mobile source emissions), area-source (space heating, landscaping, and maintenance), and construction exhaust emissions.

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	measures identified in Table 16-38 to reduce potentially significant environmental effects associated with operational emissions and air quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.
	• SJVAPCD generally defines a sensitive receptor as a facility that houses or attracts children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants, and where there is a reasonable expectation of continuous human exposure according to the averaging period for National AAQSs (e.g., 24-hour, 8-hour, or 1-hour) (SJVAPCD 2002). Sensitive receptors are primarily concentrated in urbanized areas and their proximity to construction or operational activities, the type of activity, and duration of activity, determines their potential exposure to pollutants. If criteria pollutant standards are exceeded during construction, and sensitive receptors are in proximity, mitigation measures identified in Table 16-38 would serve to reduce potentially significant air quality effects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. It is not anticipated that operation of the facilities would expose sensitive receptors to substantial pollutant concentrations because operations would not generate toxic or diesel exhaust. If diesel generators were used, they would be limited in operation and would likely be subject to air district permitting requirements that would minimize health risks. Impacts on sensitive receptors related to operation of salinity source controls would be less than significant. • The ARB traditionally has established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving State Implementation Plan, as required by the Clean Air Act provisions. Responsibilities of local air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories. SJVAPCD has adopted an air quality improvement plan that addresses NO_X and ROGs, both of which are ozone precursors and contribute to the secondary formation of PM10 and PM2.5. The plan specifies that regional air quality standards for ozone and PM10 concentrations can be met through the use of additional source controls and trip reduction strategies. It also establishes emission budgets for transportation and stationary sources. Those budgets, developed through air quality modeling, reveal how much air pollution can be present in an area before national AAQSs are violated. General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction and operation of salinity source controls would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air plans. The construction and operation of salinity source controls would not result in growth because it would serve to provide salinity source controls at different locations within a service district to reduce the overall salt loading into the sewer system and would not serve to satisfy an increase in demand or an increase in need. The construction and operation of salinity source controls would not result in population or employment growth that would result in a conflict

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	with or obstruct implementation of the applicable air quality plan because they would not require activities that are associated with population growth (e.g., housing development, business centers, etc.). Accordingly, this impact is less than significant. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). While salinity source controls may be applied at one or more of these types of facilities, the salinity source controls would not contribute to any odors that would already be produced by the facilities. This is because the salinity source controls take the facilities' source water or wastewater and remove salt. Therefore, construction and operation of salinity source controls would not create objectionable odors affecting a substantial number of people. Impacts would be less than significant.
Biological Resources	• It is expected that construction and operation of salinity source controls would be in urban and suburban areas within the footprint of existing CII facilities. These areas are expected to have a low potential for candidate, sensitive, or special-status species, and habitat (including federally protected wetlands, riparian habitat, or other sensitive natural communities) because urban and suburban areas typically have buildings and impervious surfaces and would be very unlikely to support these biological resources. Because of their location, construction and operation of salinity source control facilities are unlikely to interfere 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. Furthermore, it is expected that the treated effluent discharged from the WWTP would actually have lower concentration of salts due to the salinity source controls, and this would be beneficial to aquatic and other biological resources. If candidate, sensitive, or special-status species or habitats are identified within close proximity, Table 16-38 lists potential mitigation measures lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant environmental impacts on biological resources related to construction and operations of salinity source control facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the low potential for sensitive species and habitat to exist and the relatively short timeframe and duration of construction. • It is unlikely construction and operation of salinity source controls would conflict with local policies or ordinances protecting biological resources, or conflict with an adopted natural community conservation plan or habitat conservation plan because construction and operation would likely occur within existing facilities. However, construction and operation of salinity source control facilities would occur within the SJMSCP Plan Area. The SJMSCP is administered by the SJCOG, a non-profit corporation established by San Joaquin County and the cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton and Tracy. Implementation of new salinity source controls may be considered a covered activity under SJMSCP—a determination which would be made by SJCOG, in consultation with the lead agency. If an activity is determined to be covered, participation in the SJMSCP is voluntary except when conditioned to participate by a Permittee (i.e., SJCOG, Inc. San Joaquin County, and the cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton and Tracy). If an activity is not covered,

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	the lead agency can request coverage using one of the following four options: (1) payment of a fee, which is assessed depending on habitat type within which the project is located; (2) dedicate habitat lands as a conservation easement or fee title; (3) purchase mitigation bank credits from a SJCOG-approved mitigation bank; and (4) propose an alternative mitigation plan, consistent with the goals of the SJMSCP and equivalent in biological value. Participation in the SJMSCP fulfills ESA, CESA, NEPA, and CEQA requirements, provides mitigation and guarantees no additional mitigation, excepting for Incidental Take Minimization Measures required in limited cases (SJCOG 2016a). If the lead agency participates in the SJMSCP, construction and operation of salinity source control facilities would not be considered in conflict with the SJMSCP, and impacts would be less than significant. If the lead agency chooses to opt out of participation in the SJMSCP, that agency or agencies (e.g., municipalities or municipal water purveyors) can and should implement the mitigation measures identified in Table 16-38 to reduce potentially significant impacts on biological resources and to avoid conflict with the SJMSCP. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. If habitat is permanently removed as a result of constructing or operating salinity source control facilities, it is likely that impacts could not be mitigated and would remain significant and unavoidable. However, it is likely impacts could be reduced once mitigation was implemented because once a lead agency opts in or determines its action is covered, consistency would be determined and impacts would be less than significant. • The brine generated by salinity source controls would be disposed of at landfills, and would have a very low potential to affect biological resources because the brine would be contained within the landfill. Impacts would be less than significant.
Cultural Resources	• Construction and operation of salinity source control facilities would likely exist in urban and suburban areas within existing CII facilities. Construction may result in some ground-disturbing activities, which has the potential to disturb or destroy buried, unknown significant cultural resources (significant historical, archeological, or paleontological resources). While it is unknown if cultural resources exist in these locations, these areas would have likely been previously disturbed during the construction of the existing CII facilities, reducing the potential for significant unknown cultural resources to exist. Operation of salinity source controls has no potential to affect cultural resources because the facilities would simply remove salt and discharge wastewater of lower salinity into the sewer system. Lead agencies (e.g., CII facilities or municipalities) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on cultural resources associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the low potential for cultural resources to exist and the relatively limited area of ground disturbance. • As described above, it is expected the CII facility locations would be previously disturbed. If, in the highly unlikely event human remains are uncovered during construction, compliance with the State Health and Safety Code would be required. As specified by Section 7050.5 of the Health and Safety Code, and described in Table 16-38, no further disturbance shall occur until the county coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code, Section 5097.98. If such a discovery occurs, excavation or construction shall halt in the area of the discovery, the

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	area shall be protected, and consultation and treatment shall occur as prescribed by law. If the coroner recognizes the remains to be Native American, he or she shall contact the NAHC, who shall appoint the Most Likely Descendent. Additionally, if the human remains are determined to be Native American, a plan shall be developed regarding the treatment of human remains and associated burial objects, and the plan shall be implemented under the direction of the Most Likely Descendent. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the low potential for human remains to exist and the relatively limited area of ground disturbance.
Geology and Soils	• Salinity source controls would not result in an impact on, or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, or landslides. Since the facilities would be located within existing CII facilities, the addition of the salinity source controls would not substantially add to the structure such that it would increase the exposure to potential substantial adverse effects, such as risk of loss to rupture of known earthquake fault, seismic ground shaking, or seismic ground-related failure. Furthermore, all new structures related to salinity source controls would be required to follow all appropriate building codes and be designed to withstand seismic-related activities as identified by the building codes. Finally, salinity source controls would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would be less than significant. • The construction and operation of salinity source controls would not involve constructing or operating septic tanks and, therefore, septic tanks would not be affected by soils incapable of supporting the use of them or other alternative wastewater disposal systems. Impacts would not occur. • Construction of salinity source control facilities could result in limited ground-disturbing activities, which could cause soil erosion or loss of topsoil; however, ground-disturbing activities would be limited in duration and geography and would most likely be contained within the site of an existing CII facility. Furthermore, ground-disturbing activities of 1 acre or greater would need the preparation and implementation of a SWPPP as required by the Central Valley Water Board. The SWPPP would require soil and erosion control mechanisms. Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts related to soil erosion and storm water runoff and erosion associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented due to the temporary nature of construction and the relatively small scale of disturbance within or adjacent to an existing facility.

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Greenhouse Gas Emissions	• Similar to the discussion in Table 16-7, because construction and operation of salinity source control facilities would likely result in increased use of electricity and fuels and there would be an increase in GHG emissions. Depending on the process used (e.g., RO) salinity source controls could be an energy-intensive process (e.g., RO energy use will vary depending on the salinity and temperature of the source water or wastewater; the higher the salinity or the colder the water temperature, the more energy it takes to remove the salt [Kennedy/Jenks Consultants 2013]). The overall increased electrical load would be extremely small compared to the existing electrical load of the service area and it is unlikely to require the construction of major new power generation or transmission facilities. However, it is anticipated that this increased electricity-related GHG emissions could exceed applicable SJVAPCD ZEL thresholds and result in a potentially significant impact. Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

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Hazards and Hazardous Materials	• Construction of salinity source controls would be short term in nature and may involve the limited transport, storage, use, and disposal of hazardous materials such as fuel and lubricating grease for motorized heavy equipment. Some examples of typical hazardous materials handling are fueling; servicing construction equipment on the site; and transporting fuels, lubricating fluids, solvents, and bonding adhesives. These types of materials are not acutely hazardous, and all storage, handling, and disposal of these materials are regulated by local, county, and state laws. Furthermore, the quantities of these materials used during construction would be small (e.g., less than 100 gallons) because construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained. Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction and the small amount of hazardous materials handled, used, or transported over the course of construction. • There are eight sites within San Joaquin County that are identified on the Hazardous Waste and Substance Site List (Cortese Site list) as being hazardous materials sites under Government Code, § 65962) (CalEPA 2016). Construction and operation of salinity source controls is not likely to be located on these eight sites or interfere with these sites because these sites are not CII facilities (e.g., commercial laundry facilities, food processing operations, and industrial fabrication shops) (CalEPA 2016). CalEPA identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facility sites where DTSC has taken corrective action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action in San Joaquin County (CalEPA 2016). As such, construction and operation of salinity source controls could not affect them. There are approximately 244 leaking underground storage cases in San Joaquin County designated as open (CalEPA 2016). Sixteen facilities in San Joaquin County have received CDOs or CAOs and have active cases, but may not be necessarily related to hazardous waste (CalEPA 2016). Some of these locations could be classified as CII facilities and may decide to implement salinity source controls (e.g., commercial laundry facilities, food processing operations, and industrial fabrication shops). During construction ground disturbing activities potentially contaminated soil could be encountered. As such, Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • San Joaquin County has 14 school districts and more than 200 schools (San Joaquin County Office of Education n.d.). The location of construction of salinity source controls is unknown; however, construction could be located within one-quarter mile (0.25 miles) of a school. Hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected these would be handled, used, and stored properly in accordance with local, state, and federal laws, and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school.

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	Additionally, depending on the location of construction, remediation may be needed to address soil contamination during excavation activities. As such, if a school existed within close proximity to a construction site, those mitigation measures identified table 16-38 applied to project-specific construction needs would reduce potentially significant impacts during construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • Operation of salinity source controls would not produce any new wastewater that would not already be produced and discharged to the sewer system and ultimately treated at the WWTP. If municipal wastewater already contains constituents, they should not be hazardous due to pretreatment requirements with which CII facilities must comply. Therefore, when compared to baseline, no new quantities of hazardous materials would be used, transported, or disposed of. There could be a new waste stream (e.g., salt concentrated waste) generated from the CII facility that would need to be removed and disposed of in accordance with applicable laws and regulations. Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during operation. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the need to comply with state and federal regulations in order to conduct business and operate. • Assuming construction and operation of salinity source control measures would be located in San Joaquin County, there are six public access airports within the county (SJCOG n.d.[a]). The Stockton Metropolitan Airport and San Joaquin County Airport have approved Airport Land Use Compatibility Plans, which prescribe safety requirements and ensure land uses would not pose a safety hazard to the airports in accordance with the Federal Aviation Administration. Other airports, such as the City of Tracy, have either airport master plans or other planning documents outlining safety requirements and ensuring land uses would not pose a safety hazard, consistent with FAA requirements (City of Tracy 1998). The location of the CII facilities that may implement salinity source controls is unknown and these facilities could be located within 2 miles of an airport. However, construction and operation of salinity source controls would not be a hazard or provide a safety concern to airports since salinity source controls would be constructed and operated within the footprint of existing CII facilities and the CII facilities already exist. Impacts would not occur. • Construction and operation of salinity source controls would not physically interfere with an adopted emergency response plans or emergency evacuation plans since they would be located within exiting CII facilities and would not prohibit the mobility of people to escape potential emergencies. Furthermore, construction and operation does not involve an increase in population that would necessitate reconsideration of how to evacuate people in an emergency. Impacts would not occur. • Construction and operation of salinity source controls would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur.

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Hydrology and Water Quality	• Construction of salinity source controls could result in temporary changes to storm water drainage, existing drainage patterns, erosion, or runoff associated with typical construction activities, such as grading or preparation of land. As discussed earlier in this table (Geology and Soils section), for soil disturbance of over 1 acre, wastewater treatment special districts or municipalities would be required to prepare and implement a SWPPP, which would include specific types and sources of storm water pollutants, determine the location and nature of potential impacts, and specify appropriate control measures to eliminate any potentially significant impacts from storm water runoff on receiving waters. In addition, as discussed in this table for Hazards and Hazardous Materials, construction of salinity source controls may involve the limited transport, storage, use, and disposal of hazardous materials, which, if spilled, could have adverse effects on water quality depending on the location and magnitude of the spill. However, storage, handling, and disposal of these materials is regulated by local, county, and state laws, and the quantities of these materials used during construction would be small (e.g., less than 100 gallons) and construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained and, as such, violations of water quality standards are not expected to occur. Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given construction would be temporary and the need to follow existing regulations requiring the handling, use and disposal of hazardous materials and the need to prepare SWPPPs. • It is unknown if CII facilities implementing salinity source controls would be located in a 100-year flood hazard area. However, since salinity source controls would be located within an existing CII facility footprint, the addition of salinity source controls would not substantially add to the existing structures such that flood flows would be impeded or redirected. Furthermore, salinity source controls would not substantially increase the number of people exposed to the risk of flooding because they would not draw people to flood hazard locations or result in the construction of housing in a flood hazard area. Accordingly, salinity source controls would not expose people to significant loss, injury, or death related to flooding. Construction of salinity source controls would not result in flooding or otherwise cause flooding, including flooding as a result of the failure of a levee or dam. Impacts would be less than significant. • Under operating conditions, CII facilities would continue to discharge pretreated wastewater into the sewer and would have to comply with the pretreatment requirements of the receiving WWTP. The pretreatment requirements are in place such that the WWTP can meet the WDRs of its NPDES permit. While there could be an exceedance in wastewater treatment effluent by a CII facility due to an unforeseen circumstance, it would not be expected under normal operating procedures. Salinity source controls would not increase the volume of wastewater discharged from the CII facility but rather would reduce the salinity of the facility's wastewater discharged into the sewer system. Therefore, it is expected that hydrology or water quality would not be affected as the CII facilities' pretreated wastewater would have the same volume but lower salt concentration. Impacts would be less than significant.

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	• Salinity source controls would likely not result in the need for new storm water facilities because there is a low likelihood of new impervious surfaces being created as salinity source controls would likely be located in existing CII facility footprints. Impacts would be less than significant. • Increases in groundwater pumping are not expected under the construction and operation of salinity source controls because these types of control measures would not need to pump groundwater. Further, CII uses that would employ salinity source control already receive their source water from municipal sources and would not increase their demand. Therefore, groundwater supplies would not be substantially depleted. Construction of salinity source controls would not interfere with groundwater recharge because the controls would generally be within existing facility footprints. Impacts would be less than significant. • Construction and operation of salinity source controls would primarily be located in areas of relatively flat relief because they would be within the footprint of existing CII facilities, and these facilities typically are not located on the side of steep slopes. Therefore, these locations would not support mudflows, which typically need very steep slopes and large amounts of precipitation to occur. Furthermore, these areas would not be adjacent to the ocean and would not be affected by tsunamis. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction and operation of salinity source controls are not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of salinity source controls could result in a substantial degradation to water quality.
Land Use and Planning	• Construction and operation of salinity source controls would not physically divide an established community because they would likely be located in the existing footprint of CII facilities. Impacts would be less than significant. • Construction and operation of salinity source controls would take place on the footprint of existing CII facilities and would not conflict with land use designations or zoning because the CII facilities are allowed generally to update or modify their facilities and processes within their appropriate land use and zoning designations. Impacts would be less than significant. If the salinity source controls were inconsistent with applicable land use plans, policies, or regulations, an amendment or variant from the local jurisdiction approving the discretionary action associated with the salinity source controls would be required to be obtained by the project proponent prior to project approval and construction. If no discretionary action occurred as a result of the construction or operation of the salinity source controls, it is assumed it would not result in a conflict with local land use plans, policies, or regulations. Impacts would be less than significant. • Construction and operation of salinity source controls would likely take place in the Delta and may be considered covered activities under the Delta Plan. Only the lead CEQA state or local agency may determine whether that plan, program, or project is a covered action of the Delta Plan. If an action is covered, consistency with the Delta Plan would be determined. The consistency determination would include implementing mitigation from the Mitigation Monitoring or Reporting Program of the Delta Plan, as appropriate. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts

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	related to consistency with the Delta Plan. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely impacts could be reduced once mitigation was implemented because once a lead agency determines an action is covered and complies with the Mitigation Monitoring or Reporting Program, consistency would be determined and impacts would be less than significant. • Potential conflicts with habitat conservation plans, natural community conservation plans, or other plans, policies and regulations protecting biological species and resources are evaluated in the Biological Resources section of this table.
Mineral Resources	• The California SMARA requires the State Geologist to classify land into MZs, according to the known or inferred mineral potential of existing land. The primary goal of mineral land classification is to ensure that the mineral potential of land is recognized by local government decision-makers and considered before land-use decisions are made that could preclude mining. Local general plans, specific plans, and other local plans refer to, and use the information produced by the State Geologist, to identify mineral resources because they are specialized evaluations and because the California Geologic Survey is the designated agency to perform these surveys under SMARA. Some gravel, sand, and aggregate resources are found in close proximity to waterways and the LSJR in San Joaquin County (San Joaquin County 1998, City of Tracy 2005). Most of the city of Stockton is designated as either not having mineral resources or a low likelihood of mineral resources (City of Stockton 2007). Other mineral resources, such as gold or peat, have been previously extracted from the county (San Joaquin County 1998). • Construction and operation of salinity source controls would have a very low potential to 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 or result in the loss of availability of a locally designated mineral resource recovery site. This is because salinity source controls would be within existing CII facilities, which are typically not located in the middle of mineral resource extraction areas. Furthermore, if the CII facilities are located within a state or locally designated mineral resource area, construction and operation of salinity source controls would not permanently remove access to a mineral resource as there would be other locations around the facilities that could provide access to the mineral resource. Impacts would be less than significant.
Noise	• Construction of salinity source controls would potentially take place in San Joaquin County, and the Cities of Tracy and Stockton depending on the location of the facilities that may implement salinity source control. Each of these jurisdictions have noise requirements in their general plans or zoning ordinances for construction and operation based on land use designations and timing restrictions. Noise requirements are typically based on land uses that are considered more sensitive to ambient noise levels than others due to noise exposure. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, and outdoor recreation or natural areas are typically more sensitive to noise than are commercial or industrial land uses. Therefore, local noise standards are typically more stringent for sensitive land uses in terms of level of noise generated, duration, and frequency than less sensitive uses. Given the wide ranges of land uses throughout San Joaquin County, noise levels can range from louder high density residential and industrial uses or roadway uses to more quiet open space and agricultural areas (San Joaquin County 1992). Frequently, the most common and loud noise generating activity in San Joaquin County affecting the overall permanent ambient noise setting is freeway traffic on I-

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	5, I-205, and SR-4 and along railroads and in heavy industrial areas (e.g., Port of Stockton) or around airports (San Joaquin County 1992). • The City of Tracy and the City of Stockton regulate generation of construction noise by restricting the timing that construction can occur (e.g., operating construction requirement from 10pm to 7pm is prohibited) and the land use or adjacent land uses under which the noise generating activity occurs (City of Stockton n.d., City of Tracy n.d.). San Joaquin County exempts noise sources associated with construction, provided they do not take place before 6am or after 9pm (San Joaquin County n.d.). Construction of salinity source controls could generate temporary noise and as such could expose people to noise levels in excess of standards. It is likely salinity source controls would be constructed in areas with suitable land use designations and zoning for CII uses because they would be within the footprint of existing CII facilities; therefore, it would be unlikely that sensitive receptors (e.g., homes, hospitals, schools) would be within close proximity. If sensitive receptors were adjacent to construction activities and experienced a temporary increase in ambient noise levels due to construction, construction would likely be temporary and would be required to follow existing local noise ordinances limiting the timing of construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts related to noise. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because construction impacts would be temporary and the low potential for sensitive receptors to be located within proximity to CII facilities. • Construction activities that typical result in ground-borne vibrations or ground-borne noise are activities such as pile driving, where the ground is repeatedly struck and vibrations or noise can be generated. Given the limited nature of the facilities being constructed for salinity source controls, it is unlikely that pile driving would be used. This is because these controls would be installed within existing facilities to the water supply connection or wastewater discharge to capture and treat the water either prior to the CII process or capture and treat it prior to discharge into the sewer system. As such, it would likely require finer mechanical installation than pile driving. Impacts would be less than significant. • The operation of salinity source controls may generate temporary noise when the CII facility is running. However, the existing facilities may already generate intermittent process noise (e.g., from alarm bells, pumps, and generators). Furthermore, it is anticipated there would be a very low probability that sensitive receptors (e.g., homes, hospitals, schools) would be located within close proximity to experience the operating noise generated because it is anticipated that the CII facilities would be located in areas with similar land uses (e.g., other CII facilities). Finally, it is expected that the salinity source controls would be enclosed within the CII buildings or enclosed with security fencing or barriers, which would reduce the operating noise. As such, a permanent increase in ambient noise under operating conditions is not expected. Impacts would be less than significant. • Assuming construction and operation of salinity source controls would be located in San Joaquin County, there are six public access airports within the county (SJCOG n.d.[a]). The Stockton Metropolitan Airport, San Joaquin County Airport have approved Airport Land Use Compatibility Plans, which identifies noise contours and where noise exposures may take place as a result of aircraft flight patterns consistent with Federal Aviation Administration requirements (SJCOG n.d.[a]).

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	Other airports, such as the City of Tracy, have either airport master plans or other planning documents that outline noise contours consistent with FAA requirements (City of Tracy 1998). While it is unknown where construction or operation of salinity source controls might occur, the construction and operation of salinity source controls would not bring new or additional people within close proximity to an airport or private airstrip or expose people to noise generated by air traffic on a regular basis. This is because salinity source controls would not result in an increased permanent work force cited within proximity to an airport or private airstrip. Nor would salinity source controls result in a population increase that would be exposed to airport noise. Impacts would not occur.
Population and Housing	• The construction and operation of salinity source controls would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Additionally, construction and operation of salinity source controls would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people to the southern Delta. Impacts would not occur. • The construction and operation of salinity source controls would not displace substantial numbers of people or housing, or necessitate the construction of replacement housing elsewhere because the facilities would be located in the existing footprint of CII buildings and not where people currently reside. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, parks, libraries, schools) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, the construction and operation of salinity source controls would not involve an increase in population or housing. In addition, these actions do not include proposals for new housing and would not generate students or increased demands for school services or facilities. Impacts would not occur.
Recreation	• An increase in use of existing recreational facilities is typically associated with a substantial increase in the population to accommodate new recreationists. Construction or operation of salinity source controls would not result in a substantial increase in population because it would not result in the development of housing or other population-inducing development (e.g., job centers). The purpose of the construction and operation of salinity source controls would be to comply with water quality objectives. Construction and operation of these facilities would satisfy existing demand, not meet new projected demand for wastewater treatment or water supply. Impacts would not occur. • Construction of salinity source controls would likely occur within the footprint of CII facilities. These facilities are typically located adjacent to other CII land uses, so it is unlikely recreational facilities would be located in areas where CII facilities currently exist. However, if recreational facilities were located within very close proximity to the salinity source controls, recreational facilities could be affected by noise levels or other temporary construction activities. If construction occurs within close proximity to existing recreational resources, Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to construction noise, traffic, or air quality if those types of impacts occur within close proximity. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than

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	significant once mitigation measures were implemented, depending on the construction timeframe and the location of potential sensitive receptors and recreational resources, and the need to implement existing regulatory requirements (e.g., feasible air quality emissions reduction measures). • Construction and operation of salinity source controls would not include recreational facilities, and would not require the construction or expansion of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Assuming the construction and operation of salinity source controls would be located within San Joaquin County, projects would be subject to the SJCOG Regional Congestion Management Plan (SJCOG 2016b). CII facilities may be located in urban and suburban areas, including the City of Tracy, the City of Stockton, and the County of San Joaquin, that could already experience some congestion. As described in the Regional Congestion Management Program, projects are subject to a tiered review process, unless exempt from CEQA or unless considered as part of a previously approved project (SJCOG 2016b). Projects that trigger 125 or more vehicle trips during weekday AM or PM peak-hours or 500 or more total vehicle daily trips on any day of the week would be required to perform a quantitative regional traffic analysis. The Regional Congestion Management Program provides for mitigation to reduce effects if trips occur at those levels. Trips that are exempted from the RCMP standards, and are removed from calculations of LOS standards under the RCMP include trips resulting from construction (SJCOG 2013). A total of 103 intersections have been designated as part of SJCOG Regional Congestion Management Program (SJCOG n.d.[b]). Designation of RCMP intersections allows for congestion monitoring and appropriately focuses attention at locations where operational constraints are typically experienced on arterial roadways (SJCOG n.d.[b]). Operation of salinity source controls would generate additional truck trips to dispose of the waste brine generated by the salinity source control process. The number of truck trips depends on the volume of wastewater treated per day and the salinity; therefore, the number of trucks that would be required is unknown. As discussed above, if a project exceeds the criteria established by the Regional Congestion Management Program on roads identified in that program (e.g., 125 or more vehicle trips during weekday AM or PM peak-hours or 500 or more total vehicle daily trips on any day of the week), mitigation would be applied through that program. The criteria are particularly high and generally applicable to development such as office parks, retail, or housing developments that would generate substantial numbers of trips. However, Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant transportation and traffic impacts related to operations, if indeed brine disposal resulted in exceedances of the Regional Congestion Management criteria. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented and consistency with the Regional Congestion Management Plan was determined. • Construction and operation of salinity source controls could result in some additional trips. It is unknown the number of construction and operational trips that might be needed and the location of these trips, but it is anticipated that construction would be relatively limited in duration. Typically, construction activities are exempt from local road trip thresholds because construction is considered temporary. However, depending on the quantity of trips and the duration, the temporary increased traffic during construction or the potential increase in operational trips associated with brine disposal could exceed local or regional road trip thresholds (either vehicle miles traveled or level of service, as discussed in Table 16-25, changes to the methodology and criteria for evaluations are occurring). Projects would be required to

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Resource	Discussion
	evaluate trip generating activities through the respective jurisdiction traffic impact analysis guidelines, depending on the location and number of trips generated (City of Stockton n.d.). Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant transportation and traffic impacts related to construction or operation. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction and because brine disposal trips could likely occur on an infrequent basis. • Construction of salinity source controls is not expected to result in hazards to, or on, roadways because they would primarily be constructed within existing footprints of facilities. Similarly, construction activities are not expected to conflict with public transit facilities, public bicycle facilities, or pedestrian facilities (e.g., sidewalks) because they would be constructed within existing footprints of facilities. The development of project-specific construction traffic management plans, as identified in Table 16-38 would reduce potentially significant impacts if hazards on the roadway were temporarily created during construction due to construction related activities. Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts of transportation and traffic related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant, given the low likelihood of occurring, and once mitigation measures were implemented because construction impacts would be temporary. • Similar to the discussion in the Hazards and Hazardous Materials section of this table, it is not expected that construction of salinity source controls would result in inadequate emergency access, given the location of the construction work would primarily within the existing footprint of CII facilities. As such, there is a low likelihood of interfering with emergency access. However, Table 16-38 lists potential mitigation measures that lead agencies (e.g., CII facilities or municipalities) can and should implement to reduce potentially significant impacts of transportation and traffic related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. It is likely that impacts could be mitigated to less than significant, given the low likelihood of occurring, and once mitigation measures were implemented because construction impacts would be temporary. • Construction and operation of salinity source controls would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and are not related to air traffic or airports. Impacts would not occur. • Operation of salinity source controls are not expected to result in a permanent substantial increase in hazards due to a design feature or incompatible use, permanent inadequacy of emergency access, or a permanent change that would decrease the performance or safety of public transit facilities, public biking facilities, or public pedestrian facilities because it is anticipated that these would be located within existing facility footprints. Trips associated with brine disposal would be done on existing roads and as such, would not result in permanent substantial hazards or conflicts with emergency access and public transit, bicycle, or pedestrian facilities. Impacts would be less than significant.

Potential Environmental Effects of Salinity Source Controls

Resource	Discussion
Utilities and Service Systems	• Construction and operation of salinity source controls would not be expected to affect wastewater treatment requirements of the Central Valley Water Board because it would actually reduce the salinity of the wastewater entering a WWTP. Therefore, the salinity source controls overall would reduce the salinity in the treated effluent that is discharged into receiving waters. Additionally, construction and operation of salinity source controls would not result in a determination by a wastewater treatment provider that it has inadequate capacity to meet the service area's demand because the salinity source controls would not increase the volume of wastewater from the CII facilities discharged into the sewer system; therefore, the WWTP would receive the same volume of wastewater. Impacts would be less than significant. • Construction and operation of salinity source controls would not require new entitlements because the controls would not require water. The controls target salinity in the wastewater collection system and implemented prior to wastewater entering the system to be treated. As such, impacts would not occur. • Construction and operation of salinity source controls would involve the construction of WWTP infrastructure. Environmental effects associated with the infrastructure are discussed earlier in this table (Aesthetics through Transportation and Traffic). Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant construction and operation impacts related to all environmental resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • The construction and operation of salinity source controls would not need the construction of additional storm water drains because they would likely be built within the footprint of the existing CII facilities, which currently have impervious surfaces that generate runoff. It is expected that existing storm water infrastructure would be used. Impacts would be less than significant. • Construction and operation of salinity source controls could generate solid waste in the form of waste brine. All waste would be disposed of in accordance with applicable laws and regulations. Impacts would be less than significant.

16.4.3 Desalination

Some wastewater treatment agencies may opt to remove salts at the WWTP before treated effluent is discharged to the southern Delta. Conventional wastewater treatment processes do not significantly remove salts from the wastewater. To remove salts, a discharger must desalinate treated wastewater effluent. Methods to desalinate water at WWTPs include thermal separation, electro-dialysis, and RO. This analysis is specific for RO because it is the most common desalination technology in California and is comparable or less expensive than other desalination methods (e.g., ion exchange, distillation) (DWR 2009). It is anticipated that the following municipalities and wastewater treatment service providers that discharge into the southern Delta could implement such programs: City of Tracy, City of Stockton, and Mountain House CSD.

Cost Evaluation

The costs of RO include the costs associated with the construction of the RO facilities and operation and maintenance costs associated with energy use and brine disposal. Brine's salinity is a function of the concentration and volume of the influent into the RO filter and the efficiency of the RO filter. For example, if the influent water had 75,000 pounds of salt per 10 mgd, and the RO filter was 85 percent efficient, the brine would contain 75,000 pounds of salt per 1.5 million gallons.

Brine disposal is an important consideration when evaluating wastewater treatment technologies used to reduce salinity. This is because of the associated costs and potential environmental effects of brine disposal. There are five major methods of brine disposal: (1) disposal to WWTPs, (2) disposal to surface waters, (3) deep-well injection, (4) evaporation ponds, and (5) evaporation to dryness (crystallization). Approximately 40 percent of all desalination facilities in the country discharge brine to an existing wastewater collection system (Sethi et al. 2006, USBR 2006c). Approximately 48 percent of all desalination facilities in the country discharge brine directly to surface water (Sethi et al. 2006, USBR 2006c). In some areas, brine may be discharged to a deep well, below potable water aquifers (TWDB 2009). Regulatory concerns associated with this deep-well injection method of brine disposal include the receiving water's transmissivity, the salinity of the receiving water, and the presence of a structurally isolating and confining layer between the receiving aquifer and any overlying source of drinking water (Sethi et al. 2006, USBR 2006c). Evaporation ponds can be used in relatively warm, dry climates with high evaporation rates, level terrain, and low land costs (Sethi et al. 2006). Evaporation ponds allow the brine to dewater, and then be hauled to a landfill for ultimate disposal. Thermal separators and vapor compression systems can completely remove water from brine, leaving a crystallized solid for disposal. These crystallization systems are very energy intensive. The capital, operations, and maintenance costs can exceed the cost of the desalination facility. This potential brine disposal method is used for very small flows where other discharge methods are not feasible (Sethi et al. 2006). Other methods that have been utilized are treatment wetlands and other developing technologies (TWDB 2009).

Evaporation ponds were selected for this cost evaluation because of their lower associated cost and regulatory constraints. The assumptions included in the cost evaluation are a portion or all of the wastewater treated effluent would be treated with RO at the wastewater facility, the brine would be dewatered in evaporation ponds located at the wastewater facility or adjacent to the wastewater facility, and solids remaining after evaporation would be transported and disposed of at a Class I/II landfill (non-hazardous waste landfill).

The cost to install a desalination system at a WWTP is highly variable. In general, important factors to consider are the quality and quantity of wastewater effluent entering the desalination system, the desired quality leaving the desalination system, energy costs, the chosen method of desalination, and the brine disposal method. Some WWTPs will only need to treat a portion of the wastewater effluent to achieve effluent limitations for salinity, which would reduce costs.

The California Water Plan Update 2009 discusses the cost of desalination. Table 16-29, *California Water Plan Update 2009 Unit Cost of Desalination*, provides a summary of costs.

Table 16-29. California Water Plan Update 2009 Unit Cost of Desalination

	Total Water Cost ($/AF)	
Type of Desalting	Low	High
Groundwater	$500	$900
Wastewater	$500	$2,000
Seawater	$1,000	$2,500

Source: DWR 2009.
AF = acre-feet.

Using this approximation, a 10 mgd discharger can expect to pay $5.6–$22.4 million to construct an RO system at the WWTP. Extrapolating this trend is nonlinear. The associated administrative, engineering, and legal costs do not generally decrease for smaller projects. Larger RO facilities cost more, but the typical unit price of water produced decreases due to the scale of construction costs compared to administrative, engineering, and legal costs.

Environmental Evaluation

Summary of Potential Action

The location, timing of construction, and details of operation of desalination facilities are unknown. In addition, the size and scale of the facilities is unknown. These unknown factors would influence the type, magnitude and severity of impacts that could occur during construction and operation. However, any modified or new desalination facilities would likely be constructed and operated in the existing footprint of, or within very close proximity to, a WWTP that discharges treated effluent into the southern Delta waterways or is physically located within the southern Delta. This is because the desalination process would have to be integrated with the wastewater treatment stream to capture the WWTP treated effluent, remove the salt, and release the RO effluent into receiving waters. Additionally, it is assumed WWTPs are located within close proximity to creeks or rivers because they must discharge treated effluent into receiving waters. It is also assumed WWTPs are located in more urbanized areas and adjacent to CII and urban uses because they must be located in an area to serve their existing municipal customers. Treatment plants are generally located on lands designated and zoned for public facilities and CII uses. Desalination would likely require the disposal of highly concentrated salt waste streams (e.g., brine). These waste streams are assumed to be trucked offsite and disposed of in a landfill for nonhazardous materials. Since the operation of the desalination facilities would be located within existing WWTPs or within close proximity, and the process is highly automated, it is anticipated that the current employees of the existing WWTP would maintain and operate the desalination facility and that a substantial number of additional employees would not be needed.

Potential Environmental Effects

Construction of wastewater desalination facilities would likely result in temporary and highly localized effects typically associated with similar activities, including air quality effects and ground disturbance. As noted above, it is likely that such facilities would be constructed in areas that are already disturbed by urban development, and most facilities would be located within existing WWTP footprints. Desalination facilities are typically relatively energy intensive. However, the overall increased electrical load for new treatment facilities would be very small compared to the existing electrical grid capacity and is unlikely to require the construction of major new power generation or transmission facilities. The operation of new RO treatment facilities may require a slight increase in chemical transport and storage, but this potential increase would likely be minimal because new RO facilities would likely be constructed within or adjacent to existing WWTPs. Therefore, the increase would be negligible compared to existing chemical use and transport.
New desalination facilities would result in the production of solid waste, which would be disposed of in accordance with applicable laws and regulations in landfills. To the extent such programs were successful in reducing salinity in the southern Delta, agricultural uses and aquatic resources would benefit. Construction and operation of such facilities are highly regulated, and the project would be required to comply with applicable regulations. In addition, because such facilities are owned by WWTP service districts[25] and subject to CEQA review, any new projects would undergo project-level analysis under CEQA and other required regulatory compliance at the time they are proposed.

Table 16-30, *Potential Environmental Effects of Wastewater Treatment Plant Desalination*, summarizes the potential environmental effects associated with desalination. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, at the end of this chapter lists potential mitigation measures associated with the construction or operation of the methods of compliance and is referenced in Table 16-30 where appropriate.

[25] Note: Cities or water districts that do not treat wastewater would have no obligation to try to reduce the salt levels in the water they provide.

Table 16-30. Potential Environmental Effects of Wastewater Treatment Plant Desalination

Potential Environmental Effects of Wastewater Treatment Plant Desalination	
Resource	Discussion
Aesthetics	• Construction and operation of WWTP effluent desalination facilities would not be expected to substantially degrade the visual character or quality of areas where these facilities would be constructed, or substantially damage scenic resources (including trees, rock outcroppings, and historic buildings) within the state-designated scenic highways in San Joaquin County (I-5 and I-580) because desalination facilities would be located within the existing footprint of WWTPs or within close proximity. These facilities would be similar in size, scale, and general appearance as the existing WWTP. The magnitude and severity of the aesthetic impacts would depend on the location of sensitive receptors and scenic vistas relative to the construction and operation site. For example, San Joaquin County has no designated scenic vistas and as such an impact may not occur (San Joaquin County 2014a). Construction of the facilities could create temporary light and glare during potentially needed nighttime construction periods, and once desalination facilities become operational, they may require permanent outdoor lighting. However, given that these facilities would likely be located within an existing WWTP footprint or within close proximity, it is unlikely that this light and glare would be substantial relative to existing outdoor lighting conditions. Impacts on aesthetic resources would depend on the location of sensitive receptors relative to potential lighting. Outdoor lighting would be expected to follow lighting guidelines and plans of local jurisdictions approving the construction and operation of the desalination facilities. Table 16-38 identifies potential mitigation measures lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant environmental effects associated with light and glare and aesthetics. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, depending on the potential location of possible sensitive receptors and the ability to reduce light and glare.
Agriculture and Forestry Resources	• Construction and operation of desalination facilities would not be expected to take place on lands used for agriculture (Prime Farmland, Unique Farmland or Farmland of Statewide Importance) or on lands under Williamson Act contract because the facilities would be located within the footprint of existing WWTPs or within very close proximity such that the desalination facilities can use the existing wastewater treatment stream. Additionally, it is expected that agricultural uses in the southern Delta would benefit from the reduction in salinity and potentially offset any losses of agricultural land that might be indirectly affected by the desalination facilities. Table 16-38 identifies potential mitigation measures lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant environmental effects on agricultural resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of

Potential Environmental Effects of Wastewater Treatment Plant Desalination	
Resource	Discussion
	potential disturbance during construction. It is also expected that desalination would result in higher water quality in the southern Delta, which could potentially offset impacts on agricultural land affected by the recycled water facilities. • Construction and operation of desalination facilities would not be expected to take place forest lands or timberland because the facilities would be located within the footprint of existing WWTPs or within very close proximity such that the desalination facilities can use the existing wastewater treatment stream. Furthermore, the southern Delta generally does not have timber resources or forestlands. As such, there would be no conflict with existing zoning for forest land or timberland, and there would be no rezoning or loss of these resources. Impacts would not occur.
Air Quality	• Desalination facilities would likely be located in the SJVAB, which generally covers San Joaquin, Stanislaus, Merced, and Madera Counties. USEPA has classified SJVAB as an extreme nonattainment area for the federal 8-hour ozone standard and a nonattainment area for the federal PM2.5 standard. For the federal CO standard, USEPA has classified most major population centers of the SJVAB as maintenance areas and rural areas of the SJVAB as unclassified/attainment areas. The SJVAB is classified as a serious maintenance area with regards to the federal PM10 standards. ARB has classified the SJVAB as a severe nonattainment area for the state 1-hour ozone standard and a nonattainment area for the state 8-hour ozone, PM10, and PM2.5 standards. ARB has classified the SJVAB as an attainment area for the state CO standard. SJVAPCD's published guidelines, *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002) do not require the quantification of construction emissions. Rather, the guidelines require implementation of effective and comprehensive feasible control measures to reduce PM10 emissions (SJVAPCD 2002). SJVAPCD considers PM10 emissions to be the greatest pollutant of concern when assessing construction-related air quality impacts and has determined that compliance with its Regulation VIII, including implementation of all feasible control measures specified in its *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002), constitutes sufficient mitigation to reduce construction-related PM10 emissions to less-than-significant levels and minimize adverse air quality effects. All construction projects must abide by Regulation VIII. Since the publication of the SJVAPCD's guidance manual, the district has revised some of the rules comprising Regulation VIII. Guidance from SJVAPCD staff indicates that implementation of a Dust Control Plan would satisfy some requirements of SJVAPCD Regulation VIII (Siong pers. comm.). Further consultation with SJVAPCD staff indicates that, though explicit thresholds for construction-related emissions of ozone precursors are not enumerated in the *Guide for Assessing and Mitigating Air Quality Impacts*, SJVAPCD considers it a significant impact when construction or operational emissions of ROG or NO_X exceed 10 tons per year or if PM10 or PM2.5 emissions exceed 15 tons per year (Siong pers. comm.). SJVAPCD's CEQA Guidelines indicate their numeric thresholds are project-level and cumulative: "Any proposed project that would individually have a significant air quality impact…would also be considered to have a significant cumulative air quality impact (SJVAPCD 2002)" Construction of desalination facilities would likely result in emissions associated with construction equipment and construction worker vehicle trips as well as fugitive dust emissions from ground disturbance. The quantity, duration, and intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that

Potential Environmental Effects of Wastewater Treatment Plant Desalination	
Resource	Discussion
	would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Depending on the level of activities and amount of infrastructure built, construction of desalination facilities could exceed air quality thresholds established by SJVAPCD and would be required to implement measures to help reduce or minimize construction-related emissions. Lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on air quality from construction-related emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Prior to a project dealing with a stationary source of emissions (such as a WWTP) it is required to receive an ATC from SJVAPCD. The project is subject to the requirements of SJVAPD Rule 2201. As stated under Sections 1.1 and 1.2 of Rule 2201[26]: *The purpose of this rule is to provide for the following:* *1.1 The review of new and modified Stationary Sources of air pollution and to provide mechanisms including emission trade-offs by which Authorities to Construct such sources may be granted, without interfering with the attainment or maintenance of Ambient Air Quality Standards;* *1.2 No net increase in emissions above specified thresholds from new and modified Stationary Sources of all nonattainment pollutants and their precursors.* Rule 2201 applies to new stationary sources and all modifications to existing stationary sources that are subject to permit requirements that may emit one or more affected pollutant after construction. The requirements of this rule would be in effect on the date the application is determined to be complete by the Air Pollution Control Officer shall apply to such application. Operation of desalination facilities would likely be electric because of their expected locations in urban and suburban areas and the expected location in close proximity to existing wastewater treatment infrastructure. They may use nonelectric backup for intermittent emergency circumstances. Operations could include facility inspection and maintenance activities and are expected to be similar to or fewer maintenance activities than inspection and maintenance of existing wastewater treatment facilities. The need for additional energy could result in increased criteria pollutant emissions at other power facilities. However, the power facilities that would compensate for the additional power are already built and permitted to emit a maximum amount of criteria pollutants. These facilities are required to offset additional power generation by the use of pollution credits. Therefore, if additional emissions

[26] Sources whose primary function is permitted by SJVAPCD through Rules 2010 and 2201 are not subject to SJVAPCD Rule 9510 (Indirect Source Review). Projects subject to Rule 9510 are required to quantify and reduce indirect (mobile source emissions), area-source (space heating, landscaping, and maintenance), and construction exhaust emissions.

Potential Environmental Effects of Wastewater Treatment Plant Desalination	
Resource	Discussion
	are generated, they would be generated by facilities that are permitted to do so. • The increased number of truck trips that would be associated with the disposal of brine at landfills would produce emissions. The brine would be dewatered in evaporation ponds and then transported offsite to landfills. The number of truck trips cannot be fully quantified because it would depend on the salinity of the wastewater, which is a function of the concentration, volume of the RO influent, and the time the brine would need to spend in the evaporation ponds. However, depending on the amount of materials that would require disposal and number of haul trucks that would be required, operational activities associated with material hauling could result in exceedances of SJVAPCD's thresholds and potentially result in a cumulatively considerable net increase in criteria pollutants for which SJVAB is in nonattainment, as SJVAPCD's CEQA Guidelines indicate their numeric thresholds are project-level and cumulative: "Any proposed project that would individually have a significant air quality impact…would also be considered to have a significant cumulative air quality impact (SJVAPCD 2002)". Impacts due to operation of the desalination facilities could result in potentially significant impacts. Lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on air quality associated with operational emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • SJVAPCD generally defines a sensitive receptor as a facility that houses or attracts children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants, and where there is a reasonable expectation of continuous human exposure according to the averaging period for National AAQSs(e.g., 24-hour, 8-hour, or 1-hour) (SJVAPCD 2002). Sensitive receptors are primarily concentrated in urbanized areas and their proximity to construction or operational activities, the type of activity, and duration of activity, determines their potential exposure to pollutants. If criteria pollutant standards are exceeded during construction, and sensitive receptors are in proximity, mitigation measures identified in Table 16-38 would serve to reduce potentially significant air quality effects. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. It is not anticipated that operation of the facilities would expose sensitive receptors to substantial pollutant concentrations because operations would not generate toxic or diesel exhaust. If diesel generators were used, they would be limited in operation and would likely be subject to air district permitting requirements that would minimize health risks. • The ARB traditionally has established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving State Implementation Plan, as required by the Clean Air Act, provisions. Responsibilities of local air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories. SJVAPCD has adopted an air quality improvement plan that addresses NO_X and ROGs, both of which are ozone precursors and contribute to the secondary formation of PM10 and PM2.5. The air quality improvement plan specifies that regional air quality standards for ozone and PM10 concentrations

Potential Environmental Effects of Wastewater Treatment Plant Desalination	
Resource	Discussion
	can be met through the use of additional source controls and trip reduction strategies. It also establishes emission budgets for transportation and stationary sources. Those budgets, developed through air quality modeling, reveal how much air pollution can be present in an area before AAQSs are violated. General plan assumptions of local jurisdictions inform local air quality plans. The exceedance of air quality thresholds, or the net increase of emissions, does not necessarily mean construction and operation of new source water supply facilities would be inconsistent with applicable air quality plans or local general plans. A project is deemed inconsistent with an air quality plan if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan or local general plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects are evaluated to determine whether they would generate population and employment growth and, if so, whether that growth and associated emissions would exceed those included in the relevant air quality plan(s). The construction and operation of desalination facilities would not result in growth because it would serve to provide alternate low-salinity water source(s) to water users and would not serve to satisfy an increase in demand or an increase in need. The construction and operation of desalination facilities would not result in population or employment growth that would result in a conflict with or obstruct implementation of the applicable air quality plan because they would not require activities that are associated with population growth (e.g., housing development, business centers, etc.). Accordingly, this impact is less than significant. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants. Construction and operation of desalination facilities would not involve the type of facility identified by, for example, SJVAPCD, as a known odor source (SJVAPCD 2002). The desalination facilities would be located at the WWTP but would not produce additional odors beyond what currently may be produced at the WWTP. This is because the desalination process typically uses the existing volume of wastewater which is already treated to secondary or tertiary levels (as required by state law). The desalination process further processes the wastewater effluent. Therefore, the additional processing of the wastewater does not produce further odors as the odors are typically generated during primary treatment and biosolids production. Furthermore, many WWTPs contain any odors by enclosing primary treatment and biosolids production and by scrubbing odor-generating emissions. Consequently, it is expected desalination would not create objectionable odors affecting a substantial number of people. Impacts would be less than significant.

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Resource	Discussion
Biological Resources	• It is expected that construction and operation of desalination facilities would be in urban and suburban areas within the footprint of existing WWTPs. These areas are expected to have a low potential for candidate, sensitive, or special-status species, and habitat (including federally protected wetlands, riparian habitat, or other sensitive natural communities). Additionally, the footprints of WWTPs are expected to have a very low potential for special-status biological resources because typically WWTPs are industrial facilities with buildings and impervious surfaces, which would be unlikely to support these biological resources. As such, construction and operation of desalination facilities are unlikely to interfere substantially with the movement of any native resident or migratory fish or wildlife species, or impede the use of native wildlife nursery sites. Furthermore, it is expected that the treated effluent discharged from the WWTP would actually be improved from baseline conditions because the desalination facilities would remove salinity prior to discharge into the receiving water. This would be considered beneficial to aquatic resources. If special status species and habitat are present, construction could result in short term, temporary, indirect effects. Table 16-38 lists potential mitigation measures lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant environmental effects of construction and operations on biological resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction and depending on the ability to schedule construction for particular seasons and durations. • It is expected that construction or operation of desalination facilities would not result in a conflict with an existing local policies or ordinances protecting biological resources, or an adopted habitat conservation plan or natural community conservation plan. However, construction and operation of desalination facilities would occur within the SJMSCP Plan Area. The SJMSCP is administered by the SJCOG, a non-profit corporation established by San Joaquin County and the cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton and Tracy. Implementation of new desalination facilities may be considered a covered activity under SJMSCP—a determination which would be made by SJCOG, in consultation with the lead agency. If an activity is determined to be covered, participation in the SJMSCP is voluntary except when conditioned to participate by a Permittee (i.e., SJCOG, Inc. San Joaquin County, and the cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton and Tracy). If an activity is not covered, the lead agency can request coverage using one of the following four options: (1) payment of a fee, which is assessed depending on habitat type within which the project is located; (2) dedicate habitat lands as a conservation easement or fee title; (3) purchase mitigation bank credits from a SJCOG-approved mitigation bank; and (4) propose an alternative mitigation plan, consistent with the goals of the SJMSCP and equivalent in biological value. Participation in the SJMSCP fulfills ESA, CESA, NEPA, and CEQA requirements, provides mitigation and guarantees no additional mitigation, excepting for Incidental Take Minimization Measures required in limited cases (SJCOG 2016a). If the lead agency participates in the SJMSCP, construction and operation of desalination facilities would not be considered in conflict with the SJMSCP, and impacts would be less than significant. If the lead agency chooses to opt out of participation in the SJMSCP, that agency or agencies (e.g., municipalities or municipal water purveyors)

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Resource	Discussion
	can and should implement the mitigation measures identified in Table 16-38 to reduce potentially significant impacts on biological resources and to avoid conflict with the SJMSCP. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. If habitat is permanently removed as a result of constructing or operating desalination facilities, it is likely that impacts could not be mitigated and would remain significant and unavoidable. However, it is likely impacts could be reduced once mitigation was implemented because once a lead agency opts in or determines its action is covered, consistency would be determined and impacts would be less than significant. • Disposal of the brine generated by the desalination facilities would occur at landfills and would have a very low potential to affect sensitive biological resources because the brine would be contained in the landfill. Impacts would be less than significant.
Cultural Resources	• Construction and operation of desalination facilities would likely take place in urban and suburban areas adjacent or within close proximity to existing wastewater treatment facilities and infrastructure. Construction may result in some ground-disturbing activities which have the potential to disturb or destroy buried, unknown, significant cultural resources (significant historical, archeological, or paleontological resources). While it is unknown if cultural resources exist in these locations, these areas would likely have been previously disturbed during the construction of the existing wastewater treatment facilities, reducing the potential for significant unknown cultural resources to exist. Lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on cultural resources associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented the low potential for resources to exist. • Operation of desalination facilities have no potential to affect cultural resources because the facilities would simply remove salt, and discharge treated effluent into receiving waters. Under baseline conditions, discharges are already occurring and an increase in discharge would not occur. Impacts would be less than significant. • As described above, it is expected that wastewater treatment sites would have been previously disturbed. Therefore, it is highly unlikely that human remains, typically buried at depths of 6 ft, would be disturbed during construction. If, in the highly unlikely event human remains are uncovered during construction, compliance with the State Health and Safety Code would be required. As specified by Section 7050.5 of the Health and Safety Code, and described in Table 16-38, no further disturbance would occur until the county coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If such a discovery occurs, excavation or construction would halt in the area of the discovery, the area would be protected, and consultation and treatment would occur as prescribed by law. If the coroner recognizes the remains to be Native American, he or she would contact the NAHC, who would appoint the Most Likely Descendent. Additionally, if the human remains are determined to be Native American, a plan would be developed regarding the treatment of human remains and associated burial objects, and the plan would be implemented under the direction of the Most Likely Descendent.

Potential Environmental Effects of Wastewater Treatment Plant Desalination

Resource	Discussion
	Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the low potential for resources to exist.
Geology and Soils	• Desalination facilities could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, desalination facilities would not result in an impact on or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, expansive soils, or landslides. Since the facilities would be located within or in close proximity to existing WWTPs, the addition of the desalination facilities would not substantially add to the structure such that it would increase the exposure of the structure to potential substantial adverse effects, as the risk of loss to rupture of known earthquake faults, seismic ground shaking, or seismic ground-related failure. Furthermore, new structures would be required to follow all appropriate building codes and would be designed to withstand seismic-related activities as identified by the building codes. Finally, desalination facilities would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts related to geology and soils associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the need to follow the building code and other state and federal building requirements. • The construction and operation of desalination facilities would not involve constructing or operating septic tanks and, therefore, septic tanks would not be affected by soils incapable of supporting the use of them or other alternative wastewater disposal systems. Impacts would not occur. • Construction of desalination facilities would result in limited ground-disturbing activities that could cause soil erosion or loss of topsoil; however, ground-disturbing activities would be limited in duration and geography. Furthermore, ground-disturbing activities of 1 acre or greater would require the need for preparation and implementation of a SWPPP, as required by the Central Valley Water Board. The SWPPP would require soil and erosion control mechanisms. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts on soil erosion and storm water runoff associated with construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction.

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Resource	Discussion
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-7, because construction and operation of desalination facilities would likely result in increased use of electricity and fuels there would be an increase in GHG emissions. The desalination process is an energy-intensive process (e.g., RO energy use will vary depending on the salinity and temperature of the source water or wastewater; the higher the salinity or the colder the water temperature, the more energy it takes to remove the salt [Kennedy/Jenks Consultants 2013]). The overall increased electrical load would be extremely small compared to the existing electrical demand of the service area and it is unlikely to require the construction of major new power generation or transmission facilities. However, it is anticipated that this increased electricity-related GHG emissions could exceed applicable SJVAPCD ZEL threshold and result in a potentially significant impact. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts of construction and operations from GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091.

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Resource	**Discussion**
Hazards and Hazardous Materials	• Construction of desalination facilities would be short term and may involve the limited transport, storage, use, and disposal of hazardous materials such as fuel and lubricating grease for motorized heavy equipment. Some examples of typical hazardous materials handling are fueling and servicing construction equipment on the site, and transporting fuels, lubricating fluids, solvents, and bonding adhesives. These types of materials are not acutely hazardous, and storage, handling, and disposal of these materials are regulated by local, county, and state laws. Further, the quantities of these materials used during construction would be small (e.g., less than 100 gallons) because construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction. • Schools are not located within one-quarter mile of the WWTPs of Tracy, Stockton, or Mountain House CSD (California Department of Education 2016a, 2016b). As such, impacts would not occur. • There are eight sites within San Joaquin County that are identified on the Hazardous Waste and Substance Site List (Cortese Site list) as being hazardous materials sites under Government Code, § 65962) (CalEPA 2016). Construction and operation of desalination facilities is not likely to be located on these eight sites or interfere with these sites because these sites are not located on the WWTPs of Tracy, Stockton, or Mountain House CSD and are not located within close proximity (CalEPA 2016). CalEPA identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facility sites where DTSC has taken corrective Action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action in San Joaquin County (CalEPA 2016). As such, construction and operation of desalination facilities would not affect them. There are approximately 244 leaking underground storage cases in San Joaquin County designated as open (CalEPA 2016). Sixteen facilities in San Joaquin County have received CDOs or CAOs and have active cases, but may not be necessarily related to hazardous waste (CalEPA 2016). The location of construction and ground disturbing activities is anticipated to be within existing WWTPs or within close proximity. However, construction could occur within proximity to leaking underground storage tanks. In addition, Stockton WWTP is included on the list of cease and desist or clean up and abatement for domestic sewage and industrial purposes. As such, during construction of desalination facilities ground disturbing activities potentially contaminated soil could be encountered. As such, Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed.

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Resource	Discussion
	• Operation of desalination facilities would not produce any new wastewater that would not already be discharged. Municipal wastewater is not expected to contain hazardous materials due to CII facility pretreatment requirements. Therefore, when compared to baseline, no new quantities of hazardous materials would be used, transported, or disposed. However, there would be a new waste stream (e.g., brine) generated from the WWTP that would need to be removed. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts associated with hazardous materials during operations. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented. • Assuming construction and operation of desalination would be located in San Joaquin County, there are six public access airports within the county (SJCOG n.d.[a]). The Stockton Metropolitan Airport and San Joaquin County Airport have approved Airport Land Use Compatibility Plans, which prescribe safety requirements and ensure land uses would not pose a safety hazard to the airports in accordance with the Federal Aviation Administration. Other airports, such as the City of Tracy, have either airport master plans or other planning documents outlining safety requirements and ensuring land uses would not pose a safety hazard, consistent with FAA requirements (City of Tracy 1998). While it is unknown where construction or operation of desalination might occur, the WWTPs for the City of Tracy and Stockton and Mountain House CSD are not located within 2 miles of an airport (SJCOG n.d.[a]). Further, construction and operation of desalination facilities would not be a hazard or cause safety concerns to airports since the facilities would be constructed and operated within the footprint of existing WWTPs or within close proximity. Impacts would not occur. • Construction and operation of desalination facilities would not physically interfere with an adopted emergency response plans or emergency evacuation plans since they would be located within existing WWTPs or in close proximity to them and therefore would not prohibit the mobility of people to escape potential emergencies. Standard practices and protocols with respect to emergencies that are currently implemented by the WWTPs would apply and desalination facilities would be incorporated into the standard practices and protocols. Furthermore, construction and operation does not involve an increase in population that would necessitate reconsideration of how to evacuate people in an emergency. Impacts would not occur. • Construction and operation of desalination facilities would not involve the construction of housing or an increase in population and would not expose people or structures to wildland fires. Impacts would not occur.

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Resource	Discussion
Hydrology and Water Quality	• Construction of desalination facilities could result in temporary changes to drainages, erosion, or runoff associated with typical construction activities, such as grading or preparation of land. As discussed earlier in this table (Geology and Soils section), for soil disturbance of over 1 acre, wastewater treatment special districts or municipalities would be required to prepare and implement a SWPPP, which would include specific types and sources of storm water pollutants, determine the location and nature of potential impacts, and specify appropriate control measures to eliminate any potentially significant impacts from storm water runoff on receiving waters. In addition, as discussed in this table for Hazards and Hazardous Materials, construction of desalination facilities may involve the limited transport, storage, use, and disposal of hazardous materials, which, if spilled, could have adverse effects on water quality depending on the location and magnitude of the spill. However, storage, handling, and disposal of these materials is regulated by local, county, and state laws, and the quantities of these materials used during construction would be small (e.g., less than 100 gallons) and construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained and, as such, violations of water quality standards are not expected to occur. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts of construction on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction. • It is likely that the desalination facilities would be located in a flood hazard area because wastewater treatment facilities are typically located adjacent to rivers and streams so they can discharge treated effluent into receiving waters. Since the desalination facilities would be located within the existing WWTP footprint (or in close proximity), the addition of the desalination facilities would not substantially add to the existing structures such that flood flows would be impeded or redirected. Additionally, the desalination facilities would not substantially increase the number of people exposed to the risk of flooding because they would not draw people to flood hazard locations or result in the construction of housing in a 100-year flood hazard area. Accordingly, desalination facilities would not expose people to significant loss, injury, or death related to flooding. Construction of desalination facilities would not result in flooding or otherwise cause flooding, including flooding as a result of the failure of a levee or dam because it would not involve construction or operation of levees or dams. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given construction would be temporary and the need to comply with existing building code requirements if building in flood hazard areas were to occur. • Desalination in conjunction with the wastewater treatment process would not increase the volume of treated effluent discharged into receiving waters. This is because the amount of wastewater entering the facilities and

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	leaving the facilities would be the same, and only salts would be removed. Therefore, it is expected that hydrology would not be affected. Desalination would ensure that the treated effluent released to surface waters would be of lower salinity, and support compliance with beneficial use standards, objectives, and WDRs of NPDES permits. Impacts would be less than significant. • Increases in groundwater pumping are not expected to occur under the construction and operation of desalination facilities because wastewater treatment facilities do not pump groundwater. Furthermore, it is anticipated that evaporation ponds would be lined such that salts could not enter the groundwater system. Therefore, construction and operation of desalination facilities would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge. Impacts would be less than significant. • Construction and operation of desalination facilities would primarily be located in areas of relatively flat relief because they would be within the footprint of existing WWTPs or within relatively close proximity, and WWTPs typically are not located on the side of steep slopes. Therefore, these locations would not support mudflows, which typically need very steep slopes and large amounts of precipitation to occur. Furthermore, these areas would not be adjacent to the ocean and would not be affected by tsunamis. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction and operation of desalination facilities are not expected to occur near a lake or reservoir. Impacts would not occur. • There are no other ways in which construction or operation of desalination facilities could result in a substantial degradation to water quality.
Land Use and Planning	• Construction and operation of desalination facilities would not physically divide an established community because they would likely be located in the footprint of the existing WWTP or closely adjacent. Impacts would not occur. • Construction and operation of desalination facilities would likely take place within the footprint of an existing WWTP or within close proximity and therefore would not likely conflict with land use designations or zoning since WWTPs are typically located in areas that are for public facilities. Mountain House CSD WWTP is located in an area zoned for public facilities with a land use designation of "Public". The WWTP for the City of Stockton is in an area zoned as "Port" and with a land use designation of "Industrial", and the City of Tracy's WWTP is located in a "Light Industrial" zone with a land use designation of "Public Facilities". If the desalination facilities were inconsistent with applicable land use plans, policies, or regulations, an amendment or variant from the local jurisdiction approving the discretionary action associated with the desalination facilities would be required to be obtained by the project proponent prior to project approval and construction. If no discretionary action occurred as a result of the construction or operation of the desalination facilities, it is assumed they would not result in a conflict with local land use plans, policies, or regulations. Impacts would be less than significant. • Construction and operation of desalination facilities would likely take place in the Delta and may be considered covered activities under the Delta Plan. Only the lead CEQA state or local agency may determine whether that plan,

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	program, or project is a covered action of the Delta Plan. If an action is covered, consistency with the Delta Plan would be determined. The consistency determination would include implementing mitigation from the Mitigation Monitoring or Reporting Program of the Delta Plan, as appropriate. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to consistency with the Delta Plan. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely impacts could be reduced once mitigation was implemented because once a lead agency determines an action is covered and complies with the Mitigation Monitoring or Reporting Program, consistency would be determined and impacts would be less than significant. • Potential conflicts with habitat conservation plans, natural community conservation plans, or other plans, policies and regulations protecting biological species and resources are evaluated in the Biological Resources section of this table.
Mineral Resources	• The California SMARA requires the State Geologist to classify land into MZs, according to the known or inferred mineral potential of existing land. The primary goal of mineral land classification is to ensure that the mineral potential of land is recognized by local government decision-makers and considered before land-use decisions are made that could preclude mining. Local general plans, specific plans, and other local plans refer to, and use the information produced by the State Geologist, to identify mineral resources because they are specialized evaluations and because the California Geologic Survey is the designated agency to perform these surveys under SMARA. MZs are identified by the State to identify inferred mineral potential of an area. Areas designated MZ-1 have adequate information to determine no significant mineral resources exist, or indicate a very low likelihood; areas designated MZ-2 have adequate information to identify significant mineral deposits or indicate a high likelihood of presence; and areas designated MZ-3 have inadequate information to determine significance of mineral deposits, but contain mineral deposits. Some gravel, sand, and aggregate resources (identified as MZ-1 or MZ-2) are found in close proximity to waterways and the LSJR in San Joaquin County (San Joaquin County 1998, City of Tracy 2005). Most of the city of Stockton is designated as MZ-1, with a small area of MZ-3 (City of Stockton 2007). Other mineral resources, such as gold or peat, have been previously extracted from the county (San Joaquin County 1998). • Construction and operation of desalination facilities would have a very low potential to 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 or result in the loss of availability of a locally designated mineral resource recovery site. This is because the desalination facilities would likely be within existing WWTPs. If the desalination facilities are located within a state or locally designated mineral resource area, construction and operation of the desalination facilities would not permanently remove access to a mineral resource because there would be other locations around the facilities that could provide access to the mineral resource. Impacts would be less than significant.

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Noise	• Construction would potentially take place in Mountain House (San Joaquin County), and the Cities of Tracy and Stockton, since desalination facilities would likely be within or adjacent to existing WWTPs. Each of these jurisdictions have noise requirements in their general plans or zoning ordinances for construction and operation based on land use designations and timing restrictions. Noise requirements are typically based on land uses that are considered more sensitive to ambient noise levels than others due to noise exposure. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, and outdoor recreation or natural areas are typically more sensitive to noise than are commercial or industrial land uses. Therefore, local noise standards are typically more stringent for sensitive land uses in terms of level of noise generated, duration, and frequency than less sensitive uses. Given the wide ranges of land uses throughout San Joaquin County, noise levels can range from louder high density residential and industrial uses or roadway uses to more quiet open space and agricultural areas (San Joaquin County 1992). Frequently, the most common and loud noise generating activity in San Joaquin County affecting the overall permanent ambient noise setting is freeway traffic on I-5, I-205, and SR-4 and along railroads and in heavy industrial areas (e.g., Port of Stockton) or around airports (San Joaquin County 1992). • The City of Tracy and the City of Stockton regulate generation of construction noise by restricting the timing that construction can occur (e.g., operating construction requirement from 10pm to 7pm is prohibited) and the land use or adjacent land uses under which the noise generating activity occurs (City of Stockton n.d., City of Tracy n.d.). San Joaquin County exempts noise sources associated with construction, provided they do not take place before 6am or after 9pm (San Joaquin County n.d.). Construction of desalination facilities could generate temporary noise and as such could expose people to noise levels in excess of standards. It is likely desalination facilities would be constructed in areas with suitable land use designations and zoning for infrastructure (e.g., public facilities or industrial) and would be unlikely to have sensitive receptors (e.g., homes, hospitals, schools) within close proximity. If sensitive receptors were adjacent to construction activities and experienced a temporary increase in ambient noise levels due to construction, and the noise generating activities would be required to follow existing local noise ordinances limiting the timing of construction. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant noise impacts related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, depending on the potential location of possible sensitive receptors and the duration of the particular noise generating activities over the course of construction. • Construction activities that typical result in ground-borne vibrations or ground-borne noise are activities such as pile driving, where the ground is repeatedly struck and vibrations or noise can be generated. Pile driving may be needed to construct desalination facilities. Some local agencies (e.g., San Joaquin County) exempt vibrations associated with construction provided it is occurring within certain hours (San Joaquin County n.d). However, if pile driving is used, and there are sensitive receptors to noise (e.g., homes, hospitals, schools) within close proximity, Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant noise impacts related to construction.

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	Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • Desalination facilities would generate constant noise during operation. Existing WWTPs already generate intermittent noise (e.g., from alarm bells, pumps, and generators). It is anticipated there would be a low probability that sensitive receptors (e.g., homes, hospitals, schools) would be located within close proximity to experience the operating noise generated because it is anticipated that the WWTPs would be located in areas with similar land uses (e.g., other public facilities or CII facilities). Additionally, most of the wastewater treatment facilities are enclosed within buildings or behind walls that can reduce the operating noise. As such, a permanent increase in ambient noise under operating conditions is not expected. Impacts would be less than significant. • Assuming construction and operation of desalination facilities would be located in San Joaquin County, there are six public access airports within the county (SJCOG n.d.[a]). The Stockton Metropolitan Airport, San Joaquin County Airport have approved Airport Land Use Compatibility Plans, which identifies noise contours and where noise exposures may take place as a result of aircraft flight patterns consistent with Federal Aviation Administration requirements (SJCOG n.d.[a]). Other airports, such as the City of Tracy, have either airport master plans or other planning documents that outline noise contours consistent with FAA requirements (City of Tracy 1998). While it is unknown where construction or operation of salinity source controls might occur, the construction and operation of desalination facilities would not bring new or additional people within close proximity to an airport or private airstrip or expose people to noise generated by air traffic on a regular basis. This is because desalination facilities are expected to be automated and would not result in an increased permanent work force cited within proximity to an airport or private airstrip. Nor would desalination facilities result in a population increase that would be exposed to airport noise. Impacts would not occur.
Population and Housing	• The construction and operation of desalination facilities would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property or population growth in an area. Further, it would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people to the southern Delta. Finally, they would not be constructed and operated increase capacity to serve new users. Impacts would not occur. • The construction and operation of desalination facilities would not displace substantial numbers of people or housing, or necessitate the construction of replacement housing elsewhere because the facilities would be located in the existing footprint of WWTPs or closely adjacent in industrial or public land use type areas. As such, it is not expected people would reside in these areas. Impacts would not occur.
Public Services	• The need for additional public services (e.g., fire protection, police protection, parks, libraries, schools) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, the construction and operation of desalination facilities would not involve an increase in population or housing. In addition, these actions do not include proposals for new housing, and would not generate students or increase demands for school services or facilities. Impacts would not occur.

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Recreation	• Construction of desalination facilities would likely occur within the footprint or immediately adjacent to existing wastewater treatment facilities. These facilities are typically located adjacent to receiving waters and in CII or urban areas to provide wastewater service to urban, suburban, and CII users of the wastewater system. So it is unlikely recreational facilities would be located in areas where wastewater treatment facilities currently exist. However, if recreational facilities were located within very close proximity, recreational facilities could be affected by noise levels or other temporary construction activities. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to construction. • An increase in use of existing recreational facilities is typically associated with a substantial increase in the population to accommodate new recreationists. Construction or operation of desalination facilities would not result in a substantial increase in population because it would not result in the development of housing or other population-inducing development (e.g., job centers). The purpose of the construction and operation of desalination facilities would be to comply with water quality objectives. Construction and operation of these facilities would satisfy existing demand, not meet new projected demand for wastewater treatment or water supply (Section 16.4.1, *New Source Water Supplies*). Impacts would be less than significant. • Construction and operation of desalination facilities would not include recreational facilities or require the construction or expansion of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Assuming construction and operation of desalination facilities would occur in San Joaquin County, because that is where the cities of Tracy and Stockton are located, as well as Mountain House CSD, the project(s) would be subject to the SJCOG Regional Congestion Management Program (SJCOG 2016b). As described in the Regional Congestion Management Program, projects are subject to a tiered review process, unless exempt from CEQA or unless considered as part of a previously approved project (SJCOG 2016b). Projects that trigger 125 or more vehicle trips during weekday AM or PM peak-hours or 500 or more total vehicle daily trips on any day of the week would be required to perform a quantitative regional traffic analysis. The Regional Congestion Management Program provides for mitigation to reduce effects if trips occur at those levels and these are included in Table 16-38. Trips that are exempted from the RCMP standards, and are removed from calculations of LOS standards under the RCMP include trips resulting from construction (SJCOG 2013). A total of 103 intersections have been designated as part of SJCOG Regional Congestion Management Program (SJCOG n.d.[b]). Designation of RCMP intersections allows for congestion monitoring and appropriately focuses attention at locations where operational constraints are typically experienced on arterial roadways (SJCOG n.d.[b]). Of approximately 1,500 congestion management roadway segment miles, 245 operate at a LOS D, with approximately half of these in the county, and the remaining in the cities of Stockton, Lathrop, and Manteca and Tracy (Table 4 in Dowling Associates 2010). There are approximately 92 miles of CMP lanes operating at LOS E or F, with more than half located in county areas, and 16 percent in Stockton (Table 4 in Dowling Associates 2010). Operation of desalination facilities would generate additional truck trips to dispose of the waste brine generated by the desalination process. The number of truck trips depends on the volume and salt concentration of the wastewater treated; therefore, the number of trucks that would be required is

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	unknown, as is the roads they would travel or their ultimate destination (i.e., landfill or other facility). Trucks would likely not be required every day because the evaporation ponds would first dewater the brine solution. As discussed above, if a project exceeds the criteria established by the Regional Congestion Management Program on roads identified in that program (e.g., 125 or more vehicle trips during weekday AM or PM peak-hours or 500 or more total vehicle daily trips on any day of the week), mitigation would be applied through that program. The criteria is particularly high and is generally applicable to development such as office parks, retail, or housing developments that would generate substantial numbers of trips. However, Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant transportation and traffic impacts related to operations, if indeed disposal resulted in exceedances of the Regional Congestion Management criteria. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented and consistency with the Regional Congestion Management Plan was determined. • Construction and operation of desalination facilities could result in some additional trips. It is unknown the number of construction and operational trips that might be needed and the location of these tips, but it is anticipated that construction would be relatively limited in duration. Typically, construction activities are exempt from local road trip thresholds because construction is temporary. However, depending on the quantity of trips and the duration, the temporary increased traffic during construction or the increase in operational trips associated with brine disposal could exceed local or regional road trip thresholds (either vehicle miles traveled or level of service, as discussed in Table 16-25, changes to the methodology and criteria for evaluations are occurring). Projects would be required to evaluate trip generating activities through the respect jurisdiction traffic impact analysis guidelines depending on the location and number of trips generated (City of Stockton n.d.). Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts on transportation and traffic related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction. • Construction of desalination facilities is not expected to result in hazards to, or on, roadways because they would primarily be constructed within existing footprints of facilities or in close proximity. Similarly, construction activities are not expected to conflict with public transit facilities, public bicycle facilities, or pedestrian facilities (e.g., sidewalks). The development of project-specific construction traffic management plans, as identified in Table 16-38 would reduce potentially significant impacts if hazards on the roadway were temporarily created during construction due to construction related activities. Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts of transportation and traffic related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable,

Potential Environmental Effects of Wastewater Treatment Plant Desalination	
Resource	Discussion
	consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant, given the low likelihood of occurrence and because construction impacts would be temporary. • Similar to the discussion in Hazards and Hazardous Materials, it is not expected that construction of desalination facilities would result in inadequate emergency access, given the location of the construction work would primarily within the existing footprint of existing WWTPs or in close proximity to them. Similarly, construction activities are not expected to conflict with public transit facilities, public bicycle facilities, or pedestrian facilities (e.g., sidewalks) because they would be constructed within existing footprints of facilities. As such, there is a low likelihood of interfering with emergency access, public transit facilities, public bicycle facilities, or pedestrian facilities. However, Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts of transportation and traffic related to construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. It is likely that impacts could be mitigated to less than significant, given the low likelihood of occurrence and because construction impacts would be temporary. • Construction and operation of desalination facilities would not result in an increase demand for air traffic or the need for airports because this type of project would not result in an increase in population and is not related to air traffic or airports. Impacts would not occur. • Operation of desalination facilities is not expected to result in a permanent substantial increase in hazards due to a design feature or incompatible use, permanent inadequacy of emergency access, or a permanent change that would decrease the performance or safety of public transit facilities, public biking facilities, or public pedestrian facilities because it is anticipated that these would be located within existing facility footprints or within close proximity. Trips associated with brine disposal would be done on existing roads and as such, would not result in permanent substantial hazards or conflicts with emergency access and public transit, bicycle, or pedestrian facilities. Impacts would be less than significant.

Potential Environmental Effects of Wastewater Treatment Plant Desalination

Resource	Discussion
Utilities and Service Systems	• The construction and operation of desalination facilities would not be expected to exceed wastewater treatment requirements of the Central Valley Water Board because, by removing salts, it would actually improve the treated effluent quality. Additionally, it would not result in a determination by the wastewater treatment provider that it has inadequate capacity to meet the service area's demand because the desalination facilities would not increase the actual volume of wastewater generated in the service area. Impacts would be less than significant. • The construction and operation of desalination facilities involve construction at wastewater treatment facilities. Environmental effects associated with implementation of desalination facilities are discussed throughout this table (Aesthetics through Transportation and Traffic). Table 16-38 lists potential mitigation measures that lead agencies (e.g., wastewater treatment special districts or municipalities) can and should implement to reduce potentially significant impacts related to construction and operation of desalination facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • The construction and operation of desalination facilities would involve processing treated wastewater to remove additional salts before discharge into receiving waters. It is not anticipated that the demand for water would increase because desalination would be treating wastewater already generated by the service area. Further, it is not expected that this process would require new entitlements for water because it is at the end of the wastewater treatment process. As such, impacts would be less than significant. • The construction and operation of desalination facilities would not need the construction of additional storm water drains because desalination facilities would likely be built within the footprints of existing wastewater treatment facilities, which currently have impervious surfaces that generate runoff; therefore, it is expected that existing storm water infrastructure would be used. Impacts would be less than significant. • The construction and operation of desalination facilities could generate solid waste in the form of brine. This type of solid waste is not considered hazardous, and the disposal of brine would follow all regulations and guidelines of solid waste in Class I/II landfills (non-hazardous waste landfills). Impacts would be less than significant.

16.4.4 Agricultural Return Flow Salinity Control

Real-time management of agricultural return flow, such as changing the timing of the release of agricultural discharge to receiving waters, is a reasonably foreseeable method of compliance for agricultural water users that must comply with numeric salinity objectives. This method may reduce salinity entering the southern Delta.

Cost Evaluation

Agricultural dischargers could monitor receiving water's assimilative capacity on a real-time basis, and time discharges to coincide with periods of high flow (i.e., more assimilative capacity). This potential method of compliance with proposed salinity standards would require dischargers to establish a network of monitoring stations and a discharge schedule. When there is no assimilative capacity, irrigators would either recycle water that would otherwise be discharged or would discharge to a detention pond until discharges to the receiving waters are permitted. This method of compliance could be integrated with other BMPs, such as water recycling, to reduce salinity entering the plan area.

Temporary discharge basin sizing was estimated in the Central Valley Water Board's *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the Lower San Joaquin River, July 2004* (Basin Plan Amendments 2004). The Basin Plan Amendments analyzed a project area that included 1.4 million acres of irrigated agricultural land. The Central Valley Water Board estimated that for this irrigated area, 50,000 AF of water may need to be stored annually when there is no assimilative capacity in the river (Central Valley Water Board 2004). For this plan area, it is assumed that there are roughly 137,000 acres of irrigated agricultural land (roughly the size of the South Delta Water Agency [SDWA]). Using the relationship of detention volume to agricultural land developed in the Basin Plan Amendments 2004 and this plan area's assumed irrigated land acreage, it is estimated that this method of compliance would need 4.9 TAF of detention basin storage. If each detention basin is 10 ft deep, approximately 490 acres could be used for this potential method of compliance.

Enhanced monitoring equipment, modeling, and forecasting capability would be needed to forecast assimilative capacity in the LSJR. Control gates and conveyance systems would also be needed to divert drainage from river discharge to permanent treatment structures when assimilative capacity is not available. Personnel would be needed to manage real-time systems and coordinate discharges from multiple subareas in the LSJR Watershed (Central Valley Water Board 2004). It is assumed that there would be multiple subareas within the plan area that would manage discharges in real time, creating a real-time monitoring system. Table 16-31, *Costs and Components of a Real-Time Management System*, estimates the components needed and costs associated with constructing a real-time management system.

Table 16-31. Costs and Components of a Real-Time Management System

Construction	Cost
Computer and Software	$ 5,000
Control Gates (10)	$ 100,000
Floats, Weirs, and EC Monitoring Equipment	$ 50,000
Installation of Monitoring Components	$ 75,000
Conveyance to River	$ 100,000
Subtotal	$ 330,000
Contingency (30%)	$ 99,000
Total Construction Cost	$ 429,000
Operations and Maintenance	
Operations and Maintenance (Including Coordinating Discharges)	$100,000 per year

Source: Central Valley Water Board 2004.
EC = electrical conductivity (salinity).
EC is electrical conductivity, which is generally expressed in deciSiemens per meter (dS/m) in this document. Measurement of EC is a widely accepted indirect method to determine the salinity of water, which is the concentration of dissolved salts (often expressed in parts per thousand or parts per million).

The costs in Table 16-31, *Costs and Components of a Real-Time Management System,* were adapted from the Central Valley Water Board's Basin Plan Amendments 2004. Costs for a real-time management system in the plan area were assumed to be the same as those in Table 16-31, but the contingency was increased to 30 percent of construction costs based on best professional judgment. It is assumed that 11 systems would need to be constructed to effectively cover the major water users in the plan area (Central Valley Water Board 2004). The total estimated construction cost for 11 systems is $4,719,000, with an operations and maintenance budget of $1,100,000 per year.

Environmental Evaluation

Summary of Potential Action

Real-time management is a reasonable foreseeable salinity control measure that would include shifting the agricultural discharge timing to allow agricultural return flows released from agricultural lands to occur during times of high assimilative capacity for the receiving waters. This would require agricultural dischargers to hold or contain their discharge in detention ponds and release it at different times of the year. The agricultural dischargers could hold salt in the soil column for a period of time and then leach it by applying water. The leached water (e.g., agricultural return flow) could be held in a detention pond or released directly into the receiving water, depending on the assimilative capacity of the receiving water at the time of leaching. While assimilative capacity can increase in receiving waters during higher flows, the relationship between assimilative capacity and flow is not always linear. The construction of detention ponds on the agricultural discharger property would likely be contained in close proximity to the discharge point and the generation source (e.g., fields and orchards in the southern Delta). The location, timing of construction, and details of operation for the detention ponds are unknown. However, detention ponds for these types of purposes would likely be less than 0.5 acre and take a few months to construct. The volume of agricultural discharge would essentially remain the same, and discharges would be expected to occur from current outfall locations along the receiving waters.

Potential Environmental Effects

The most likely potential effect of a change in discharge timing and the use of detention ponds would be the repurposing of lands currently used for agriculture. Discharge timing or the use of detention ponds would not result in the loss of agricultural land (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) but only a reuse of that land. While there may be economic effects for individuals, the amount of land temporarily taken out of production would be small compared to the amount of agricultural land in the southern Delta (primarily located in San Joaquin County). There is some potential that natural and cultural resources (significant historical, archaeological, or paleontological resources) adjacent to existing agricultural lands could be affected. However, construction and operation of detention pond facilities on farmland would be subject to county code and potential county permit requirements (e.g., agricultural excavation permit), which could minimize potential construction- and operation-related effects on natural and cultural resources. San Joaquin County, as part of the county permitting process for agricultural excavation, determines if a proposed project would result adverse environmental effects. If the County determines that there is no potential for adverse effect(s) from a proposed project, a permit is issued. However, if it is determined that there is potential for a project to result in adverse effects, the County would require environmental review under CEQA to issue the permit.

CEQA allows categorical exemptions for classes of projects which have been determined not to have a significant effect on the environment. (Pub. Res. Code, § 21084.) Specifically, modification or demolition of existing facilities can be exempt from CEQA under a Class 1 categorical exemption. The Class 1 categorical exemption consists of the minor alteration of existing public or private structures, facilities, topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" listed in the exemption are not intended to be all-inclusive of the types of projects which might fall within the CEQA exemption. The key to the consideration of this class of categorical exemptions is whether the project involves negligible or no expansion of an existing use. As construction and operation of detention ponds on agricultural land would not expand an existing use, the detention ponds may be eligible for a Class 1 categorical exemption depending on the project-specific circumstances. Table 16-32, *Potential Environmental Effects of Agricultural Return Flow Salinity Controls*, summarizes the potential environmental effects associated with agricultural return flow salinity controls. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, at the end of this chapter lists potential mitigation measures associated with the construction or operation of the methods of compliance and is referenced in Table 16-32 where appropriate.

Table 16-32. Potential Environmental Effects of Agricultural Return Flow Salinity Controls

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
Aesthetics	• The detention ponds that may store agricultural discharge would be on private agricultural property in the southern Delta. There are relatively few sensitive receptors to views in the southern Delta, but receptors may include boaters on southern Delta waterways. Because the detention ponds would be relatively small and below grade, are not expected to involve large buildings or facilities, and would not likely require permanent lighting, the potential to substantially adversely affect a scenic vista or substantially degrade the existing visual character or quality of the sites where they are to be installed would be low. The detention ponds may be fenced for security purposes, and this fencing would serve as a screen from viewers. The detention ponds would not substantially detract from the existing view of agricultural activities and facilities in the southern Delta. Further, detention ponds would not substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic building within view of the two state-designated scenic highways in San Joaquin County, I-5 and I-580, because the ponds would be installed and operated on existing actively farmed land where these resources are not likely to occur or can be easily avoided. Impacts would be less than significant.
Agriculture and Forestry Resources	• The detention ponds would likely be constructed and operated within existing agricultural land (including Prime Farmland, Unique Farmland, or Farmland of Statewide Importance). They would be relatively small in size when compared to the overall amount of agricultural land in production in the southern Delta. Therefore, they would have a low potential to convert large amounts of agricultural land. Furthermore, using agricultural land for agricultural ponds would be considered an agricultural use and would be supporting existing agricultural lands by reducing salinity of the discharge used for irrigation and improving the water quality of the southern Delta. Because of this, detention ponds would likely be included within agricultural land use designations and zoning. If the construction and operation of detention ponds were inconsistent with local land use plans, policies and regulations, and required a discretionary action by a local government agency, the project would obtain an amendment or variant from the local jurisdiction prior to operation. The lead agency with permitting approval over the ponds can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects on agricultural resources. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the small area of disturbance and the purpose of detention ponds to support agricultural uses. • Construction and operation of the detention ponds would not be located on forest land or timberland because they would likely be constructed and operated within existing agricultural lands. Impacts would not occur.

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
Air Quality	• Construction of detention ponds would likely result in emissions associated with construction equipment and construction vehicles, as well as fugitive dust emissions from ground disturbance. The quantity, duration, and the intensity of construction activity have an effect on the amount of construction emissions and related pollutant concentrations occurring at any one time. As such, more emissions are typically generated by relatively large amounts of relatively intensive construction. SJVAPCD's published guidelines, *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002) do not require the quantification of construction emissions. Rather, the guidelines require implementation of effective and comprehensive feasible control measures to reduce PM10 emissions (SJVAPCD 2002). SJVAPCD considers PM10 emissions to be the greatest pollutant of concern when assessing construction-related air quality impacts and has determined that compliance with its Regulation VIII, including implementation of all feasible control measures specified in its *Guide for Assessing Air Quality Impacts* (SJVAPCD 2002), constitutes sufficient mitigation to reduce construction-related PM10 emissions to less-than-significant levels and minimize adverse air quality effects. All construction projects must abide by Regulation VIII. Since the publication of SJVAPCD's guidance manual, the district has revised some of the rules comprising Regulation VIII. Guidance from SJVAPCD staff indicates that implementation of a Dust Control Plan would satisfy all of the requirements of SJVAPCD Regulation VIII (Siong pers. comm.). However, if construction is conducted over a longer time period, emissions could be "diluted" relative to construction that would occur over a shorter time period because of a less intensive buildout schedule (i.e., total daily or yearly emissions would be averaged over a longer time interval). Since construction of detention ponds does not require lengthy construction activities, the potential for significant environmental effects is minimal. Further, construction emissions generated would need to comply with the SJVAPCD regulations and established thresholds. Impacts would be less than significant. • Operation of detention ponds would not release air quality emissions because changing the timing of the release of discharge into receiving waters would not generate air quality emissions. As such, operations would not have the potential to emit criteria pollutants, result in a net increase of criteria pollutants, conflict with an applicable air quality plan, or contribute to objectionable odors. Impacts would not occur. • SJVAPCD has determined some common types of facilities that have been known to produce odors in the SJVAB. Some of these facilities are wastewater treatment facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, painting/coating operations, food processing facilities, feed lots/dairies, and rendering plants (SJVAPCD 2002). Construction and operation of detention ponds would not involve the type of facility identified by, for example, SJVAPCD, as a known odor source. Consequently, it is not expected detention ponds would create objectionable odors affecting a substantial number of people. Impacts would be less than significant.

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
Biological Resources	• Construction of detention ponds would result in soil disturbance and alteration of drainage in areas of active agricultural management. There is generally a low potential for candidate, sensitive, or special-status species, or habitat (including federally protected wetlands, riparian habitat, or other sensitive natural communities) in these areas because of ongoing farming activities and the changing landscape. Similarly, because detention ponds would be located on existing, actively farmed agricultural land, it is unlikely that construction of detention ponds would substantially interfere with the movement of any native resident or migratory fish or wildlife species or associated migratory corridors, or impede the use of native wildlife nursery sites. The lead agency with permitting approval over the ponds can and should implement the mitigation measures listed in Table 16-38 to reduce potentially significant environmental effects on biological resources, if it is determined that sensitive species or habitat is present. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because of the small area of disturbance and the low likelihood of special status species to exist. • Because detention ponds would be located on existing, actively farmed agricultural land, it is unlikely that construction and operation of the ponds would conflict with local policies and ordinances protecting biological resources, or conflict with an adopted natural community conservation plan or habitat conservation plan. Construction and operation of detention ponds would occur within the SJMSCP Plan Area; however, agricultural activities located on agriculturally zoned land are not covered (SJCOG 2016a). As discussed above, the lead agency with permitting approval over the ponds can and should implement the mitigation measures listed in Table 16-38 to reduce potentially significant environmental effects on biological resources, if it is determined that sensitive species or habitat is present. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because of the small area of disturbance and the low likelihood of special status species to exist. • Operation of detention ponds would be expected to discharge agricultural flow into receiving waters when salinity levels in the river are below the designated salinity objective and with high assimilative capacity (i.e., ability for the receiving waters to increase salt concentration without exceeding salinity objectives). Salinity concentration in the receiving waters would not result in significant impacts on fish and wildlife. Additionally, these fish and wildlife are adapted to tidally influenced environments which exhibit a wide range of salinity levels. Impacts would be less than significant.
Cultural Resources	• Construction of detention ponds would result in ground disturbance in existing managed and active agricultural lands in the southern Delta. It is likely managed and active agricultural lands have been disturbed before; however, cultural resources (significant historical, archeological, or paleontological resources) could exist depending on the location of disturbance and depth of disturbance. The lead agency with permitting approval over the ponds can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant environmental effects associated with construction of detention ponds should unknown significant cultural resources be discovered during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
	impacts could be mitigated to less than significant once mitigation measures were implemented because of the small area of disturbance and the low likelihood of cultural resources to exist. • Construction of detention ponds would result in ground-disturbing activities at depths greater than 6 ft. It is considered highly unlikely human remains, typically buried at depths of 6 ft, would be disturbed during construction, because these lands have been in agricultural production and have been regularly disturbed. In the event human remains are uncovered during construction, compliance with the State Health and Safety Code would be required. As specified by Section 7050.5 of the Health and Safety Code, and described in Table 16-38, no further disturbance shall occur until the county coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If such a discovery occurs, excavation or construction shall halt in the area of the discovery, the area shall be protected, and consultation and treatment shall occur as prescribed by law. If the coroner recognizes the remains to be Native American, he or she shall contact the NAHC, who shall appoint the Most Likely Descendent. Additionally, if the human remains are determined to be Native American, a plan shall be developed regarding the treatment of human remains and associated burial objects, and the plan shall be implemented under the direction of the Most Likely Descendent. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because of the small area of disturbance and the low likelihood of human remains to exist. • Operation of detention ponds would result in a change in timing of release of water or a change in the volume of agricultural return flow released and would not involve ground-disturbing activities. Therefore, it is highly unlikely any known or unknown cultural resources would be affected because of the lack of ground-disturbing activities during operation. Impacts would be less than significant.
Geology and Soils	• The new detention ponds could occur in areas known to have an earthquake fault, experience strong seismic ground shaking, experience seismic-related ground failure, experience landslides, or be located on a geologic unit or soil that is unstable or be located on expansive soil. However, construction and operation of a detention pond would not result in an impact on, or be affected by: Alquist-Priolo faults, strong seismic shaking, seismic-related ground failure, unstable geologic units, expansive soils or landslides. Furthermore, storing agricultural return flow in a detention pond would not bring people to the risk of earthquakes or geologic hazards, meaning construction or operation of detention ponds would not substantially increase the number of people exposed to the risk of earthquakes or geologic hazards because it would not draw people to earthquake areas or hazard locations not already frequented. Impacts would not occur. • Construction of detention ponds would result in ground-disturbing activities that could result in soil erosion or loss of topsoil; however, ground-disturbing activities would be limited in duration and geography. The lead agency with permitting approval over the ponds can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant impacts related to soil erosion and storm water runoff. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented because of the small area of disturbance and the limited duration of disturbance.

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
	• Operation of detention ponds would involve the release of agricultural return flow into receiving waters. It is expected the releases would occur at existing discharge points and the releases would not result in erosion or topsoil loss. Impacts would be less than significant. • Construction and operation of detention ponds would not involve constructing or operating septic tanks and, therefore, they would not be affected. Impacts would not occur.
Greenhouse Gas Emissions	• Similar to the discussion in Table 16-7, construction of detention ponds would likely result in increased use of electricity and fuels and, therefore, an increase in GHG emissions that could exceed SJVAPCD's ZEL and result in a potentially significant impact. The lead agency with permitting approval over the ponds can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant impacts related to construction and operation activities and GHG emissions. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • In September 2006, the California State Legislature adopted AB 32. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, the ARB is required to take the following actions. ○ Adopt early action measures to reduce GHGs. ○ Establish a statewide GHG emissions cap for 2020 based on 1990 emissions. ○ Adopt mandatory report rules for significant GHG sources. ○ Adopt a scoping plan indicating how emission reductions would be achieved through regulations, market mechanisms, and other actions. ○ Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs AB 32 establishes a statewide GHG reduction target from which most local GHG thresholds are based and substantial evidence is taken for these established GHG thresholds. Therefore, if GHG emissions are in excess of a relevant threshold, then it would conflict with the reduction targets established by AB 32 and would be inconsistent with the AB 32 Scoping Plan. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts from GHG emissions associated with construction and operation of the facilities. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. • The release of agricultural return flow into receiving waters from detention ponds does not have the potential to emit GHGs. Impacts would not occur.

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
Hazards and Hazardous Materials	• Construction of detention ponds would be short term and may involve the limited transport, storage, use, and disposal of hazardous materials such as fuel and lubricating grease for motorized heavy equipment. Some examples of typical hazardous materials handling are fueling and servicing construction equipment on the site, and transporting fuels, lubricating fluids, solvents, and bonding adhesives. These types of materials are not acutely hazardous, and storage, handling, and disposal of these materials are regulated by local, county, and state laws. Furthermore, the quantities of these materials used during construction would be small (e.g., less than 100 gallons) because construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained. The lead agency with permitting approval over the ponds can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant impacts associated with hazardous materials during construction of detention ponds. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented, given the temporary nature of construction, the short duration of construction, and the relatively small quantities of hazards handled. • There are eight sites within San Joaquin County that are identified on the Hazardous Waste and Substance Site List (Cortese Site list) as sites being hazardous materials sites under Government Code Section 65962 (CalEPA 2016). Construction and operation of detention ponds are not likely to be located on these eight sites or interfere with these sites because the construction and operation of detention ponds would be in agricultural areas and would not involve activities at the sites on this list (e.g., Lawrence Livermore National Lab, McCormick and Baxter Creosoting Company). CalEPA identifies leaking underground storage tank sites, sites that have received CDOs or CAOs, and hazardous waste facility sites where DTSC has taken corrective Action (CalEPA 2016). There are no hazardous waste facility sites where DTSC has taken corrective action in San Joaquin County (CalEPA 2016). As such, construction of detention ponds would not affect them. There are approximately 244 leaking underground storage cases in San Joaquin County designated as open (CalEPA 2016). Sixteen facilities in San Joaquin County have received CDOs or CAOs and have active cases, but may not be necessarily related to hazardous waste (CalEPA 2016). The location of construction of detention ponds is unknown, but could occur on one of these sites as some of the sites are agriculturally related land uses. During excavation or soil disturbance potentially contaminated soil could be encountered. As such, the lead agency with permitting approval over the ponds can and should implement potential mitigation measures in Table 16-38 to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed. • Assuming construction of detention ponds would be located in San Joaquin County, there are six public access airports within the county (SJCOG n.d.[a]). While it is unknown where construction of detention ponds might occur, they would occur within agricultural areas. Furthermore, they would not result in the construction of structures that would result in a safety conflict with airport land use plans. As such, impacts would be less than significant. San Joaquin County has 14 school districts and more than 200 schools (San Joaquin County Office of Education n.d.). The location of

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
	construction of detention ponds unknown. They are likely to occur in primarily agricultural lands and the likelihood of a school being within one-quarter mile (0.25 miles) is low. However, hazardous materials may be used during construction (e.g., fuels, lubricants, diesel). While it is expected materials would be handled, used, and stored properly in accordance with local, state and federal regulation, and contained in the event of an accidental release, if an accidental release occurred, it could occur within proximity to a school. Additionally, depending on the location of construction, remediation may be needed to address soil contamination during excavation activities. As such, if a school existed within close proximity to a construction site, those mitigation measures identified table 16-38 applied to project-specific construction needs would reduce potentially significant impacts during construction. The lead agency with permitting approval over the ponds can and should implement potential mitigation measures identified in Table 16-38 to reduce potentially significant impacts associated with hazardous materials during construction. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once implemented because hazardous materials contamination could be remediated and removed and because the measures would ensure the appropriate handling of hazardous materials during construction. • Construction and operation of detention ponds would not physically interfere with an adopted emergency response plans or emergency evacuation plans since they would be located on existing agricultural lands and therefore would not prohibit the mobility of people to escape potential emergencies. Furthermore, construction and operation does not involve an increase in population that would necessitate reconsideration of how to evacuate people in an emergency. Impacts would not occur. • Operation of detention ponds would result in a change in timing or volume of agricultural return flow discharged into receiving waters. The activity of discharging agricultural return flow would not result in the use, transport, or disposal of hazardous materials, nor would it interfere with an airport or result in an increased risk of wildland fire exposure. Impacts would not occur.
Hydrology and Water Quality	• Construction of detention ponds would entail ground-disturbing activities, such as grading, that could result in temporary changes to existing drainages (including any storm water drainage), erosion, or runoff. However, ground-disturbing activities would be limited in duration and geography (i.e., detention ponds would generally be constructed on approximately 0.5 acre of land or less). Further, it is assumed that as part of adhering to city and/or county grading/excavation permits or other applicable permit requirements, detention pond construction would be such that changes to drainage and erosion or runoff are minimized, and existing drainage patterns would not be substantially altered such that onsite flooding would occur. In addition, as discussed in this table for Hazards and Hazardous Materials, construction of detention ponds may involve the limited transport, storage, use, and disposal of hazardous materials, which, if spilled, could have adverse effects on water quality depending on the location and magnitude of the spill. However, storage, handling, and disposal of these materials is regulated by local, county, and state laws, and the quantities of these materials used during construction would be small (e.g., less than 100 gallons) and construction would be limited in duration. Therefore, if a spill occurred, it could be readily and easily contained and, as such, violations of water quality standards are not expected to occur. The lead agency with permitting approval over the ponds can and should implement potential mitigation measures identified in Table 16-38 to reduce

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
	potentially significant impacts on hydrology and water quality. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction, the short duration of construction, and the relatively small area of ground disturbance. • Operation of a detention pond is expected to change the seasonal fluctuations of agricultural return flow by changing the timing of the discharge from agricultural lands to receiving waters. Although the discharge could have a different salinity concentration than the discharge previously released, the change in timing of the release would allow the receiving water to have higher assimilative capacity. Thus the discharge would not be considered polluted runoff. The same volume of discharge would be released under baseline conditions when compared to being released from detention ponds. It is likely that the discharges would occur during higher flows or normal flows when there may be more assimilative capacity. Water quality standards would be maintained because the discharge would have to comply with the Central Valley Water Board's water quality requirements. Impacts would be less than significant. • Detention ponds could be located within a 100-year flood hazard area; however, these structures are of low relief, and/or below ground surface, and would not impede or redirect flood flows. Additionally, the detention ponds would not substantially increase the number of people exposed to the risk of flooding because they would not draw people to flood hazard locations or result in the construction of housing in a 100-year flood hazard area. Accordingly, detention ponds would not expose people to significant loss, injury, or death related to flooding. Impacts would be less than significant. • Detention ponds would be constructed in areas of low land relief. Therefore, these locations would not support mudflows, which typically need very steep slopes and large amounts of precipitation to occur. Furthermore, these areas would not be adjacent to the ocean and would not be affected by tsunamis. Impacts would be less than significant. • A seiche is an oscillation of the surface of a landlocked body of water that varies in period from a few minutes to several hours that is caused by ground movement generated by meteorological effects (e.g., wind) or earthquakes. Construction and operation of detention ponds are not expected to occur near a lake or reservoir. Impacts would not occur. • Construction and operation of the detention ponds would not substantially deplete groundwater supplies because groundwater would not be pumped. In addition, construction and operation of the detention ponds would not interfere with groundwater recharge because no impervious surfaces would be constructed. Impacts would not occur. • There are no other ways in which construction or operation of detention ponds could result in a substantial degradation to water quality.

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
Land Use and Planning	• Construction and operation of detention ponds is not expected to physically divide an established community because the ponds would be developed on existing agricultural land, support existing agricultural practices, and because the discharge locations already exist on the agricultural lands. Detention ponds would be considered agricultural infrastructure and likely included within agricultural land use designations and zoning. If the construction and operation of detention ponds were inconsistent with local land use plans, policies and regulations, and required a discretionary action by a local government agency, the project would obtain an amendment or variant from the local jurisdiction prior to operation. Impacts would be less than significant. • Construction and operation of detention ponds would likely take place in the Delta and may be considered covered activities under the Delta Plan. Only the lead CEQA state or local agency may determine whether that plan, program, or project is a covered action of the Delta Plan. If an action is covered, consistency with the Delta Plan would be determined. The consistency determination would include implementing mitigation from the Mitigation Monitoring or Reporting Program of the Delta Plan, as appropriate. Table 16-38 lists potential mitigation measures that lead agencies (e.g., municipalities or municipal water purveyors) can and should implement to reduce potentially significant impacts related to consistency with the Delta Plan. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely impacts could be reduced once mitigation was implemented because once a lead agency determines an action is covered and complies with the Mitigation Monitoring or Reporting Program, consistency would be determined and impacts would be less than significant. • Potential conflicts with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations protecting biological species and resources are evaluated in the Biological Reso urces section of this table.
Mineral Resources	• The California SMARA requires the State Geologist to classify land into MZs, according to the known or inferred mineral potential of existing land. The primary goal of mineral land classification is to ensure that the mineral potential of land is recognized by local government decision-makers and considered before land-use decisions are made that could preclude mining. Local general plans, specific plans, and other local plans refer to, and use the information produced by the State Geologist, to identify mineral resources because they are specialized evaluations and because the California geologic survey is the designated agency to perform these surveys under SMARA. Some gravel, sand, and aggregate resources are found in close proximity to waterways and the LSJR in San Joaquin County (San Joaquin County 1998, City of Tracy 2005, City of Manteca 2003, City of Lathrop 2004). Most of the City of Stockton is designated as either not having mineral resources or a low likelihood of mineral resources (City of Stockton 2007). Other mineral resources, such as gold or peat, have been previously extracted from the county (San Joaquin County 1998). • Construction and operation of detention ponds would have a very low potential to 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 or result in the loss of availability of a locally designated mineral resource recovery site. This is because these uses would be located within existing agricultural lands that are not used for mineral extraction. Impacts would not occur.

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
Noise	• Construction and operation of the detention ponds would occur in agricultural areas where there are limited sensitive receptors (e.g., schools, hospitals). Agricultural activities, which generate noise, are part of the existing noise conditions in actively farmed agricultural lands. Construction of detention ponds would be temporary and limited to ground-disturbing activities, and would be required to comply with existing local noise ordinances limiting the timing of construction (e.g., generally Mondays–Fridays, 7am–6pm). The lead agency with permitting approval over the ponds can and should implement potential mitigation measures identified in Table 16-38 or comparable to reduce potentially significant impacts associated with noise during construction of detention ponds. Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts could be mitigated to less than significant once mitigation measures were implemented given the temporary nature of construction, the short duration of construction, and the relatively small area of ground disturbance. • Construction activities that typical result in ground-borne vibrations or ground-borne noise are activities such as pile driving, where the ground is repeatedly struck and vibrations or noise can be generated. Given nature of construction to build a detention pond (e.g., digging and excavating) it is highly likely that pile driving would not occur or be needed. Impacts would be less than significant • Once operational, detention ponds would not produce noise as they would discharge agricultural return flows into receiving waters, which is not a noise-producing activity. As such, a permanent increase in ambient noise under operating conditions is not expected. Impacts would not occur. • While it is unknown where construction or operation of detention ponds might occur, the construction and operation of detention ponds would not bring new or additional people within close proximity to an airport or private airstrip or expose people to noise generated by air traffic on a regular basis. This is because detention ponds would not result in an increased permanent work force cited within proximity to an airport or private airstrip. Nor would detention ponds result in a population increase that would be exposed to airport noise. Impacts would not occur.
Population and Housing	• Construction and operation of detention ponds would not involve the construction of new homes or businesses, the extension of roads, or other actions that may induce substantial property growth in an area. Construction and operation of detention ponds would not develop any amenities (e.g., malls, amusement parks, hotels, recreation areas) that would attract people to the southern Delta. Impacts would not occur. • Construction and operation of detention ponds would not displace substantial numbers of people or housing, or necessitate the construction of replacement housing elsewhere because the change in volume of water (and timing of release of water) would take place at existing discharge points and agricultural lands, and not where people currently reside. Impacts would not occur.

Potential Environmental Effects of Agricultural Return Flow Salinity Controls	
Resource	Discussion
Public Services	• The need for additional public services (e.g., fire protection, police protection, parks, libraries, schools) or the deterioration of existing public services typically results from an increase in population. As a location's population increases, the need for additional or new public services and public service facilities generally increases. As discussed in Population and Housing, above, construction and operation of the detention ponds would not involve an increase in population or housing. In addition, construction and operation of the ponds would not include proposals for new housing, and would not generate students or increase demands for school services or facilities. Impacts would not occur.
Recreation	• Recreational facilities are not typically located in agricultural fields, and construction and operation of detention ponds in agricultural lands would not result in impacts on recreational facilities or lead to the construction of recreational facilities. Impacts would not occur.
Transportation and Traffic	• Construction of detention ponds may involve construction vehicle trips. However, due to the limited geographic scale and limited duration of construction, it is not expected truck or worker trips would exceed local or regional road trip thresholds. Impacts would be less than significant. • Construction and operation of detention ponds would occur on existing agricultural land, which is generally not heavily trafficked and access would likely be restricted to the public. As such, it is not expected construction or operation would conflict with a regional congestion management program, would result in inadequate emergency access, conflict with existing public transit, public bicycle facilities, or public pedestrian facilities (e.g., sidewalks) or result in a hazard to on-road traffic. Once operational, they would not generate trips beyond what currently is generated on existing agricultural lands and as such would not conflict with the Regional Congestion Management Plan or local or regional trip thresholds. Impacts would not occur. • Construction and operation of detention ponds would not result in an increase demand for air traffic or the need for airports because these projects would not result in an increase in population and is not related to air traffic or airports. Impacts would not occur.
Utilities and Service Systems	• Construction and operation of detention ponds would not involve the need for utilities or service systems because it would not require the construction or operation of wastewater treatment facilities or water treatment supply facilities. It would not increase the demand for water and therefore new entitlements would not be needed. It would not result in the generation of solid waste. Impacts would not occur.

16.4.5 South Delta Temporary Barriers

The program of implementation for the SDWQ alternatives requires continued operations of the agricultural barriers at Grant Line Canal, Middle River, and Old River at Tracy, or other reasonable measures, to address the impacts of the CVP or SWP export operations on water levels and flow conditions that might affect salinity. The existing temporary barriers would likely to continue to operate in the southern Delta under the program of implementation. DWR determined it is essential to continue barrier installations to protect salmon migrating through the Delta, and to provide an adequate agricultural water supply for southern Delta farmers (DWR 2015b). An adequate agricultural water supply must satisfy quantity, quality, and channel water levels to meet the reasonable and beneficial needs of water users in the SDWA (DWR 2015b).

The purpose of operating the temporary barriers is to protect salmon migrating through the Delta and provide an adequate agricultural water supply in terms of quantity, quality, and channel water levels to meet the reasonable and beneficial needs of water users in the southern Delta area. The program is operated by DWR and also takes actions to protect agricultural diversions that are affected from the operations of the barriers. The program consists of four rock barriers across southern Delta channels that primarily benefit migrating fish or benefit agricultural water users.

- HOR – fish barrier
- Old River Near Tracy (ORT) – agricultural barrier
- Middle River (MR) – agricultural barrier
- Grant Line Canal (GLC) – agricultural barrier

The HOR barrier and has been in place most years since 1963 between September 15 and November 30. It was also installed in the spring between April 15 and May 30 of 1992, 1994, 1996, 1997, 2000, 2001, 2002, 2003, and 2004 and 2007 (high SJR flows prohibited installation in 1993, 1995, 1998, 1999, 2005, and 2006). The remaining three barriers and are installed between April 5 and September 30 of each season. The ORT barrier has been installed since 1991 and the MR barrier has been installed since 1987. A rock barrier in GLC was first installed in spring 1996, and has since been installed in 1997, 1999, and 2000 through the present. The four rock barriers were not installed in 1998 due to high SJR flows (DWR 2015c).

DWR maintains a publicly available schedule for the operation of the barriers. The schedule for 2015 is described in Table 16-33, *Temporary Barrier 2015 Schedule*, and generally follows seasonal timeframes and restrictions associated with fish and agriculture (DWR 2015d).

Table 16-33. Temporary Barrier 2015 Schedule

Barrier	Beginning of Onsite Work	Beginning of In-Water Work	Closure	Complete Removal
Spring Head of Old River	March 16, 2015	March 16, 2015	April 8, 2015	June 2015
Middle River	March 30, 2015	March 30, 2015	April 3, 2015	Early to Mid November 2015
Old River at Tracy	March 16, 2015	March 16, 2015	April 7, 2015	Mid to Late November 2015
Grant Line Canal	April 2, 2015	April 2, 2015	June 2015	Mid to Late November 2015
Fall Head of Old River	September 2015	September 2015	September 2015	Mid to Late November 2015

Source: DWR 2015d.

DWR identifies that water levels and water circulation in the southern Delta have improved with agricultural barrier installation. Migration conditions for salmon have improved when the HOR barrier was installed. As such, DWR determined it is essential to continue barrier installations to protect salmon migrating through the Delta, and to provide an adequate agricultural water supply for southern Delta farmers. An adequate agricultural water supply must satisfy quantity, quality, and channel water levels to meet the reasonable and beneficial needs of water users in the SDWA (DWR 2015c).

The temporary agricultural barriers maintain higher water elevations during ebb tides (water moving downstream towards the estuary) by blocking the tidal flow once the water elevation falls below the barrier crest. The crest elevation of the ORT and MR barriers are 1 foot higher than the GLC barrier, to create a slight upstream net flow towards Grant Line Canal as the tide elevation drops below the barrier crests. The minimum tidal elevations upstream of the barriers are thereby constrained by the GLC barrier crest, although the slight flow through the barriers allows a slowly decreasing elevation. The general effects of the barriers are such that the minimum daily elevations increase by about 2–3 ft during the period when the temporary barriers are installed.

The tidal flow during each ebb tide moves water one direction (towards the estuary) and the tidal flow during each flood tide moves water in the opposite direction (away from the estuary). Salinity will increase in a tidal channel having a higher salinity discharge (e.g., treated wastewater or agricultural drainage) both upstream and downstream; the increase in salinity will be less if the tidal flows are higher (from a greater tidal mixing volume) or if the net flow is higher (from greater dilution). The combination of tidal flows (mixing) with a net channel flow is sometimes called circulation; a null zone refers to a portion of a channel that has limited tidal flows and a small net flow, allowing salinity to accumulate from local drainage discharges. Tidal flow measurements at each of the temporary agricultural barriers show similar effects; the tidal flows upstream of the barriers are reduced to about 50 percent of the full tidal flows.

The salinity in the SJR at Vernalis is generally controlled by releases from New Melones Reservoir to meet the existing water quality objectives as described by the 2006 Bay-Delta Plan. Salinity generally increases downstream of Vernalis from the effects of agricultural drainage and treated wastewater discharges. Salinity along Old River between the SJR near Mossdale and Tracy Boulevard also generally increases from the City of Tracy wastewater discharge and many local discharges of agricultural drainage. Below is the cost evaluation and environmental evaluation for continuing to operate the South Delta Temporary Barriers, as described by the program of implementation for the SDWQ alternatives.

Cost Evaluation

The primary cost for the temporary barriers is driven by the activities, materials and equipment required to construct and remove them. Based on the DWR's multi-year (2016–2018) construction contract for the temporary barriers, DWR's estimated cost for constructing and removing the barriers for the 3-year period was approximately $11.8 million (DWR 2015e). This cost estimate includes labor, materials, equipment for construction and removal of the temporary rock barriers at MR, ORT, and GLC, and maintenance, refurbishment and/or replacement of appurtenances (e.g., temporary agricultural pumping facilities), as well as other related tasks, which could include furnishing, installing, and removing a non-physical barrier at Delta divergence locations (DWR 2015f). The contract was awarded for the lowest bid of $9.5 million (DWR 2015e).

Environmental Evaluation

The temporary barriers have been installed during their respective seasons for decades as described above. They are currently part of the baseline hydrology, water quality, and biological conditions of the southern Delta. They may continue to operate as they have been to maintain water levels and circulation in the southern Delta under the program of implementation. As such, DWR would continue to work with permitting agencies (e.g., U.S. Army Corps of Engineers) and resource agencies (e.g., Central Valley Water Board, NMFS, USFWS) to obtain the appropriate permits and conditions to operate the temporary barriers. As such, there would be no change from baseline conditions and there would be no environmental impacts with the continued operation of the temporary barriers.

16.4.6 Low Lift Pumping Stations

The program of implementation for the SDWQ alternatives requires additional studies and monitoring of the southern Delta circulation and water levels. It is possible that additional study and monitoring would determine the need for modifications of the existing South Delta Temporary Barriers Project. If this determination is made by the State Water Board, DWR may be required to install low lift pumping stations at the temporary barriers as a method of compliance.

Modifications could include providing additional lift stations at the barriers. DWR prepared the *Low-Head Pumping Conceptual Plan* (2011c) describing potential modifications to the operations of these barriers. Below is the cost evaluation and environmental evaluation performed by the *Low Head Pumping Conceptual Plan* for the installation of either permanent or temporary pumps at the South Delta Temporary Barriers.

Cost Evaluation

Cost evaluations were based on a number of layouts and scenarios. Costs were evaluated for stand-alone pumping sites or *single pumping sites* on each of the agricultural barriers in the southern Delta (ORT, MR, GLC). Costs were also evaluated for two pumping sites, or pumping sites on two of the three agricultural barriers (MR and ORT or MR and GLC). Three intake structure types were analyzed: temporary cylindrical, permanent cylindrical, and permanent flat intake screens. Lastly, pumping capacities were also analyzed with the above variables. The three analyzed pumping capacities were 250, 1,000, and 1,500 cfs. Tables 16-34, *Single Pumping Sites Estimated Initial Capital Costs*, through Table 16-37, *Two Pumping Sites Estimated Annual Costs*, show the costs of these potential methods of compliance.

The cost ranges are based on different site layout configurations analyzed in DWR's *Low-Head Pumping Conceptual Plan*. The site layout that would provide the greatest reduction in water quality violations is a two-pumping site alternative with 1,000 cfs pumping capacity combined pumping at MR and ORT barriers (DWR 2011c). The estimated cost of this layout is $55.5–$540.7 million; the estimated annual costs are $4.5–$62.7 million.

Table 16-34. Single Pumping Sites Estimated Initial Capital Costs

	Pump Capacity (cfs)		
Pump Facility Intake Screen Design	250	500	1,000
Temporary Cylindrical	$5.5–$20.7	$9.8–$40.9	$19.6–$80.9
Permanent Cylindrical	$20.2–$60.8	$40.9–$112.9	$81.7–$234.3
Permanent Flat	$120– $161.4	$214.5–$286.6	$391.7–$551

Source: DWR 2011c.
Note: All cost values in millions of dollars.
cfs = cubic feet per second.

Table 16-35. Two Pumping Sites Estimated Initial Capital Costs

	Pump Capacity (cfs)		
Pump Facility Intake Screen Design	250	500	1,000
Temporary Cylindrical	$14.9	$28.4	$55.5
Permanent Cylindrical	$49.5	$87.6	$168.1
Permanent Flat	$186.9	$301.0	$540.7

Source: DWR 2011c.
Note: All cost values in millions of dollars.
cfs = cubic feet per second.

Table 16-36. Single Pumping Sites Estimated Annual Costs

	Pump Capacity (cfs)		
Pump Facility Intake Screen Design	250	500	1,000
Temporary Cylindrical	$10–$22.6	$15.6–$45.1	$32.4–$89.9
Permanent Cylindrical	$0.7–$1.4	$1.4–$2.6	$2.7–$5.3
Permanent Flat	$3.4–$4.5	$6.1–$8.5	$11.8–$16.3

Source: DWR 2011c.
Note: All cost values in millions of dollars.
cfs = cubic feet per second.

Table 16-37. Two Pumping Sites Estimated Annual Costs

	Pump Capacity (cfs)		
Pump Facility Intake Screen Design	250	500	1,000
Temporary Cylindrical	$17.8	$33.5	$62.7
Permanent Cylindrical	$1.3	$2.3	$4.5
Permanent Flat	$4.7	$8.0	$14.7

Source: DWR 2011c.
Note: All cost values in millions of dollars.
cfs = cubic feet per second.

Environmental Evaluation

As part of the *Low-Head Pumping Conceptual Plan* (2011b), DWR prepared an environmental checklist documenting potential impacts on environmental resources should the conceptual plan be implemented. The environmental checklist and analysis identified environmental commitments and/or potential mitigation measures to be implemented by DWR, should the project move forward, to reduce potentially significant impacts for the following resources associated with either construction or operation: aesthetics, agriculture, air quality, biological resources, cultural resources, geology and soils, GHG emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, transportation and traffic, and utilities and service systems. The environmental checklist identified less-than-significant impacts for the following resources: mineral resources, population and housing, public services, and recreation. Attachment 4 of Appendix H, *Supporting Materials for Chapter 16*, contains the environmental checklist of the conceptual plan and is incorporated into this evaluation. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, at the end of this chapter, lists potential mitigation measures that DWR can and should implement to reduce potentially significant environmental effects on environmental resources. It is likely that those impacts related to construction could be mitigated to less than significant once mitigation measures were implemented due to the temporary nature of construction, the relative short duration of construction, and the relatively small area of ground disturbance. However, given the potential need to construct a cofferdam and dewater, there is the potential for take of listed fish species (similar to coffer dams required and described in Section 16.3.6, *Fish Passage Improvements – Fish Screens*, Section 16.3.7, *Fish Passage Improvements – Physical Barriers in the Southern Delta*, and Section 16.3.9, *Predatory Fish Control*). As such, even with mitigation measures, significant and unavoidable impacts may occur if the potential for take cannot be avoided or reduced or take occurs during construction. In addition, as described in Tables 16-12 and 16-21, the generation of GHGs during construction and operation may not be lessened with mitigation measures and as such, may result in exceedances of existing air quality management basin thresholds that cannot be mitigated to less-than-significant levels.

16.5 Sources of Funding

There are many financial assistance programs designed to assist agencies implement water supply and water quality projects. The federal and state governments manage these programs. Often, these funding programs can leverage each other to make a project more feasible. Below is a brief description of some pertinent funding programs.

16.5.1 Federal Sources

U.S. Department of Agriculture

Water and wastewater loans and grants are offered through U.S. Department of Agriculture (USDA) Rural Development. Eligible applicants are public entities, nonprofit organizations, federally recognized tribes, and mutual water companies located outside cities, with a population under 10,000 people. Financial assistance recipients may receive a grant and loan component. The grant component cannot exceed 75 percent of the total financial assistance requested. Loans are offered up to a 40-year term at an interest rate updated quarterly, based on nonmetropolitan median household income (CFCC 2012).

U.S. Department of the Interior, Bureau of Reclamation

The Water Sustain and Manage America's Resources for Tomorrow (Water SMART) Program is an umbrella program that manages many grant programs for water supply research and implementation projects. The core focus of Water SMART is sustainable management and water efficiency. Typical projects include projects to reduce water losses in distribution systems, water recycling projects, and the creation of new water sources for agricultural irrigation purposes. Water SMART has multiple funding opportunities for municipal and agricultural water users. Typical grant awards range from $200,000 to $1,500,000 (CFCC 2012).

The U.S. Department of the Interior, Bureau of Reclamation (USBR) also offers grant programs targeted at improving the Bay-Delta's water resources and water quality through the Bay-Delta Restoration Water Use Efficiency Grants Program. Funds are available for improving water supply reliability and for increasing water use efficiency. Eligible applicants are public entities with authority over water delivery located within the CALFED solution area as identified in the 1999 *CALFED Programmatic Environmental Impact Statement/ Environmental Impact Report* (CALFED 2000a, CFCC 2012).

16.5.2 State Sources

California Infrastructure and Economic Development Bank

The Infrastructure State Revolving Fund finances water supply and water quality projects. Financial assistance is available in the form of lower-than-market interest rate loans. Based on a project description and applicant's credit score, an interest rate is computed. The term of the loan can be up to 30 years. Eligible applicants include public entities, such as cities, counties, and special districts (CFCC 2012).

California Department of Water Resources

The Agricultural Water Use Efficiency Grant Program provides funds for projects that improve agricultural water use efficiency. Projects must result in water savings, increased in-stream flow, increased water quality, or increased energy efficiency in water systems. Sample projects include: feasibility studies, research, development, training, education, public outreach, and pilot projects (CFCC 2012).

Integrated Regional Water Management (IRWM) provides funds for many types of water quality activities. Current IRWM grant programs include: planning, implementation, and storm water flood management. IRWM grants focus on holistic watershed management activities and regional coordination of water supplies. Eligible applicants include cities, counties, districts, and nonprofit organizations (CFCC 2012).

DWR manages the Delta and San Joaquin and Sacramento Rivers Water Quality Grant Program to assist agencies with projects that protect drinking water supplies. Eligible projects include: (1) projects that reduce or eliminate discharges of salt, dissolved organic carbon, pesticides, pathogens, and other pollutants to the SJR; (2) projects that reduce or eliminate discharges of bromide, dissolved organic carbon, salt, pesticides, and pathogens from discharges to the Sacramento River; (3) projects at Franks Tract and other locations in the Delta that will reduce salinity or other pollutants at agricultural and drinking water intakes; and (4) projects identified in the June 2005 *Delta Region Drinking Water Quality Management Plan*, prioritizing design and construction of the relocation of drinking water intake facilities for in-Delta water users (CFCC 2012).

State Water Resources Control Board

The Clean Water State Revolving Fund provides low-interest loans for water quality improvement projects, including water recycling and desalination. The loan term is up to 30 years, and the interest rate is between 0 percent and half the general obligation bond rate (2.4–3 percent) depending on the applicant’s population and median household income. Principal forgiveness is available for small disadvantaged communities. Typical loans are for 20 years at half the State’s general obligation bond rate. Eligible applicants are cities, counties, special districts, and joint powers authorities (CFCC 2012).

Water recycling projects that offset potable water supplies are eligible to apply for financial assistance from the Water Recycling Funding Program (WRFP). WRFP has funds available to assist with planning and implementation of water recycling projects. Only public entities (e.g., cities, counties, special districts) are eligible to apply for these funds. The WRFP offers both grants and loans (CFCC 2012).

The Agricultural Drainage Loan and Agricultural Drainage Management Loan Programs provide funding for projects that address treatment, storage, conveyance, or disposal of agricultural drainage that threatens waters of the State. An example project is the installation of tailwater recirculation systems and drip irrigation systems to reduce the volume of tailwater and contaminants discharged to a receiving waterbody. Eligible applicants include public entities (e.g., cities, counties), districts, joint powers authority, or other political subdivisions of the State involved with water management (CFCC 2012).

Department of Public Health

The Safe Drinking Water State Revolving Fund provides low-interest loans for projects that correct and upgrade drinking water infrastructure. The loan term is up to 30 years, and the interest rate is between 0 percent and half the general obligation bond rate (2.4–3 percent) depending on the applicant's population and median household income. Principal forgiveness is available for small disadvantaged communities. Typical loans are for 20 years at half the State's general obligation bond rate. Eligible applicants are cities, counties, special districts, and joint powers authorities (CFCC 2012).

16.6 Potential Mitigation Measures

This section summarizes potential mitigation measures that could be applied by lead agencies or other entities to reduce potentially significant impacts identified in the environmental evaluations of Sections 16.2, *Lower San Joaquin River Alternatives – Other Indirect Actions*, 16.3, *Lower San Joaquin River Alternatives – Non-Flow Measures,* and 16.4, *Southern Delta Water Quality Alternatives – Reasonably Foreseeable Methods of Compliance*. These potential mitigation measures were developed based on a review of similar projects. The scope, scale, and location of a particular project would dictate the need for, and the type of, mitigation. While the particular circumstances and location of a project may result in significant and unavoidable impacts post mitigation, lead agencies and entities may be able to fully mitigate impacts to a less-than-significant level (using one or more of the potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*). In addition, as required by CEQA (State CEQA Guidelines § 15126.2) lead agencies and entities would describe a reasonable range of alternatives based on project-specific conditions and project-specific objectives, and one of the alternatives may, in and of itself reduce significant environmental impacts. The effectiveness of mitigation is contingent upon several other factors, such as those listed below.

- The ability of lead agencies and entities to implement the mitigation.
- The other responsible agencies involved in the project.
- The thresholds lead agencies use to evaluate the impact.
- Site-specific conditions.

This section first summarizes those mitigation measures that could be applied to other indirect actions and methods of compliance and then summarizes mitigation measures that could be applied to non-flow measures.

16.6.1 Other Indirect Actions and Methods of Compliance

The other indirect actions that could occur under the LSJR alternatives and the reasonably foreseeable methods of compliance that could occur under the SDWQ alternatives, discussed herein, would be subject to project-specific CEQA review prior to approval. The project-specific analysis would be required to identify potentially significant environmental impacts. The lead agency would be required to require the implementation of all feasible mitigation measures to reduce impacts to less than significant or be responsible for providing a statement of overriding considerations for significant impacts that cannot be mitigated to a level of less than significant. Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, identifies the potential mitigation measures that lead agencies could implement should they determine a discretionary action they approve has significant impacts. These mitigation measures are based, in part, on mitigation measures presented in the following documents.

- *Proposed Amendment to the Water Quality Control Plan for the North Coast Region to Establish Exception Criteria to Point Source Waste Discharge Prohibition by Raising the Action Plan for Storm Water Discharges and Adding a New Action Plan for Low Threat Discharges* (North Coast Regional Water Quality Control Board 2009).
- *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento and San Joaquin Delta Estuary* (Central Valley Water Board 2010a).
- *Substitute Environmental Document for Toxic Pollutants in the Dominguez Chanel and Greater Los Angeles and Long Beach Waters Total Maximum Daily Load* (California Regional Water Quality Control Board, Los Angeles Region 2011).
- *Initial Study and Mitigated Negative Declaration for the Tracy Desalination and Green Energy Project* (City of Tracy 2011).
- *Irrigated Lands Regulatory Program Environmental Impact Report* (Central Valley Water Board 2010b).
- Low Head Pump Salinity Control Study Prepared to Meet Requirements of the State of California State Water Resources Control Board Water Rights Order WR 2010-0002, Condition A.7. Appendix C: Environmental Considerations for South Delta Low Head Pump Station (DWR 2011c).
- *Water Supply Options* (SFPUC 2007).

An SED must identify feasible mitigation measures for each significant environmental impact identified in the SED. (Cal. Code Regs., tit. 23, § 3777, subd. (b)(d).) Feasible mitigation measures are intended to avoid, reduce, or compensate for adverse impacts on a resource and can include actions such as implementation of plans to minimize impacts. For each impact identified as significant, a mitigation measure to reduce that impact to a less-than-significant level is described, if appropriate, or the infeasibility of mitigation is discussed. One legal factor that may render a mitigation measure infeasible is the limited authority of the lead agency. CEQA does not grant agencies new, discretionary powers independent of the powers granted to the agencies by other laws. (Pub. Resources Code, § 21004; Cal. Code Regs., tit. 14, § 15040.) Accordingly, a mitigation measure may be legally infeasible if the lead agency does not have the discretionary authority to implement it. In addition, economic considerations may render mitigation measures infeasible. (Pub. Resources Code, § 21004; Cal. Code Regs., tit. 14, §§ 15040, 15041, 15126.4, 15364.) The authority to require project-level mitigation lies with the lead agencies undertaking or approving the individual projects, not the State Water Board. These agencies can and should impose the mitigation measures presented in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions*, and until such time that these mitigation measures are imposed, impacts would remain significant, consistent with State CEQA Guidelines Section 15091. Potential mitigation measures associated with water transfers discussed in Section 16.2.1, *Transfer/Sale of Surface Water*, are summarized in Attachment 1 of Appendix H, *Supporting Materials for Chapter 16*. Potential mitigation measures associated with Water Supply Desalination discussed in Section 16.2.6, *Water Supply Desalination*, are summarized in Attachment 3 of Appendix H, *Supporting Materials for Chapter 16*.

Table 16-38. Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions[a]

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
Construction											
Aesthetics	• Direct construction lighting away from residential and roadway areas if sensitive receptors are present.[2]	X	—	X	—	X	X	X	X	—	X
	• Implement a revegetation plan to revegetate areas where construction-related ground disturbance has occurred.	—	—	X	—	X	X	X	X	—	X
	• Design facility to blend with surrounding land uses.	—	—	—	X	X	X	—	X	—	X
	• Use appropriate architectural treatment and landscaping.	—	—	—	X	X	X	—	X	—	X
	• Reservoir management plan to incorporate elevation/storage levels to accommodate recreational access to the extent practicable.	—	—	—	—	X	—	—	—	—	—
Agriculture and Forestry Resources	• If forest or vegetation is removed by a qualified forester or restoration ecologist and reviewed by the appropriate agencies, develop and implement a reforestation and/or revegetation plan.[2]	—	—	—	—	—	X	—	X	—	—
	• Restrict ground-disturbing mechanical operations around sensitive forested or agricultural areas.[2]	—	—	X	X	X	X	—	X	—	X
	• Preserve or replace onsite trees as a means of maintaining forest resource(s) and providing carbon storage (afforestation/reforestation).[2]	—	—		—	X	X	—	X	—	X
	• Avoid agricultural lands (including Prime Farmland, Unique Farmland, and Farmland of Statewide Importance) or timber production zone lands or National Forest System lands to the greatest extent possible.[6]	—	—	X	X	X	X	X	X	X	X
	• Develop a plan that mitigates to the maximum extent practicable for lands inundated by new surface water storage to reduce impacts on forestry resources.	—	—	—	—	X	—	—	—	—	—
	• Coordinate with applicable counties and local jurisdictions to determine if there is an agricultural mitigation program and comply with mitigation the program to the extent required by law. For example, San Joaquin County's agricultural mitigation ordinance (Title 9, Division 10, Chapter 9-1080) requires agricultural mitigation for an amendment to the general plan or a zoning reclassification that changes the designation of any land from agricultural to nonagricultural use. Mitigation is satisfied by granting a farmland conservation easement or other farmland conservation mechanism, and the number of acres of agricultural mitigation land must be at least equal to the number of acres converted to a nonagricultural use (1:1 ratio). The City of Tracy, pursuant to an agricultural mitigation fee ordinance (Municipal Code Title 13, Chapter 13.28), requires payment of a fee for each acre of farmland to be developed for private urban uses. The fees are used for the purchase of conservation easements on agricultural lands. Similarly, the City of Stockton's Agricultural Land Mitigation Program requires that all projects under the City's jurisdiction that would result in the conversion of agricultural land to nonagricultural uses to either dedicate an in-kind direct	—	—	—	—	—	X	—	X	—	—

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	purchase/acquisition of an agricultural conservation easement at a 1:1 ratio or pay an in-lieu agricultural land mitigation fee.										
Air Quality	• Apply appropriate construction mitigation measures from the applicable air district (e.g., SJVAPCD) to reduce construction emissions. These measures will be applied on a project-level basis and may be tailored in consultation with the appropriate air district, depending on the severity of anticipated construction emissions. [5] ○ CCAPCD: – The applicant shall be responsible for ensuring that all adequate dust control measures are implemented in a timely manner during all phases of project development and construction. – All material excavated, stockpiled, or graded shall be sufficiently watered, treated, or covered to prevent fugitive dust from leaving the property boundaries and causing a public nuisance or a violation of an AAQS. Watering should occur at least twice daily, with complete site coverage. – All areas with vehicle traffic shall be watered or have dust palliative applied as necessary for regular stabilization of dust emissions. – All onsite vehicle traffic shall be limited to a speed of 15 miles per hour on unpaved roads. – All land clearing, grading, earth moving, or excavation activities on a project shall be suspended as necessary to prevent excessive windblown dust when winds are expected to exceed 20 miles per hour. – All inactive portions of the development site shall be covered, seeded, or watered until a suitable cover is established. Alternatively, the applicant may apply County-approved nontoxic soil stabilizers (according to manufacturer's specifications) to all inactive construction areas (previously graded areas which remain inactive for 96 hours) in accordance with the local grading ordinance. – All material transported offsite shall be either sufficiently watered or securely covered to prevent public nuisance, and there must be a minimum of 6 inches of freeboard in the bed of the transport vehicle. – Paved streets adjacent to the project shall be swept or washed at the end of each day, or more frequently if necessary, to remove excessive or visibly raised accumulations of dirt and/or mud which may have	X	—	X	X	X	X	X	X	—	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	resulted from activities at the project site. – Prior to final occupancy, the applicant shall re-establish ground cover on the site through seeding and watering in accordance with the local grading ordinance. – In addition, the CCAPCD recommends the following mitigation measures, which may be applicable to a proposed project: ○ Mitigation for Use during Design and Construction Phases: – Grid power shall be used (as opposed to diesel generators) for job site power needs where feasible during construction. – Temporary traffic control shall be provided during all phases of construction to improve traffic flow as deemed appropriate by local transportation agencies and/or Caltrans. – Construction activities shall be scheduled to direct traffic flow to off-peak hours as much as practicable. – During initial grading, earth moving, or site preparation, larger projects may be required to construct a paved, coarse gravel, or dust palliative treated apron, at least 100 ft in length, leading onto the paved road(s). – Wheel washers may be required where project vehicles and/or equipment enter and/or exit onto paved streets from unpaved roads on larger projects. – All self-propelled off-road diesel-powered equipment and vehicles greater than 25 bhp shall be equipped with an engine meeting at least Tier 1 emission standards (typically manufactured 1996 or later). ○ GBUAPCD: – Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land. – Application of asphalt, water, or suitable chemicals on dirt roads, material stockpiles, and other surfaces which can give rise to airborne dusts. – Installation and use of hoods, fans, and fabric filters, to enclose and vent the handling of dusty materials. Adequate contaminant methods shall be employed during such handling operations. – Use of water, chemicals, chuting, venting, or other precautions to prevent particulate matter from										

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	becoming airborne in handling dusty materials to open stockpiles and mobile equipment. – Maintenance of roadways in a clean condition. ○ MCAPCD: – Maintaining construction vehicles and equipment according to manufacturers [sic] specifications. – Limiting equipment idling time. – Scheduling construction truck work trips to non-peak traffic hours. – Minimizing the length of construction truck trips. – Using water or chemicals to control dust from demolition, construction, or grading. – Applying asphalt, oil, water, or suitable chemicals on unpaved roads, material stockpiles or other surfaces. – Installation of hoods, fans and filters to enclose and vent the handling of dusty materials. – Using water, chemicals, chuting, venting, or other precautions when handling dusty materials in open stockpiles and mobile equipment. – Maintaining paved roadways in a clean condition. ○ TCAPCD (from the Tuolumne County General Plan Update EIR [Tuolumne County 2015]): – Exposed soils shall be watered as needed to control wind borne dust. – Exposed piles of dirt, sand, gravel, or other construction debris shall be enclosed, covered and/or watered as needed to control wind borne dust. – Vehicle trackout shall be minimized through the use of rubble strips and wheel washers for all trucks and equipment leaving the site. – Sweep streets once a day if visible soil materials are carried to adjacent streets (recommend water sweepers with reclaimed water). – Onsite vehicle speed shall be limited to 15 miles per hour on unpaved surfaces. – Loads on all haul/dump trucks shall be covered securely or at least 2 ft of freeboard shall be maintained on trucks hauling loads. – Construction equipment shall be maintained and tuned at the interval recommended by the manufacturers to										

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	minimize exhaust emissions. – Equipment idling shall be kept to a minimum when equipment is not in use. – Construction equipment shall be in compliance with the ARB off-road and portable equipment diesel particulate matter (DPM), regulations. – Substitute electrical equipment for diesel- and gasoline-powered equipment where practical. – Use alternatively fueled construction equipment onsite, where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, or biodiesel. – Avoid the use of onsite generators by connecting to grid electricity or utilizing solar-powered equipment. – Limit heavy-duty equipment idling time to a period of 3 minutes or less, exceeding the ARB regulation minimum requirements of 5 minutes.										
	• Apply appropriate Toxic Air Contaminants (TAC) and Hazardous Air Pollutants (HAP) mitigation measures from the applicable air district to reduce public exposure to DPM pesticides, and asbestos. These measures are documented in official rules and guidance reports; however, not all districts make recommendations for mitigation measures for TAC/HAP emissions. These measures will be applied on a project-level basis and may be tailored in consultation with the appropriate air district, depending on the severity of anticipated TAC/HAP emissions.[5]	X	—	X	X	X	X	X	X	—	X
	• Use vehicles with zero-emission or lower-emission engines.[2]	X	—	X	—	X	X	X	X	—	—
	• Limit the unnecessary idling of vehicles and equipment.[2]	X	—	X	—	X	X	X	X	—	X
	• Use low/zero carbon/alternative fuels, such as B20 biodiesel or renewable diesel.[2]	X	—	X	—	X	X	X	X	—	X
	• Control visible emissions from off-road diesel powered equipment.[2]	X	—	X	—	X	X	X	X	—	X
	• Design structural devices to minimize the frequency of maintenance trips.[2]	X	—	X	—	X	X	X	X	—	X
	• Perform necessary equipment maintenance, such as inspections and corrections, to detect failures early; keep equipment operating cleanly and efficiently. [2]	X	—	X	—	X	X	X	X	—	X
	• Use the proper sized equipment for the job during construction and operation.[2]	X	—	X	—	X	X	X	X	—	X
	• Train equipment operators in proper use of equipment during construction and operation.[2]	X	—	X	—	X	X	X	X	—	X
	• Produce concrete onsite if determined to be less emissive than transporting ready mix.[2]	X	—	X	—	X	X	X	X	—	X
	• Minimize the amount of concrete for paved surfaces or utilize a low-carbon concrete option.[2]	X	—	X	—	X	X	X	X	—	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Use locally sourced or recycled materials for construction materials.[2]	X	—	X	—	X	X	X	X	—	X
	• Control fugitive dust emissions during land clearing, grubbing, scraping, excavation, leveling, grading, or cut and fill operations with application of water (at least twice daily) or by presoaking.[2, 4]	X	—	X	X	X	X	X	X	—	X
	• Cover stockpiles of soil, sand, and other materials, and stabilize all disturbed areas and storage piles that are not being actively utilized for construction purposes using water, chemical stabilizers, or by covering with tarps, other suitable cover, or vegetative ground cover.[2, 4]	X	—	X	X	X	X	X	X	—	X
	• Pave, apply water, or apply soil stabilizers to unpaved areas, including all access roads and parking areas.[2, 4]	X	—	X	—	X	X	X	X	—	X
	• Sweep surrounding streets and paved areas (e.g., once per day).[2]	X	—	X	—	X	X	X	X	—	X
	• Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 miles per hour and/or greater than 20 miles per hour over a 1-hour period.[2, 4]	X	—	X	—	X	X	X	X	—	X
	• Initiate landscaping and revegetation as soon as construction tasks allow in order to minimize wind erosion.[2]	X	—	X	—	X	X	X	X	—	X
	• Encourage ride sharing and use of transit transportation for construction employees commuting to the project site.[4]	X	—	X	—	X	X	X	X	—	X
	• Use electric equipment for construction whenever possible in lieu of fossil fuel–powered equipment.4	X	—	X	—	X	X	X	X	—	X
	• Discontinue all construction activities during first stage smog alerts, first stage ozone alerts, and/or curtail construction during periods of high ambient pollutant concentrations.[4]	X	—	X	—	X	X	X	X	—	X
	• Water previously disturbed exposed surfaces (soil) a minimum of 3 times per day or whenever visible dust is capable of drifting from the site or approaches 20 percent opacity.[4]	X	—	X	X	X	X	X	X	—	X
	• Water all haul roads (unpaved) a minimum of 3 times per day or whenever visible dust is capable of drifting from the site or approaches 20 percent opacity.[4]	X	—	X	X	X	X	X	X	—	X
	• Reduce speed on unpaved roads to less than 15 miles per hour.[4]	X	—	X	—	X	X	X	X	—	X
	• Install and maintain a trackout control device that meets the specifications of regional air board requirements if needed (e.g., SJVAPCD Rule 8041 if the site exceeds 150 vehicle trips per day or more than 20 vehicle trips per day by vehicles with three or more axles).[4]	X	—	X	—	X	X	X	X	—	X
	• Cover trucks hauling debris, soil, sand, or other material to reduce dust and suspended air particles, and when transporting materials offsite, maintain a freeboard limit of at least 6 inches or effectively wet to limit visible dust emissions.[4,2]	X	—	X	X	X	X	X	X	—	X
	• Limit and remove the accumulation of mud and/or dirt from adjacent public roadways at the end of each workday.[4]	X	—	X	—	X	X	X	X	—	X
	• Remove visible trackout from the site at the end of each workday.[4]	X	—	X	—	X	X	X	X	—	X
	• Comply with applicable regional air board asphalt-concrete paving	X	—	X	X	X	X	X	X	—	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	rules such as SJVAPCD Rule 4641 (e.g., restrict use of cutback, slow-sure, and emulsified asphalt paving materials).[4]										
	• Install diesel particulate filter and utilize diesel oxidation catalyst.[6]	—	—	—	—	X	—	—	—	—	X
	• Require the pump system be electric or alternatively fueled.[6]	—	—	—	—	X	—	—	—	—	X
	• Locate pump system/emissions generating activity as far from sensitive receptors as possible.[6]	X	—	X	—	X	X	X	X	—	X
Biological Resources[b]	• Prior to land disturbance, contact USFWS and CDFW (or appropriate land management agency, such as national forests and Bureau of Land Management) and conduct all necessary pre-construction surveys for special-status plants, species, and habitat prior to construction activities. This may include the hiring of a qualified biologist to identify riparian and other sensitive vegetation communities and/or habitat for special-status plants and animals.[1,5,6]	X	—	X	X	X	X	X	X	X	X
	• Comply with local, state, and federal regulations and ordinances such as those listed below. ○ USFWS ESA Section 7 consultation for threatened and endangered species.[2] ○ U.S. Army Corps of Engineers Clean Water Act Section 404 Permit and State Clean Water Act Section 401 Water Quality Certification for filling or dredging waters of the United States and other federal permitting actions.[2, 5] ○ CDFW California Fish and Game Code 1601 Agreement for Streambed Alteration.[2] ○ State Water Board WDRs (which are also permits for purposes of the Clean Water Act, if applicable).[2] ○ General plan or National Forest System land or Bureau of Land Management conservation requirements.[2] ○ City and/or county tree ordinances.[2]	X	—	X	X	X	X	X	X	X	X
	○ Contract with qualified botanists, wildlife biologists, and arborists to develop biological assessments if a project's specific location warrants doing so. At a minimum, assessments should include project area-specific literature searches, reviews of CDFW's California Natural Diversity Database and the California Native Plant Society's Inventory of Rare and Endangered Plants of California, and field surveys of all potential project sites and their surrounding areas to identify and map existing plant communities, wildlife habitat, and heritage trees, and to identify wildlife species that currently occur, have occurred in the past (e.g., resident and migratory wildlife species that have been documented as foraging or nesting at the site), or have the potential to occur at the site due to the presence of suitable habitat. Field surveys should follow protocols established by CDFW and should be conducted during the appropriate time(s) of year (e.g., during the blooming period of potentially occurring plant species).[2,5]	X	—	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Select a project site that does not contain critical habitat if there are project site alternatives. Or locate project facilities outside the boundaries of critical habitat areas if there is only one project site available.[2,5]	X	—	X	X		X	X	X	X	X
	• Avoid and minimize disturbance of riparian and other sensitive vegetation communities.[5]	X	—	X	X	X	X	X	X	X	X
	• Avoid and minimize disturbance of areas containing special-status plant or animal species.[5]	X	—	X	X		X	X	X	X	X
	• Where adverse effects on sensitive biological resources (including fish species) cannot be avoided, undertake additional CEQA review and develop a restoration or compensation plan to mitigate the loss of the resources.[5]	X	—	X	—	X	X	X	X	X	X
	• Where construction in areas that may contain special-status fish species cannot be avoided through the use of alternative management practices, conduct an assessment of habitat conditions and the potential for presence of special-status fish species prior to construction; this may include the hiring of a qualified fish biologist to determine the presence of special-status fish species.[5]	X	—	X	—	X	X	X	X	X	X
	• Based on the species present in adjacent waterbodies and the likely extent of construction work that may affect fish, limit construction to periods that avoid or minimize impacts on special-status fish species.[5]	X	—	X	—	X	X	X	X	X	X
	• Develop a mitigation and management plan in coordination with CDFW and USFWS to implement all appropriate measures as required by USFWS ESA Section 7 consultation and to satisfy any other local, state, and federal requirements for achieving no net loss of wetlands or other critical habitat, or take of wildlife species of concern. The plan should be submitted to the local city/county environmental planning department, USACE, USFWS, CDFW, applicable regional water quality control board (e.g., as part of a Section 401 Water Quality Certification application), and/or other oversight agencies as applicable for approval prior to its implementation if an impact on special-status species population(s) is determined to occur based on the biological assessment and evaluation of the final project site and design.[2]	X	—	X	X	X	X	X	X	X	X
	• Develop a revegetation plan if vegetation would be disturbed during construction or operation. The revegetation plan should be prepared by a qualified restoration ecologist and reviewed by the appropriate agencies. The plan should specify sites where revegetation should take place, the planting stock appropriate for the region, appropriate designs (e.g., plant arrangements that, when mature, replicate the natural structure and species composition of similar habitats in the region), planting techniques, monitoring frequency, and success criteria (e.g., sapling trees no longer require active management).[2]	X	—	—	—	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Establish temporary construction buffers for drainages, wetlands/vernal pools, and other sensitive habitat in the project area that could be affected by construction activities. The outer edges of the buffer zones will be demarcated using flagging or temporary orange mesh construction fencing before initiation of construction activities and based on site-specific conditions, seasonal restrictions for wildlife, local planning department specifications, and resource agency (e.g., USFWS and CDFW) requirements.[2,6]	X	—	X	X	X	X	X	X	X	X
	• Require a qualified biologist to perform the following construction functions if sensitive habitat or species are present. ○ Perform required preconstruction surveys to determine the current presence of, and demarcate the boundaries of construction buffers around, sensitive habitats, and submit survey reports according to CDFW and local agency guidelines for approval prior to construction.[1,2,5,6] ○ Provide USFWS-approved worker environmental awareness training that informs all construction personnel about sensitive plant and wildlife species and habitats.[2] ○ Oversee major excavation and other construction activities with the authority to stop construction activities until appropriate corrective measures have been completed.[2] ○ Report to USFWS any incidental take.[2] ○ Periodically re-inspect the project site (e.g., every week) during construction activities or whenever a there has been a substantial lapse in construction activity (e.g., more than 2 weeks).[2]	X	—	X	X	X	X	X	X	X	X
	• Locate temporary access roads and staging areas outside the boundaries of critical habitat areas, restrict movement of heavy equipment to and from the project site to established roadways and areas designated for construction and staging, and do not allow parking of vehicles or storage of potentially toxic chemicals near or up-gradient of drainages or sensitive habitats or under heritage trees.[2]	X	—	X	X	X	X	X	X	X	X
	• Implement measures to control dust, erosion, and noise (see the Air Quality, Geology and Soils, and Noise sections, respectively). [2]	X	—	X	X	X	X	X	X	X	X
	• Properly contain or remove all trash that may attract predators to the worksite during construction.[2]	X	—	X	—	X	X	X	X	X	X
	• Remove any temporary fill and construction debris and, wherever feasible, restore disturbed areas to pre-project conditions according to the before-mentioned revegetation plan after completion of construction activities.[2]	X	—	X	—	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Provide compensation for unavoidable degradation or loss of critical habitat due to project construction to ensure no net loss of that habitat as required by local, state, or federal agencies. Compensation could be provided at a minimum ratio (e.g., 3:1, 3 acres of restored wetlands for every 1 acre affected, or three native oak trees planted for every native oak tree eliminated) that ensures long-term replacement of habitat functions and values and complies with local, state, and federal requirements. Examples of compensation are as follows. ○ Construct replacement habitat as close as possible to the previous habitat location at the project site (e.g., locate replacement riparian and wetland habitats along the same drainage affected by the project construction). ○ If site limitations prevent onsite habitat replacement, construct replacement habitat as near the project site as possible. ○ Provide payment on a per-acre basis to an approved restoration or mitigation bank or other trust fund.[2]	X	—	X	—	X	X	X	X	X	X
	• Comply with measures contained within habitat conservation plans or natural community conservation plans, such as the San Joaquin Multi-Species Habitat Conservation and Open Space Plan. Consult with appropriate biologists who have training and are knowledgeable about the habitat conservation plan or natural community conservation plan. Monitoring, construction, and relocation surveys by a qualified biologist would be done as appropriate.[4]	X	—	X	X	—	X	X	X	X	X
	• Prior to implementing any management practice that would result in the permanent loss of wetlands, conduct a delineation of affected wetland areas to determine the acreage of loss in accordance with current USACE methods. For compliance with the Clean Water Act Section 404 permit and WDRs, compensate for the permanent loss (fill) of wetlands and ensure no net loss of habitat functions and values. Compensation ratios will be determined through coordination with the Central Valley Water Board and U.S. Army Corps of Engineers as part of the permitting process. Compensation may be a combination of mitigation bank credits and restoration/creation of habitat, as described below. ○ Purchase credits for the affected wetland type (e.g., perennial marsh, seasonal wetland) at a locally approved mitigation bank and provide written evidence to the resource agencies that compensation has been established through the purchase of mitigation credits. ○ Develop and ensure implementation of a wetland restoration plan that involves creating or enhancing the affected wetland type.[5]	X	—	X	X	X	X	X	X	X	X
	• Install species exclusion fencing for animal species during construction; install a temporary, plastic mesh-type construction fence at least 1.2 m tall around any established special-status plant species buffer areas to prevent encroachment by construction vehicles and personnel; a qualified biologist will determine the exact	—	—	X	X	X	—	—	—	—	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	location of the fencing.[6]										
	• Conduct pile driving with vibratory hammer.[6]	—	—	—	—	X	—	—	—	—	X
	• Implement turbidity monitoring during construction/removal.[6]	—	—	—	X	X					X
	• Implement environmental awareness program for construction personnel.[6]	—	—	—	X	X	—	—	—	—	X
Cultural Resources	• Where construction within areas that may contain cultural resources cannot be avoided through the use of alternative management practices, conduct an assessment of the potential for damage to cultural resources prior to construction; this may require the hiring of a qualified cultural resources specialist to determine the presence of significant cultural resources.[5]	—	—	X	X	X	X	X	X	X	X
	• Where the assessment indicates that damage may occur, and prior to land disturbance, submit a non-confidential records search request to the appropriate California Historic Resources Information System (CHRIS) which potentially includes the following in the plan area.[1,5] ○ Alpine County: Central California CHRIS Information Center ○ Calaveras County: Central California CHRIS Information Center[5] ○ Contra Costa County: Central California CHRIS Information Center[5] ○ Madera County: Southern San Joaquin Valley CHRIS Information Center[5] ○ Mariposa County: Central California CHRIS Information Center[5] ○ Merced County: Central California CHRIS Information Center[5] ○ San Joaquin County: Central California CHRIS Information Center[5] ○ Stanislaus County: Central California CHRIS Information Center[5] ○ Tuolumne County: Central California CHRIS Information Center[5]	—	—	X	—	X	X	X	X	X	X
	• Implement the recommendations provided by the CHRIS information center(s) in response to the records search request.[5]										
	• Where adverse effects on cultural resources cannot be avoided, undertake additional CEQA review and develop appropriate mitigation to avoid or minimize the potential impact(s).[5]										
	• Require a professional trained to identify evidence of cultural resources to observe major excavation and earth-moving activities if significant cultural resources are known to exist on the project site or if there is a high probability for significant cultural resources to exist.[2]	—	—	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Construction will stop within a 100-foot radius of any archaeological, paleontological, or historical resources discovered during construction activities, and treatment measures will be devised as needed. A qualified archaeologist should be brought on site within 24 hours of the discovery. If the find is determined to be significant, a full archaeological survey will take place. Construction activities in the area resume once the survey is completed and all cultural resources are recovered.[2, 6]	—	—	X	X	X	X	X	X	X	X
	• No further excavation or other site disturbance takes place if any human remains are discovered during construction activities. Notify the local coroner so that a determination can be made as to whether the remains are of Native American origin or whether an investigation into the cause of death is required. If the remains are determined to be Native American, the following actions would be taken. ○ The coroner notifies the NAHC within 24 hours. ○ The NAHC immediately notifies those persons believed to be the most likely descendant(s) (MLD) of the deceased. ○ Once the NAHC identifies the MLD, the MLD, with the permission of the landowner, inspects the site of the discovery and makes recommendations for the treatment or disposition of the remains and any associated grave items within 48 hours (per Assembly Bill 2641) of the MLD being granted access to the site. ○ The landowner is to ensure that the immediate vicinity of the remains, established according to standard professional practices, is not damaged or disturbed by further activity until the landowner has conferred with the MLD. ○ Discussion and consultation between the landowner and MLD should take into account the possibility of multiple burials and reasonable options regarding the MLD's preferences for treatment. ○ If the NAHC is unable to identify an MLD, if the MLD fails to make a recommendation, or if the NAHC is unable to mediate a dispute concerning the appropriate disposition of the remains, the landowner shall re-inter the human remains and any associated items with appropriate dignity on the property in a location not subject to further subsurface disturbance; and, to protect the remains from disturbance, the landowner must record the site with the NAHC or the appropriate CHRIS, use an open space or conservation zoning designation or easement, and/or record a document with the county in which the property is located.[2,5]	X	—	X	X	X	X	X	X	X	X
	• No further disturbance of an area, if fossils are encountered, will occur until the materials have been evaluated by a qualified paleontologist and appropriate treatment measures have been identified.[4]	—	—	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Construction workers should be aware of the following protocols for identifying cultural resources: ○ If built environment resources or archaeological resources, including chipped stone (often obsidian, basalt, or chert), ground stone (often in the form of a bowl mortar or pestle), stone tools (such as projectile points or scrapers), unusual amounts of shell or bone, historic debris (such as concentrations of cans or bottles), building foundations, or structures are inadvertently discovered during ground-disturbing activities, the land owner should stop work in the vicinity of the find and retain a qualified cultural resources specialist to assess the significance of the resources. If necessary, the cultural resource specialist also will develop appropriate treatment measures for the find. ○ If human bone is found as a result of ground disturbance, the land owner should notify the county coroner in accordance with the instructions described above. If Native American remains are identified and descendants are found, the descendants may—with the permission of the owner of the land or his or her authorized representative—inspect the site of the discovery of the Native American remains. The descendants may recommend to the owner or the person responsible for the excavation work means for treating or disposing of the human remains and any associated grave goods, with appropriate dignity. The descendants will make their recommendation within 48 hours of inspection of the remains. If the NAHC is unable to identify a descendant, if the descendants identified fail to make a recommendation, or if the landowner rejects the recommendation of the descendants, the landowner will inter the human remains and associated grave goods with appropriate dignity on the property in a location not subject to further and future subsurface disturbance.[5]	—	—	X	—	X	X	X	X	X	X
	• Develop a cultural resources monitoring and mitigation plan for cultural resources (historical, archaeological, paleontological) newly discovered during reservoir drawdown periods.	—	—	—	—	X	—	—	—	—	—
Geology and Soils	• Require a licensed geologist to evaluate county general plans and other available geologic literature for additional geological information, and conduct site-specific geologic, geotechnical, and soil investigations to evaluate the potential for the presence of an active fault or other seismic risks (strong ground shaking, liquefaction, landslides, mass wasting, or other ground failure) for site-specific projects. [2]	—	—	X	X	X	X	—	X	X	X
	• Comply with existing local, state, and federal geotechnical regulations, building codes, standards specifications, and the recommendations of geotechnical studies prepared for site-specific projects.[2, 4]	—	—	X	X	X	X	—	X	X	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Evaluate the project site, and up- and down-gradient areas, for erosion potential. Design the project and implement construction and maintenance activities to prevent erosion and sedimentation.[2]	—	—	X	X	X	X	—	X	X	X
	• Design storm water runoff control systems to fit the hydrology of the project area once it is fully developed, to have adequate capacity to transport the flow from all upland/upstream areas, to be non-erosive, and to conduct runoff to a stable outlet. Install systems prior to the rainy season.[2]	—	—	X	X	X	X	—	X	X	X
	• Remove vegetation only when necessary and make every effort to conserve topsoil for reuse in revegetation of disturbed areas.[2]	—	—	X	—	X	X	—	X	X	X
	• Develop land in increments of workable size such that construction can be completed during a single construction season, and coordinate erosion and sediment control measures with the sequence of grading and construction operations.[2]	—	—	X	—	X	X	—	X	X	X
	• Stabilize and revegetate all disturbed soil surfaces before the rainy season.[2]	—	—	X	—	X	X	—	X	X	X
	• Restrict stockpiling of construction materials to the designated construction staging areas and exclusive of habitats and their buffer zones.[2]	—	—	X	—	X	X	—	X	X	X
	• Employ BMPs that prevent soil or sediment from leaving construction sites, monitor them for effectiveness, and maintain them throughout the construction operations and between construction seasons. Standard measures include installation of sediment basins and traps in conjunction with grading operations; development of slope drains; stabilization of stream banks; use of hydraulic mulch, hydroseeding, straw, mulch anchored with a tackifier, polyacrylamide, rolled erosion control products (e.g., blankets and mats), earth dikes, drainage swales, and velocity dissipation devices; and installation of silt fences, fiber rolls, gravel bag berms, sandbag barriers, storm drain inlet protection, and check dams.[2]	X	—	X	—	X	X	X	X	X	X
	• Contain runoff from truck and cement equipment washdown.[2]	—	—	X	—	X	X	—	X	X	X
	• Limit to the dry season any construction activities within an area of the Ordinary High Water (OHW) line of drainages and lakes. Limit any construction activities within a floodplain, but above an OHW line, to those actions that can adequately withstand high river flows without resulting in the inundation of and entrainment of materials in flood flows.[2]	—	—	X	—	X	X	—	X	X	X
	• Have a professional hydrologist or licensed engineer develop an erosion control and water quality protection plan to avoid habitat degradation and ensure compliance with local and state erosion- and sediment-related requirements. The plan should be integrated into the construction schedule and describe how site cleanup and regrading will affect current physical conditions.[2]	—	—	X	—	X	X	—	X	X	X
	• Locate projects away from areas with unsuitable soils or steep slopes.[2]	—	—	X	X	X	X	—	X	X	X

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	• Depending on soil and geologic conditions, do the following. ○ Ground improvements, such as soil compaction and excavation and disposal of liquefiable soils. ○ Structural improvements, such as berms or dikes, to prevent large lateral spreading. ○ Buttress landslides. ○ Install special drainage devices and water injection wells. ○ Monitor groundwater level to ensure stable conditions.[2]	—	—	X	X	X	X	—	X	X	X
	• Comply with all provisions of the applicable codes for the county or counties in which construction of a septic system is proposed, including the design and installation of septic systems. The design of those systems will be required in accordance with applicable county code to comply with all design requirements, including for factors such as wastewater generation, soil types within the leach field, percolation testing, and slope of the leach field.	—	—	—	—	X	—	—	—	—	—
Greenhouse Gas Emissions	• Implement all requirements under Air Quality, above.	X	—	X	X	X	X	X	X	X	X
	• Implement water recycling practices or policies.[2]	—	—	X	—	X	—	—	—	—	—
	• Preserve known GHG sinks to the extent feasible and limit GHG sources as a component of project design.[2]	—	—	—	—	X	—	—	—	X	—
	• Preserve or replace onsite trees or contribute to a mitigation program providing carbon storage.[2]	—	—	—	—	X	—	—	—	X	—
Hazards and Hazardous Materials	• Provide hazardous materials and worksite safety training for construction workers in accordance with local, state, and federal requirements including, but not limited to the Occupational Safety and Health Act, Title 9 of the Code of Federal Regulations, and Title 8 of the California Code of Regulations.[2]	X	—	X	X	X	X	X	X	X	X
	• Provide hazardous materials accidental spill response plans (and/or Hazardous Materials Management Program) and training that would outline methods, materials, and responsibilities for the response to, and clean-up of, an accidental hazardous material spill during construction of the project. At a minimum, the plans should include provisions for immediate response, containment, and cleanup of a spill, including excavation and disposal of contaminated soil and notification responsibilities. Materials needed for potential cleanup activities should be kept onsite.[2]	X	—	X	X	X	X	X	X	X	X
	• Provide a health and safety plan for construction workers that is prepared by a certified industrial hygienist; comply with all appropriate local, state, and federal regulations; and identifies specific safety measures to be followed during all phases of construction and long-term operation.[2]	X	—	X	X	X	X	X	X	X	X

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	• Conduct careful surveys of mine sites and prepare written reports and guidance in compliance with applicable state and federal requirements before commencing cleanup actions to identify and characterize safety concerns; potential for erosion during and after cleanup actions; potentially recyclable materials (e.g., sediment/soil for fill, scrap steel, processing equipment, brick, wood, mercury, and gold); and major waste streams for disposal in onsite or offsite landfills.[2]	X	—	—	—	X	X	X	X	X	—
	• Implement dust-suppression and other measures available to prevent risks associated with inhaling dust and exhaust during construction activities.[2]	X	—	X	X	X	X	X	X	X	X
	• Label all hazardous materials onsite to inform users of potential risks and train users in appropriate handling, storage, and disposal procedures.[2]	X	—	X	X	X	X	X	X	X	X
	• Protect sites from unmonitored access with fencing and signs to prevent accidental health hazards to the nearby residents.[2]	X	—	X	—	X	X	X	X	X	X
	• To control vector (e.g., mosquito) production, design projects so they do not increase the area and/or duration of standing water, selectively install systems that are prone to standing water away from high-density areas and away from residential housing, and/or incorporate measures to mitigate vector creation (e.g., install netting over devices and/or employ vector control agencies to mitigate vector production). Design projects to comply with local vector/mosquito control agencies' requirements.[2]	—	—	—	—	X	—	—	—	X	X
	• Adhere to applicable building and safety codes and permits that would ensure construction activities would result in less-than-significant delays in response times for fire and police vehicles.[2]	—	—	X	X	X	X	X	X	—	X
	• Coordinate with local fire and police providers to establish alternative routes and traffic control during the construction activities that could cause traffic congestion or road closures.[2]	—	—	X	X	X	X	X	X	—	X
	• Review California Department of Fire's Fire Hazard Safety Zone maps, contact local fire protection agencies during early phases of project planning and, if possible, select project sites that are not in High or Very High fire severity hazard zones.[2]	—	—	X	—	X	X	X	—	—	X
	• Identify local laws, ordinances, and building codes related to fire prevention, burning, welding, and blasting, etc., to obtain any necessary permits and adhere to permit conditions.[2]	—	—	X	X	X	X	X	X	X	X
	• Maintain an adequate number of fire extinguishers and other tools and equipment that can be used for fighting fire onsite, and ensure that personnel are trained in their use.[2]	—	—	X	—	X	X	X	X	X	X
	• Maintain a water tender during extensive welding/cutting operations.[2]	—	—	X	—	X	X	X	X	X	X
	• Maintain a fire watch during hazardous operations and after the work has ceased for the day.[2]	—	—	X	—	X	—	—	—	—	—
	• Provide funding for an inspector from the local fire agency.[2]	—	—	X	—	X	—	—	—	—	—
	• Provide equipment that gives construction personnel and fire agencies the ability to communicate with one another.[2]	—	—	X	—	X	X	X	X	X	X

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	• Remove materials that easily ignite or contribute to an increased intensity and spread of fire from high risk areas.[2]	—	—	X	—	X	X	X	X	X	X
	• Prepare and implement an RMP for the use and storage of anhydrous ammonia that meets the requirements of California Health and Safety Code, Division 20, Chapter 6.95, Article 2 and the California Code of Regulation Title 19, Division 2, Chapter 4.5, Articles 1–11. Submit the RPM to the appropriate local or regional agency for review and approval (e.g., San Joaquin County Environmental Compliance Division).[4]	X	—	X	—	X	X	—	X	—	—
	• Identify existing underground utility lines at excavation sites prior to construction, and avoid/relocate underground utility lines in coordination with utility company/service provider; coordinate with natural gas companies and Underground Service Alert before beginning any excavation or other construction activities to ensure that pipelines are not affected.[2,6]	—	—	X	X	X	X	X	X	X	X
	• Prior to construction, perform pre-construction hazardous waste evaluations through record searches and on-site evaluations to potentially identify leaking underground storage tanks, facilities that have received CDOs or CAOs for hazardous materials, or where soil contamination may be suspected (e.g., through soil discoloration or other indicators). If soil contamination is identified, test soil prior to excavation to determine if construction site would be located in area with soil contamination. Areas to be excavated will undergo soil and/or groundwater testing (if groundwater is present in excavated area) at a certified laboratory, provided existing data cannot characterize the nature and concentration of the contamination. Where concentrations exceed applicable federal or state thresholds, contaminated areas will be avoided or soil and/or groundwater will be remediated and contained in compliance with applicable state and federal laws. If hazardous materials are encountered, consultation with DTSC will be required to establish if a permit and subsequent actions are needed to appropriately handle the materials.	X	—	X	X	X	X	X	—	—	—
Hydrology and Water Quality	• Evaluate site-specific tsunami and seiche risks, comply with local building codes that address tsunami and seiche risk, and consult with an engineer to ensure that critical structures are designed to resist strong ground motion, tsunami, and seiche wave impact if appropriate for the project site.[2]	—	—	—	—	X	—	X	X	—	X
	• Elevate and brace any project buildings if buildings are located in areas prone to flooding or tsunamis.[2]	—	—	X	X	X	X	X	X	—	X
	• Position project roads and structures to be perpendicular to potential waves so there is less resistance and erosive force.[2]	—	—	X	—	X	—	—	X	—	—
	• Ensure that project activities do not weaken nearby levees.[2]	—	—	X	X	X	X	X	X	X	X

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	• Prepare a SWPPP that includes specific types and sources of storm water pollutants, determines the location and nature of potential impacts, and specifies appropriate control measures to eliminate any potentially significant impacts from storm water runoff on receiving waters. The SWPPP will require treatment BMPs that incorporate, at a minimum, the required hydraulic sizing design criteria for volume and flow to treat projected storm water runoff. The SWPPP shall comply with the most current standards established by the regional water quality control board. BMPs shall be selected from the local agency's Storm water Quality Control Standards.[4,6]	X	—	X	X	X	X	X	X	X	X
	• Implement turbidity monitoring during construction/removal.[6]	—	—	X	X	X	X	X	X	X	X
	• Comply with all provisions of the applicable codes for the county or counties in which construction of a septic system is proposed, including the design and installation of septic systems. The design of those systems will be required in accordance with applicable county code to comply with all design requirements, including for factors such as wastewater generation, soil types within the leach field, percolation testing, and slope of the leach field.	—	—	—	—	X	—	—	—	—	—
Land Use	• Comply with adopted plans, policies, and regulations.	X	—	—	X	X	X	X	X	X	X
	• All actions a lead agency determines is a covered action under the Delta Plan will comply with the Delta Plan Mitigation Monitoring and Reporting Program.	—	—	—	X	—	—	X	X	X	X
	• Locate facilities consistent with land use and zoning designations.	—	—	—	X	X	X	X	X	X	X
Mineral Resources	• Design new surface water facilities to avoid displacement of active natural gas wells to the extent feasible.	—	—	—	—	X	—	—	—	—	—
	• Design new surface water facilities to maintain drilling access to natural gas fields to the extent feasible.	—	—	—	—	X	—	—	—	—	—
	• Purchase affected aggregate resource sites.	—	—	—	—	X	—	—	—	—	—
Noise	• Limit construction work to the appropriate windows of construction per the local or regional noise ordinances. Typically construction is limited to 7:00 am–6:00 pm on weekdays and permit no work on Saturdays, Sundays, or holidays unless appropriate city and county building officials grant prior approval.[2,3]	X	—	X	X	X	X	X	X	X	X
	• Implement noise-reducing construction practices such that noise from construction does not exceed applicable local noise standards or limits specified in the applicable county ordinances and general plan noise elements.[5,6]	X	—	X	X	X	X	X	X	X	X
	• Use noise-generating equipment during periods when fewer people are present near the construction area.[2]	X	—	X	X	X	X	X	X	X	X
	• Muffle or otherwise control all construction equipment with a high noise-generating potential, including all equipment powered by internal combustion engines.[2]	X	—	X	X	X	X	X	X	X	X

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	• Use newer equipment with improved noise muffling, and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators, intact and operational. Newer equipment will generally be quieter in operation than older equipment. All installation equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).[3]	X	—	X	X	X	X	X	X	X	X
	• Shroud or shield all impact tools.[2]	X	—	X	X	X	X	X	X	X	X
	• Locate all stationary noise-generating equipment, such as compressors, as far as possible from adjacent occupied offices, residents, or sensitive habitats (if they are adjacent to the project site).[2]	X	—	X	X	X	X	X	X	X	X
	• Turn off mobile equipment and machinery when not in use to reduce noise from idling equipment.[2]	X	—	X	X	X	X	X	X	X	X
	• Use temporary noise barriers or curtains along installation boundaries or partial enclosures around continuously operating equipment.[2]	X	—	X	X	X	X	X	X	X	X
	• Use the shortest possible routes from construction sites to local freeways for truck delivery routes, except when selecting routes to avoid going through residential neighborhoods.[2]	X	—	X	X	X	X	X	X	X	X
	• Establish an active community liaison program that notifies landowners within 300 ft of construction areas of the construction schedule, in writing, prior to construction to keep them informed of schedule changes, and designate a "disturbance coordinator" for the construction site.[2]	X	—	X	X	X	X	X	X	X	X
	• Develop an operations plan for specific construction activities that documents maximum noise limits and addresses the variety of available measures to limit the impacts from noise on adjacent homes, businesses, or sensitive habitats.[2]	X	—	X	X	X	X	X	X	X	X
	• Regularly inspect equipment and monitor noise and vibration to ensure that all equipment on the site is in good condition and effectively muffled and that contractors take all reasonable steps to minimize impacts, particularly when near sensitive areas.[2, 3]	X	—	X	X	X	X	X	X	X	X
	• Monitor construction noise and vibrations and modify and/or reschedule construction activities if monitoring determines that maximum limits set by local or regional noise ordinances are exceeded.[2,3]	X	—	X	X	X	X	X	X	X	X
Population and Housing	• Planned growth would be subject to growth management provisions of applicable general plans.	—	—	—	X	X	—	—	—	—	—
Public Services	• Notify local emergency and police service providers of construction activities and road closures, if any, and coordinate with the local police protection to establish alternative routes and traffic control during the installation activities.[3]	—	—	X	X	X	X	X	X	—	X

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Transportation and Traffic	• Use signage, striping, fencing, barricades, and other physical structures to mark the excavated areas, promote safety, and minimize pedestrian/bicyclist accidents.[2]	X	—	X	X	X	X	X	X	—	X
	• Control traffic with signals or traffic control personnel in compliance with authorized local police or California Highway Patrol requirements.[2]	X	—	X	X	X	X	X	X	—	X
	• Develop and implement a project-specific construction traffic management plan to minimize traffic impacts on the local circulation system and ensure that construction activities adhere to local and state police and transportation requirements. A construction traffic management plan could address traffic control for any street closure, detour, or other disruption to traffic circulation; identify the routes that construction vehicles will use to access the site, hours of construction traffic, and traffic controls and detours; and include strategies for temporary traffic control, temporary signage and tripping, location points for ingestion and egress of construction vehicles, staging areas, and timing of construction activity that appropriately limits hours during which large construction equipment may be brought on or offsite and identify the need for and use of signage, striping, fencing, barricades, and other physical structures to mark minimize pedestrian/bicyclist accidents and identify public transit closures, or relocations, if needed.[2]	X	—	X	X	X	X	X	X	—	X
	• Restore public transit facilities, bicycle lanes, or pedestrian facilities (e.g., sidewalks) if closed, damaged or moved during construction, prior to the completion of construction of the entire project.	X	—	X	X	X	X	X	X	—	X
	• Limit or restrict hours of construction so as to avoid peak traffic times.[2]	X	—	X	X	X	X	X	X	—	X
Utilities and Service Systems	• Coordinate power outages and notify potentially affected utility users of temporary loss of electricity.[6]	—	—	X	X	X	X	X	X	—	X
	• Existing underground utility lines at excavation sites will be identified prior to construction and underground utility lines will be avoided or relocated in coordination with the utility company or service provider.[6]	—	—	X	X	X	X	X	X	—	X
	• Comply with all provisions of the applicable codes for the county or counties in which construction of a septic system is proposed, including the design and installation of septic systems. The design of those systems will be required in accordance with applicable county code to comply with all design requirements, including for factors such as wastewater generation, soil types within the leach field, percolation testing, and slope of the leach field.	—	—	—	—	X	—	—	—	—	—

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Operation											
Aesthetics	• Direct operational lighting away from any residential and roadway areas.[2]	X	—	—	X	X	X	X	X	—	X
	• Develop and implement a lighting plan to comply with local jurisdiction lighting requirements that may exist. The lighting plan could include stipulations such as the following. ○ Design site lighting and exterior building light fixtures to reduce the effects of light pollution and glare off of glass and metal surfaces. ○ Lighting shall be directed downward and light fixtures shall be shielded to reduce upward and spillover lighting. ○ Where it is not feasible to fully shield light fixtures from emitting light pollution, the lighting shall be directed downward and be of the minimum wattage and height suitable for illuminating the areas to be secured and the exterior work areas for worker safety.[4]	X	—	—	X	X	X	X	X	—	X
	• Apply minimum lighting standards.[6]	—	—	—	X	X	X	X	X	—	X
	• Use landscape vegetation to buffer views of new facilities if sensitive receptors are present and reduce visibility of new structures.[2,6]	X	—	X	X	X	X	X	X	—	X
	• Use building materials that do not create a source of glare if sensitive receptors are present.[2,6]	X	—	X	X	X	X	X	X	—	X
Agriculture and Forestry Resources	• Treat used municipal water and return it to the senior water right holder as recycled water for agricultural uses.	—	—	—	—	X	—	—	—	—	—
Air Quality	• Apply appropriate mitigation measures from the applicable air district to reduce operational emissions. These measures are suggested by the district or are documented in official rules and guidance reports; however, not all districts make recommendations for operational mitigation measures. Where applicable, measures will be applied on a project-level basis and may be tailored in consultation with the appropriate air district, depending on the severity of anticipated operational emissions.[5]	—	—	X	X	X	X	X	X	—	X
	• Apply appropriate TAC and HAP mitigation measures from the applicable air district to reduce public exposure to DPM, pesticides, and asbestos. These measures are suggested by the district or are documented in official rules and guidance reports; however, not all districts make recommendations for mitigation measures for TAC/HAP emissions. These measures will be applied on a project-level basis and may be tailored in consultation with the appropriate air district, depending on the severity of anticipated TAC/HAP emissions.[5]	—	—	X	X	X	X	X	X	—	X
	• Perform necessary equipment maintenance, such as inspections and corrections, to detect failures early so that the equipment operates cleanly and efficiently.[2]	X	—	X	—	X	X	X	X	—	—
	• Use maintenance vehicles with zero-emission or lower-emission engines.[2]	—	—	X	—	X	X	X	X	—	—

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Limit the unnecessary idling of delivery vehicles and equipment.[2]	—	—	X	—	X	X	X	X	—	—
	• Use low/zero carbon fuels, such as B20 biodiesel or renewable diesel.[2]	—	—	X	—	X	X	X	X	—	—
	• Install diesel particulate filter and utilize diesel oxidation catalyst.[6]	—	—	—	—	X	—	—	—	—	X
	• Require the pump system be electric or alternatively fueled.[6]	—	—	—	—	X	—	—	—	—	X
Biological Resources	• During maintenance activities, properly contain or remove all trash that may attract predators to the worksite.[2]	—	—	X	X	X	X	—	—	—	X
Geology and Soils	• Comply with all provisions of the applicable codes for the county or counties in which operation of a septic system is proposed, including the design and installation of septic systems. The design of those systems will be required in accordance with applicable county code to comply with all design requirements, including for factors such as wastewater generation, soil types within the leach field, percolation testing, and slope of the leach field.	—	—	—	—	X	—	—	—	—	—
Greenhouse Gas Emissions	• See measures in Air Quality, above.	X	—	X	X	X	X	X	X	—	X
	• Perform necessary equipment maintenance, such as inspections and corrections, to detect failures early so that the equipment operates cleanly and efficiently.[2]	X	—	X	X	X	X	X	X	—	X
	• Implement water recycling practices or policies.[2]	—	—	X	—	X	—	—	X	—	—
	• The California Attorney General's office report entitled, *Addressing Global Warming at the Local Agency Level*, identifies various example measures to reduce GHG emissions at the project level (California Department of Justice 2008). The following mitigation measures and project design features were compiled from the California Attorney General's Office report. These measures are not meant to be exhaustive but to provide a sample list of measures that could be incorporated into future project design. The solid waste measures and transportation measures are listed below. ○ Reuse and recycle construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard). ○ Provide interior and exterior storage areas for recyclables and green waste and adequate recycling containers. ○ Recover byproduct methane to generate electricity. ○ Limit idling time for commercial vehicles, including delivery and construction vehicles. ○ Use low- or zero-emission vehicles, including construction vehicles.[5]	—	—	X	X	X	X	X	X	—	X
	• Require pump system to be electric.[6]	X	—	—	—	X	—	—	—	—	X

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
Hazards and Hazardous Materials	• Provide hazardous materials and worksite safety training for workers who maintain the projects in accordance with local, state, and federal requirements, such as the Occupational Safety and Health Act, Title 9 of the Code of Federal Regulations, and Title 8 of the California Code of Regulations.[2]	X	—	X	—	X	—	X	X	—	—
	• Provide hazardous materials accidental spill response plans (and/or Hazardous Materials Management Program) and training that would outline methods, materials, and responsibilities for the response to, and clean-up of, an accidental hazardous material spill during long-term maintenance of the project. At a minimum, the plans should include provisions for immediate response, containment, and cleanup of a spill, including excavation and disposal of contaminated soil and notification responsibilities. Materials needed for potential clean-up activities should be kept onsite.[2,6]	X	—	X	X	X	—	X	X	—	X
	• Provide a health and safety plan for maintenance workers that is prepared by a certified industrial hygienist; complies with all appropriate local, state, and federal regulations; and identifies specific safety measures to be followed during long-term operation.[2]	X	—	X	X	X	—	X	X	—	X
	• Label all hazardous materials onsite to inform users of potential risks, and train users in appropriate handling, storage, and disposal procedures.[2]	X	—	X	X	X	—	X	X	—	X
	• Maintain an adequate number of fire extinguishers and other tools and equipment that can be used for fighting fire onsite, and ensure that personnel are trained in their use.[2]	X	—	X	X	X	—	X	X	—	X
	• Provide equipment that provides operations personnel and fire agencies the ability to communicate with one another.[2]	X	—	X	X	X	—	X	X	—	X
	• Maintain a defensible space around the perimeter of the project area.[2]	—	—	X	X	X	—	X	X	—	X
	• Implement dust-suppression and other measures available to prevent risks associated with inhaling dust and exhaust during maintenance activities.[2]	X	—	X	—	X	—	—	X	—	—
	• Dewater and dispose of waste brine at an appropriate landfill. If suitable, and depending on the volumes and characterization of the brine, use the brine byproduct in a solar-thermal electrical generation process to help offset electrical costs to run a desalination device.	—	—	—	—	X	—	X	X	—	—
Hydrology and Water Quality	• Actively educate project personnel about tsunami and seiche hazards, characteristics, and evacuation routes as part of site safety training.[2]	—	—	—	—	X	—	—	—	—	—
	• Develop multiple ways to receive tsunami and seiche warnings and alert site personnel.[2]	—	—	—	—	X	—	—	—	—	—
	• Develop a formal tsunami hazard plan as part of the project's site safety plan, and conduct emergency exercises.[2]	—	—	—	—	X	—	—	—	—	—

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Comply with all provisions of the applicable codes for the county or counties in which operation of a septic system is proposed, including the design and installation of septic systems. The design of those systems will be required in accordance with applicable county code to comply with all design requirements, including for factors such as wastewater generation, soil types within the leach field, percolation testing, and slope of the leach field.	—	—	—	—	X	—	—	—	—	—
Noise	• Employ noise-reducing operational measures; develop plans for operations and maintenance activities to address the variety of available measures to limit the impacts from noise on adjacent homes, businesses, or sensitive habitats.[2, 6]	X	—	X	—	X	X	—	X	—	X
	• Ensure all noise producing equipment under operating conditions (e.g., pumps) are enclosed or located behind barriers such that noise does not exceed applicable local noise standards or limits specified in the applicable county ordinances and general plan noise elements if sensitive receptors are present.[5]	X	—	X	X	X	X	—	X	—	X
Public Services	• Coordinate reservoir and associated recreational plans with local towns, counties, Sheriff's Department, Highway Patrol, CALFIRE, and other agencies to identify needed permit and regulatory oversight, police and fire protection and other public services for both construction and operations.	—	—	—	—	X	—	—	—	—	—
	• Coordinate reservoir development and operation plans (including associated recreation sites) with local, county, and state agencies to identify funding sources needed for increased personnel, equipment, and facilities.	—	—	—	—	X	—	—	—	—	—
Transportation and Traffic	• Follow SJCOG Regional Congestion Management Program (RCMP) policy regarding mitigation measures for capital improvement projects, which includes: mitigation measures must be adequate to allow RCMP roadway to meet RCMP LOS Standard; mitigation measures must be fully funded to be considered adequate; mitigation measures that rely on state or federal funds directed by or influenced by SJCOG must be consistent with project funding priorities established in the capital improvement plan of the RCMP and RTP or Federal TIP; and, for those mitigation measures that involve fair share contributing for mitigating cumulative impacts, the fee must be committed to funding priorities established in the capital improvement plan of the RCM, the RTP, or the Federal TIP.[8]	—	—	—	—	—	X	X	X	—	—
	• Prepare cumulative impacts on the RCMP network and reflect the most recently approved development projects from the lead agency as well as from adjacent jurisdictions (including currently programmed infrastructure improvements). [8]	—	—	—	—	—	X	X	X	X	—
	• If an RCMP intersection is projected to operate at LOS E or F after trip exemptions have been accounted for, the affected jurisdiction can choose to proactively prepare a deficiency plan in lieu of waiting for the facility to possibly fail after the development is implemented.[8]	—	—	—	—	—	X	X	X	X	—

Resource	Potential Mitigation Measure	Substituting Surface Water with Groundwater	Aquifer Storage and Recovery	Recycled Water Sources	In-Delta Diversion	New Surface Water Storage	New Source Water Supplies	Salinity Pretreatment Programs	Wastewater Treatment Plant Desalinization	Agricultural Return Flow Salinity Control	Low Lift Pump Station(s)
	• Follow the SJCOG RCMP specific mitigation fee program relative to cumulative regional impacts, if applicable, and track actual funding/implementation.[8]	—	—	—	—	—	X	X	X	X	—
Utilities and Service Systems	• Comply with all provisions of the applicable codes for the county or counties in which operation of a septic system is proposed, including the design and installation of septic systems. The design of those systems will be required in accordance with applicable county code to comply with all design requirements, including for factors such as wastewater generation, soil types within the leach field, percolation testing, and slope of the leach field.	—	—	—	—	X	—	—	—	—	—

Sources: [1]North Coast Regional Water Quality Control Board 2009, [2]Central Valley Water Board 2010a, [3]California Regional Water Quality Control Board, Los Angeles Region 2011, [4]City of Tracy 2011, [5]Central Valley Water Board 2010b, [6]DWR 2011c, [7]SFPUC 2007, [8]SJCOG 2016b, [9]CALFED 2000b.

Notes:

[a] Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts would be mitigated to less than significant once mitigation measures were implemented.

[b] Potential mitigation measures for conflicts with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations protecting biological species and resources that maybe attributable to land use and planning are presented in the Biological Resources sections in this table.

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16.6.2 Non-Flow Measures

The regulated public agencies would likely be required to comply with CEQA and perform a project-specific analysis, and engineering design should they determine the need, to approve a discretionary action associated with a non-flow measure. The project-specific analysis would be required to identify potentially significant environmental impacts. The lead agency would be required to require the implementation of all feasible mitigation measures to reduce impacts to less than significant or be responsible for providing a statement of overriding considerations for significant impacts that cannot be mitigated to a level of less than significant. Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, identifies the potential mitigation measures that the regulated community could implement should they determine a discretionary action they approve has significant impacts. These mitigation measures are based, in part, on mitigation measures presented in the following documents.

- *Proposed Amendment to the Water Quality Control Plan for the North Coast Region to Establish Exception Criteria to Point Source Waste Discharge Prohibition by Raising the Action Plan for Storm Water Discharges and Adding a New Action Plan for Low Threat Discharges* (North Coast Regional Water Quality Control Board 2009).
- *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento and San Joaquin Delta Estuary* (Central Valley Water Board 2010a).
- *Substitute Environmental Document for Toxic Pollutants in the Dominguez Chanel and Greater Los Angeles and Long Beach Waters Total Maximum Daily Load* (California Regional Water Quality Control Board, Los Angeles Region 2011).
- *Initial Study and Mitigated Negative Declaration for the Tracy Desalination and Green Energy Project* (City of Tracy 2011).
- *Irrigated Lands Regulatory Program Environmental Impact Report* (Central Valley Water Board 2010b).
- Low Head Pump Salinity Control Study Prepared to Meet Requirements of the State of California State Water Resources Control Board Water Rights Order WR 2010-0002, Condition A.7. Appendix C: Environmental Considerations for South Delta Low Head Pump Station (DWR 2011c).
- *Water Supply Options* (SFPUC 2007).
- *Biological Opinion for the 2014 Georgiana Slough Floating Fish Guidance Structure Study in Sacramento County* (NMFS 2014b).
- *Battle Creek Salmon and Steelhead Restoration Project. Environmental Implementation Plan* (ICF Jones & Stokes 2013).
- *Bay Delta Conservation Plan. Public Draft* (DWR 2013c).

An SED must identify feasible mitigation measures for each significant environmental impact identified in the SED. (Cal. Code Regs., tit. 23, § 3777, subd. (b)(d).) Feasible mitigation measures are intended to avoid, reduce, or compensate for adverse impacts on a resource and can include actions such as implementation of plans to minimize impacts. For each impact identified as significant, a mitigation measure to reduce that impact to a less-than-significant level is described, if appropriate, or the infeasibility of mitigation is discussed. One legal factor that may render a mitigation measure infeasible is the limited authority of the lead agency. CEQA does not grant agencies new, discretionary powers independent of the powers granted to the agencies by other laws. (Pub. Resources Code, § 21004; Cal. Code Regs., tit. 14, § 15040.) Accordingly, a mitigation measure may be legally infeasible if the lead agency does not have the discretionary authority to implement it. In addition, economic considerations may render mitigation measures infeasible. (Pub. Resources Code, § 21004; Cal. Code Regs., tit. 14, §§ 15040, 15041, 15126.4, 15364.) The authority to require project-level mitigation lies with the lead agencies undertaking or approving the individual projects, not the State Water Board. These agencies can and should impose the mitigation measures presented in Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*.

Table 16-39. Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures[a]

Resource	Potential Mitigation Measure	Floodplain and Riparian Habitat Restoration	Gravel Augmentation	Enhanced In-Channel Complexity	Improve Temperature Conditions	Fish Screens	Physical Barriers in Southern Delta	Predatory Fish Control	Invasive Aquatic Vegetation Control
Construction									
Aesthetics	• Direct construction lighting away from residential and roadway areas if sensitive receptors are present.[2]	—	—	—	X	—	X	—	—
Agriculture and Forestry Resources	• Require payment of the appropriate Agricultural Mitigation Fee, as required by local agencies consistent with applicable law, to offset the loss of Prime and Unique Farmland if construction activities disturb or destroy Prime Farmland or Unique Farmland, as defined by the California Department of Conservation.[4]	X	—	—	—	—	—	—	—
	• Avoid agricultural lands (Prime Farmland, Unique Farmland, and Farmland of Statewide Importance) to the greatest extent possible.[6]	X	—	—	—	—	—	—	—
	• Restore existing degraded habitat as a priority before converting agricultural land (Prime Farmland, Unique Farmland, and Farmland of Statewide Importance). [10]	X	—	—	—	—	—	—	—
	• Site and align project features to avoid or minimize impacts on agriculture, particularly on Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. [10]	X	—	—	—	—	—	—	—
	• Focus habitat restoration efforts on developing new habitat on public lands before converting agricultural land (Prime Farmland, Unique Farmland, and Farmland of Statewide Importance). [10]	X	—	—	—	—	—	—	—
	• If public lands are not available for restoration efforts, focus restoration efforts on acquiring lands that can meet ecosystem restoration goals from willing sellers where at least part of the reason to sell is an economic hardship (for example, lands that flood frequently or where levees are too expensive to maintain). [10]	X	—	—	—	—	—	—	—
	• Use farmer-initiated and developed restoration and conservation projects as a means of reaching project goals. [10]	X	—	—	—	—	—	—	—
	• Obtain easements on existing agricultural land for minor changes in agricultural practices (such as flooding rice fields after harvest) that would increase the value of the agricultural crop(s) to wildlife. [10]	X	—	—	—	—	—	—	—
	• Include provisions in floodplain restoration efforts for compatible agricultural practices. [10]	X	—	—	—	—	—	—	—
	• Use a planned or phased habitat development approach in concert with adaptive management. [10]	X	—	—	—	—	—	—	—
	• Minimize the amount of water supply required to sustain habitat restoration acreage. [10]	X	—	—	—	—	—	—	—
	• Implement features that are consistent with local and regional land use plans. [10]	X	—	—	—	—	—	—	—
	• Involve all affected parties, especially landowners and local communities, in developing appropriate configurations to achieve the optimal balance between resource impacts and benefits. [10]	X	—	—	—	—	—	—	—

Resource	Potential Mitigation Measure	Floodplain and Riparian Habitat Restoration	Gravel Augmentation	Enhanced In-Channel Complexity	Improve Temperature Conditions	Fish Screens	Physical Barriers in Southern Delta	Predatory Fish Control	Invasive Aquatic Vegetation Control
Air Quality	• Apply appropriate construction mitigation measures from the applicable air district (e.g., SJVAPCD) to reduce construction emissions. These measures will be applied on a project-level basis and may be tailored in consultation with the appropriate air district, depending on the severity of anticipated construction emissions.[5]	X	X	X	X	X	X	X	X
	• Apply appropriate TAC and HAP mitigation measures from the applicable air district to reduce public exposure to DPM pesticides, and asbestos. These measures are documented in official rules and guidance reports; however, not all districts make recommendations for mitigation measures for TAC/HAP emissions. These measures will be applied on a project-level basis and may be tailored in consultation with the appropriate air district, depending on the severity of anticipated TAC/HAP emissions.[5]	X	X	X	X	X	X	X	X
	• Use vehicles with zero-emission or lower-emission engines.[2]	X	X	X	X	X	X	X	X
	• Limit the unnecessary idling of vehicles and equipment.[2]	X	X	X	X	X	X	X	X
	• Use low/zero carbon/alternative fuels, such as B20 biodiesel or renewable diesel.[2]	X	X	X	X	X	X	X	X
	• Control visible emissions from off-road diesel powered equipment.[2]	X	X	X	X	X	X	X	X
	• Design structural devices to minimize the frequency of maintenance trips.[2]	X	X	X	X	X	X	X	X
	• Perform necessary equipment maintenance, such as inspections and corrections, to detect failures early keep equipment operating cleanly and efficiently.[2]	X	X	X	X	X	X	X	X
	• Use the proper sized equipment for the job during construction and operation.[2]	X	X	X	X	X	X	X	X
	• Train equipment operators in proper use of equipment during construction and operation.[2]	X	X	X	X	X	X	X	X
	• Produce concrete onsite if determined to be less emissive than transporting ready mix.[2]	—	—	—	X	X	X	—	—
	• Use locally sourced or recycled materials for construction materials.[2]	—	—	—	X	X	X	—	—
	• Control fugitive dust emissions during land clearing, grubbing, scraping, excavation, leveling, grading, or cut and fill operations with application of water (at least twice daily) or by presoaking.[2,4]	X	X	X	X	X	X	X	X
	• Cover stockpiles of soil, sand, and other materials, and stabilize all disturbed areas and storage piles that are not being actively utilized for construction purposes using water, chemical stabilizers, or by covering with tarps, other suitable cover, or vegetative ground cover.[2,4]	X	X	X	X	X	X	X	X
	• Pave, apply water, or apply soil stabilizers to unpaved areas, including all access roads and parking areas.[2,4]	X	X	X	X	X	X	X	X
	• Sweep surrounding streets and paved areas (e.g., once per day).[2]	X	X	X	X	X	X	X	X
	• Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 miles per hour and/or greater than 20 miles per hour over a 1-hour period.[2,4]	X	X	X	X	X	X	X	X
	• Initiate landscaping and revegetation as soon as construction tasks allow in order to minimize wind erosion.[2]	X	X	X	X	X	X	X	—
	• Encourage ride sharing and of use transit transportation for construction employees commuting to the project site.[4]	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Floodplain and Riparian Habitat Restoration	Gravel Augmentation	Enhanced In-Channel Complexity	Improve Temperature Conditions	Fish Screens	Physical Barriers in Southern Delta	Predatory Fish Control	Invasive Aquatic Vegetation Control
	• Use electric equipment for construction whenever possible in lieu of fossil fuel-powered equipment.[4]	X	X	X	X	X	X	X	X
	• Discontinue all construction activities during first stage smog alerts, first stage ozone alerts, and/or curtail construction during periods of high ambient pollutant concentrations.[4]	X	X	X	X	X	X	X	X
	• Water previously disturbed exposed surfaces (soil) a minimum of 3 times per day or whenever visible dust is capable of drifting from the site or approaches 20 percent opacity.[4]	X	X	X	X	X	X	X	X
	• Water all haul roads (unpaved) a minimum of 3 times per day or whenever visible dust is capable of drifting from the site or approaches 20 percent opacity.[4]	X	X	X	X	X	X	X	X
	• Reduce speed on unpaved roads to less than 15 miles per hour.[4]	X	X	X	X	X	X	X	X
	• Install and maintain a trackout control device that meets the specifications of regional air board requirements if needed (e.g., SJVAPCD Rule 8041 if the site exceeds 150 vehicle trips per day or more than 20 vehicle trips per day by vehicles with three or more axles.[4]	X	X	X	X	X	X	X	X
	• Cover trucks hauling debris, soil, sand, or other material to reduce dust and suspended air particles, and when transporting materials offsite, maintain a freeboard limit of at least 6 inches or effectively wet to limit visible dust emissions.[4,2]	X	X	X	X	X	X	X	X
	• Limit and remove the accumulation of mud and/or dirt from adjacent public roadways at the end of each workday.[4]	X	X	X	X	X	X	X	X
	• Remove visible trackout from the site at the end of each workday.[4]	X	X	X	X	X	X	X	X
	• Comply with applicable regional air board asphalt-concrete paving rules such as SJVAPCD Rule 4641 (e.g., restrict use of cutback, slow-sure, and emulsified asphalt paving materials).[4]	X	X	X	X	X	X	X	X
	• Install diesel particulate filter and utilize diesel oxidation catalyst.[6]	X	X	X	X	X	X	X	X
	• Require the pump system be electric or alternatively fueled.[6]			X		X	X	X	
	• Locate pump system/emissions generating activity as far from sensitive receptors as possible.[6]	X	X	X	X	X	X	X	X
Biological Resources[b]	• Prior to land disturbance, contact USFWS and CDFW and conduct all necessary preconstruction surveys for special-status plants, species, and habitat prior to construction activities. This may include the hiring of a qualified biologist to identify riparian and other sensitive vegetation communities and/or habitat for special-status plants and animals.[1, 5,6]	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Floodplain and Riparian Habitat Restoration	Gravel Augmentation	Enhanced In-Channel Complexity	Improve Temperature Conditions	Fish Screens	Physical Barriers in Southern Delta	Predatory Fish Control	Invasive Aquatic Vegetation Control
	• Comply with local, state, and federal regulations and ordinances such as those listed below. ○ USFWS ESA Section 7 consultation for threatened and endangered species.[2] ○ U.S. Army Corps of Engineers Section Clean Water Act 404 Permit and State Clean Water Act Section 401 Water Quality Certification for filling or dredging waters of the United States and other federal permitting actions.[2, 5] ○ CDFW California Fish and Game Code Section 1601 Agreement for Streambed Alteration.[2] ○ State Water Board WDRs (which are also permits for purposes of the Clean Water Act, if applicable).[2] ○ General plan conservation requirements.[2]	X	X	X	X	X	X	X	X
	City and/or county tree ordinances.[2]	X	X	X	X	X	X	X	X
	• Contract with qualified botanists, wildlife biologists, and arborists to develop biological assessments if a project's specific location warrants doing so. At a minimum, assessments should include project area-specific literature searches, reviews of CDFW's California Natural Diversity Database and the California Native Plant Society's Inventory of Rare and Endangered Plants of California, and field surveys of all potential project sites and their surrounding areas to identify and map existing plant communities, wildlife habitat, and heritage trees, and to identify wildlife species that currently occur, have occurred in the past (e.g., resident and migratory wildlife species that have been documented as foraging or nesting at the site), or have the potential to occur at the site due to the presence of suitable habitat. Field surveys should follow protocols established by CDFW and should be conducted during the appropriate time(s) of year (e.g., during the blooming period of potentially occurring plant species).[2,5]								
	• Avoid and minimize disturbance of riparian and other sensitive vegetation communities.[5]	X	X	X	X	X	X	X	X
	• Avoid and minimize disturbance of areas containing special-status plant or animal species.[5]	X	X	X	X	X	X	X	X
	• Where adverse effects on sensitive biological resources (including fish species) cannot be avoided, undertake additional CEQA review and develop a restoration or compensation plan to mitigate the loss of the resources.[5]	X	X	X	X	X	X	X	X
	• Where construction in areas that may contain special-status fish species cannot be avoided through the use of alternative management practices, conduct an assessment of habitat conditions and the potential for presence of special-status fish species prior to construction; this may include the hiring of a qualified fish biologist to determine the presence of special-status fish species.[5]	X	X	X	X	X	X	X	X
	• Based on the species present in adjacent waterbodies and the likely extent of construction work that may affect fish, limit construction to periods that avoid or minimize impacts on special-status fish species.[5]	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Floodplain and Riparian Habitat Restoration	Gravel Augmentation	Enhanced In-Channel Complexity	Improve Temperature Conditions	Fish Screens	Physical Barriers in Southern Delta	Predatory Fish Control	Invasive Aquatic Vegetation Control
	• If there is a possibility of fish stranding within cofferdams, a fish rescue plan will be written and submitted to the appropriate resource agencies (NMFS, CDFW). Some of the following actions may be included:[9] ○ Fish rescue operations will occur at any project site where dewatering and resulting isolation of fish may occur, e.g., when dewatering creates pools within the stream channel or when an enclosed area within a cofferdam is dewatered. ○ Collection of fish for rescue from areas isolated by dewatering may occur by electrofishing, netting (seining or dipnetting), or a combination of these. The appropriate collection method will be determined based on site conditions. ○ The fish rescue team will include at least one person with a 4-year college degree in fisheries or biology, or a related degree. The person also must have at least 2 years of professional experience in fisheries field surveys and the use of electrofishing equipment. ○ Transfer captured fish into 5-gallon buckets filled with clean, cold creek water, supplied either with an aerator to maintain an adequate dissolved oxygen concentration or multiple small holes to provide flow-through conditions when placed on the creek bed. ○ Note the date, time, and location of collection; species; number of fish; approximate age (e.g., young-of-the-year, yearling, adult); fish condition (dead, visibly injured, healthy); approximate water depth; and water temperature. ○ Release living anadromous salmonids downstream of the project area if it is determined that they are downstream migrants, noting release date, time, and location. ○ Place dead fish in sealed zip-lock bags on ice with labels indicating species, location, date, and time of collection, and store them on ice. ○ Freeze collected dead fish as soon as possible, provide the frozen specimens to the USFWS Office for tissue analysis and run determination (if possible), and retain specimens until NMFS advises on their disposition or until 6 months after capture.	—	—	X	—	X	X	—	—
	• Develop a mitigation and management plan in coordination with CDFW and USFWS to implement all appropriate measures as required by USFWS ESA Section 7 consultation and to satisfy any other local, state, and federal requirements for achieving no net loss of wetlands, riparian habitat or other critical habitat, or take of wildlife species of concern. The plan should be submitted to the local city/county environmental planning department, U.S. Army Corps of Engineers, USFWS, CDFW, applicable regional board (e.g., as part of a Clean Water Act Section 401 Water Quality Certification application), and/or other oversight agencies as applicable for approval prior to its implementation if an impact on special-status species population(s) is determined to occur based on the biological assessment and evaluation of the final project site and design.[2]	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Floodplain and Riparian Habitat Restoration	Gravel Augmentation	Enhanced In-Channel Complexity	Improve Temperature Conditions	Fish Screens	Physical Barriers in Southern Delta	Predatory Fish Control	Invasive Aquatic Vegetation Control
	• Develop a revegetation plan if vegetation would be disturbed during construction or operation. The re-vegetation plan should be prepared by a qualified restoration ecologist and reviewed by the appropriate agencies. The plan should specify sites where revegetation should take place, the planting stock appropriate for the region, appropriate designs (e.g., plant arrangements that, when mature, replicate the natural structure and species composition of similar habitats in the region), planting techniques, monitoring frequency, and success criteria (e.g., sapling trees no longer require active management).[2]	X	X	X	X	X	X	X	X
	• Establish temporary construction buffers for drainages, wetlands/vernal pools, and other sensitive habitat in the project area that could be affected by construction activities. The outer edges of the buffer zones will be demarcated using flagging or temporary orange mesh construction fencing before initiation of construction activities and based on site-specific conditions, seasonal restrictions for wildlife, local planning department specifications, and resource agency (e.g., USFWS and CDFW) requirements.[2, 6]	X	X	X	X	X	X	X	X
	• Require a qualified biologist to perform the following construction functions if sensitive habitat or species are present. ○ Perform required preconstruction surveys to determine the current presence of, and demarcate the boundaries of construction buffers around, sensitive habitats, and submit survey reports according to CDFW and local agency guidelines for approval prior to construction.[1, 2, 5, 6] ○ Provide USFWS-approved worker environmental awareness training that informs all construction personnel about sensitive plant and wildlife species and habitats.[2] ○ Oversee major excavation and other construction activities with the authority to stop construction activities until appropriate corrective measures have been completed.[2] ○ Report to USFWS any incidental take.[2] ○ Periodically re-inspect the project site (e.g., every week) during construction activities or whenever a there has been a substantial lapse in construction activity (e.g., more than 2 weeks).[2]	X	X	X	X	X	X	X	X
	• Locate temporary access roads and staging areas outside the boundaries of critical habitat areas, restrict movement of heavy equipment to and from the project site to established roadways and areas designated for construction and staging, and do not allow parking of vehicles or storage of potentially-toxic chemicals near or up-gradient of drainages or sensitive habitats or under heritage trees.[2]	X	X	X	X	X	X	X	X
	• Implement measures to control dust, erosion, and noise (see the Air Quality, and Geology and Soils, respectively).[2]	X	X	X	X	X	X	X	X
	• Properly contain or remove all trash that may attract predators to the worksite during construction.[2]	X	X	X	X	X	X	X	X
	• Remove any temporary fill and construction debris and, wherever feasible, restore disturbed areas to pre-project conditions according to the before-mentioned revegetation plan after completion of construction activities.[2]	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Floodplain and Riparian Habitat Restoration	Gravel Augmentation	Enhanced In-Channel Complexity	Improve Temperature Conditions	Fish Screens	Physical Barriers in Southern Delta	Predatory Fish Control	Invasive Aquatic Vegetation Control
	• Provide compensation for unavoidable degradation or loss of critical habitat due to project construction to ensure no net loss of that habitat as required by local, state, or federal agencies. Compensation could be provided at a minimum ratio (e.g., 3:1, 3 acres of restored wetlands for every 1 acre affected, or three native oak trees planted for every native oak tree eliminated) that ensures long-term replacement of habitat functions and values and complies with local, state, and federal requirements. Examples of compensation are as follows. ○ Construct replacement habitat as close as possible to the previous habitat location at the project site (e.g., locate replacement riparian and wetland habitats along the same drainage affected by the project construction). ○ If site limitations prevent onsite habitat replacement, construct replacement habitat as near the project site as possible.	X	X	X	X	X	X	X	X
	• Provide payment on a per-acre basis to an approved restoration or mitigation bank or other trust fund.[2]	X	X	X	X	X	X	X	X
	• Comply with measures contained within habitat conservation plans or natural community conservation plans, such as the San Joaquin Multi-Species Habitat Conservation and Open Space Plan. Consult with appropriate biologists who have training and are knowledgeable about the habitat conservation plan or natural community conservation plan. Monitoring, construction, and relocation surveys by a qualified biologist would be done as appropriate.[4]	X	X	X	X	X	X	X	X
	• Prior to implementing any management practice that would result in the permanent loss of wetlands, conduct a delineation of affected wetland areas to determine the acreage of loss in accordance with current U.S. Army Corps of Engineers methods. For compliance with the Clean Water Act Section 404 permit and WDRs, compensate for the permanent loss (fill) of wetlands and ensure no net loss of habitat functions and values. Compensation ratios will be determined through coordination with the Central Valley Water Board and U.S. Army Corps of Engineers as part of the permitting process. Compensation may be a combination of mitigation bank credits and restoration/creation of habitat, as described below. ○ Purchase credits for the affected wetland type (e.g., perennial marsh, seasonal wetland) at a locally approved mitigation bank and provide written evidence to the resource agencies that compensation has been established through the purchase of mitigation credits. ○ Develop and ensure implementation of a wetland restoration plan that involves creating or enhancing the affected wetland type.[5]	X	X	X	X	X	X	X	X
	• Install species exclusion fencing for animal species during construction; install a temporary, plastic mesh-type construction fences at least 1.2 m tall around any established special-status plant species buffer areas to prevent encroachment by construction vehicles and personnel; a qualified biologist will determine the exact location of the fencing.[6]	X	X	X	X	X	X	X	X
	• Conduct pile driving with vibratory hammer.[6]	—	—	—	X	X	X	X	—

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	• Monitor underwater sound generated by impact and vibratory hammers during pile installation. Monitoring shall be conducted to verify that sound level criteria are not being exceeded as calculated in the project description. If levels are exceeded, NMFS shall be notified and work halted until corrective actions are instituted to achieve sound level criteria.	—	—	—	X	X	X	X	—
	• Implement turbidity monitoring during construction/removal.[6]	X	X	X	X	X	X	—	X
	• Mitigation Measures for Hook and Line Sampling: ○ Implement environmental awareness program for construction personnel.[6] ○ Implement measures to decrease injury/mortality for predatory fish control hook and line sampling:[8] ○ Do not use soft lures or live bait. ○ For bait fishing, a circle hook will be used to minimize potential for injury, but may be barbed. ○ All listed fish (salmonids, green sturgeon) will be handled as little as possible. Remove hook from the captured fish while the fish is still in the water and release the fish as soon as possible with the minimal amount of handling required to complete the release. ○ If any deviation from this protocol occurs, the methods used to unhook the fish and release it and the reasons for the deviation from the protocol will be documented. These methods may include but are not limited to: – Cutting the fishing line outside of the mouth of deeply-hooked fish and allowing the hook to remain in the fish. A deeply-hooked fish is more likely to occur with bait and when the presentation of the bait is on a "slack line" technique rather than fished on a "tight" line technique. This reduces collateral injury and excessive bleeding of the fish through attempting to remove a deeply embedded hook. Retained hooks will eventually dissolve or will naturally be expelled from these fish. – Gently holding fish for extended periods of time in the water to ensure resuscitation and recovery by providing water flow through their mouth and gills. Fish are retained until they regain normal ventilatory movement of their gills and re-establish their equilibrium in the water prior to release.	—	—	—	—	—	—	X	—
	• Measures for Invasive Aquatic Plant Control (performed by DBW): ○ Timing restrictions based on outmigration of juvenile salmonids at specific sites (e.g., no treatment before June 1 at sites with juvenile outmigration, no treatment from October 16 to March 31) ○ Survey for elderberry shrubs and treat at low tide if any elderberry shrubs are within 100 ft of the water's edge ○ Application window restrictions on timing between repeat applications for water hyacinth ○ An aquatic pesticide application plan including BMPs.	—	—	—	—	—	—	—	X

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	○ A pesticide application log including specific information on each application ○ The Water Hyacinth Control Program Protocol and Procedures Manual and appendices that include requirements covering herbicide handling, treatment planning protocol, day of treatment protocols, and BMPs, plus the permit conditions of the two biological opinions and the NPDES permit (DBW 2009). ○ Environmental awareness training for all field crew members – Species identification and impact avoidance guidelines – Protocol for identification and protection of elderberry shrubs – Protocol for identification and protection of delta smelt, Chinook salmon, steelhead, green sturgeon, and associated protected habitats – Protocol for take of protected species – Use and calibration of equipment ○ Monitoring and monthly reporting of the following. – Pre- and posttreatment measurements of chemical residue, pH, turbidity levels, water temperature, and DO at selected sites – Water temperature and DO changes resulting from EDCP activities – Amounts, types, and dates of herbicide application at each site – Visual assessment of pre- and posttreatment conditions of treated sites to determine efficacy of treatment and any effects of chemical drift – Operational status of equipment and vessels ○ A water monitoring program requiring that a minimum of 10 percent of all treatment sites be sampled for each water type to collect and analyze Delta water quality data, and results of chemical residue and toxicity tests. ○ An environmental monitoring plan. ○ An approved monitoring protocol and sampling plan. ○ A quality assurance project plan for chemical residue and toxicity monitoring, describing procedures and protocols for data collection and analysis. ○ An annual report describing permit compliance and program findings and conclusions. ○ An annual data validation package to confirm the quality of environmental monitoring data.								

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Cultural Resources	• Where construction within areas that may contain cultural resources cannot be avoided through the use of alternative management practices, conduct an assessment of the potential for damage to cultural resources prior to construction; this may require the hiring of a qualified cultural resources specialist to determine the presence of significant cultural resources.[5]	X	—	X	—	X	X	X	—
	• Where the assessment indicates that damage may occur, and prior to land disturbance, submit a non-confidential records search request to the appropriate CHRIS which potentially includes the following in the plan area.[1, 5] ○ Calaveras County: Central California CHRIS Information Center[5] ○ Mariposa County: Central California CHRIS Information Center[5] ○ Merced County: Central California CHRIS Information Center[5] ○ San Joaquin County: Central California CHRIS Information Center[5] ○ Stanislaus County: Central California CHRIS Information Center[5] ○ Tuolumne County: Central California CHRIS Information Center[5] • Implement the recommendations provided by the CHRIS information center(s) in response to the records search request.[5] • Where adverse effects on cultural resources cannot be avoided, undertake additional CEQA review and develop appropriate mitigation to avoid or minimize the potential impact(s).[5]	X	—	X	—	X	X	X	—
	• To avoid a potentially significant impact on New Melones, New Don Pedro, and New Exchequer dams due to construction and operation of water temperature control structures, a Cultural Resource Management (CRM) strategy shall be incorporated prior to the addition of any temperature controls. An appropriate CRM strategy for recording and evaluating the New Melones, New Don Pedro, and New Exchequer dams would include a records search of the area of potential effects of these projects; a field recordation of the dam and any associated historical structures on California Department of Recreation series 523 forms, specifically 523B (building, structure, or object) and/or 523E (linear resource); and the submission of these materials and any nominating materials to the State Historical Resources Commission of the California Office of Historic Preservation.	—	—	—	X	—	—	—	—
	• Require a professional trained to identify evidence of cultural resources to observe major excavation and earth-moving activities if significant cultural resources are known to exist on the project site or if there is a high probability for significant cultural resources to exist.[2]	X	—	X	—	X	X	X	—

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	• Construction will stop within a 100-foot radius of any archaeological, paleontological, or historical resources discovered during construction activities, and treatment measures will be devised as needed. A qualified archaeologist should be brought on site within 24 hours of the discovery. If the find is determined to be significant, a full archaeological survey will take place. Construction activities in the area resumes once the survey is completed and all cultural resources are recovered.[2, 6]	X	—	X	—	X	X	X	—
	• No further excavation or other site disturbance takes place if any human remains are discovered during construction activities. Notify the local coroner so that a determination can be made as to whether the remains are of Native American origin or whether an investigation into the cause of death is required. If the remains are determined to be Native American, the following actions would be taken. ○ The coroner notifies the NAHC within 24 hours. ○ The NAHC immediately notifies those persons believed to be the most likely descendant(s) (MLD) of the deceased. ○ Once the NAHC identifies the MLD, the MLD, with the permission of the landowner, inspects the site of the discovery and makes recommendations for the treatment or disposition of the remains and any associated grave items within 48 hours (per AB 2641) of the MLD being granted access to the site. ○ The landowner is to ensure that the immediate vicinity of the remains, established according to standard professional practices, is not damaged or disturbed by further activity until the landowner has conferred with the MLD. ○ Discussion and consultation between the landowner and MLD should take into account the possibility of multiple burials and reasonable options regarding the MLD's preferences for treatment. • If the NAHC is unable to identify an MLD, if the MLD fails to make a recommendation, or if the NAHC is unable to mediate a dispute concerning the appropriate disposition of the remains, the landowner shall re-inter the human remains and any associated items with appropriate dignity on the property in a location not subject to further subsurface disturbance; and, to protect the remains from disturbance, the landowner must record the site with the NAHC or the appropriate CHRIS, use an open space or conservation zoning designation or easement, and/or record a document with the county in which the property is located.[2, 5]	X	—	X	—	X	X	X	—
	○ No further disturbance of an area, if fossils are encountered, will occur until the materials have been evaluated by a qualified paleontologist and appropriate treatment measures have been identified.[4]	X	—	X	—	X	X	X	—
	• Construction workers should be aware of the following protocols for identifying cultural resources: ○ If built environment resources or archaeological resources, including chipped stone (often obsidian, basalt, or chert), ground stone (often in the form of a bowl mortar or pestle), stone tools (such as projectile points or scrapers), unusual amounts of shell or bone, historic debris (such as concentrations of cans or bottles), building foundations, or structures are inadvertently discovered during ground-disturbing	X	—	X	—	X	X	X	—

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	activities, the land owner should stop work in the vicinity of the find and retain a qualified cultural resources specialist to assess the significance of the resources. If necessary, the cultural resource specialist also will develop appropriate treatment measures for the find. ○ If human bone is found as a result of ground disturbance, the land owner should notify the county coroner in accordance with the instructions described above. If Native American remains are identified and descendants are found, the descendants may—with the permission of the owner of the land or his or her authorized representative—inspect the site of the discovery of the Native American remains. The descendants may recommend to the owner or the person responsible for the excavation work means for treating or disposing of the human remains and any associated grave goods, with appropriate dignity. The descendants will make their recommendation within 48 hours of inspection of the remains. If the NAHC is unable to identify a descendant, if the descendants identified fail to make a recommendation, or if the landowner rejects the recommendation of the descendants, the landowner will inter the human remains and associated grave goods with appropriate dignity on the property in a location not subject to further and future subsurface disturbance.[5]								
Geology and Soils	• Evaluate the project site, and up- and down-gradient areas, for erosion potential. Design the project and implement construction and maintenance activities to prevent erosion and sedimentation.[2]	X	X	X	—	—	X	—	—
	• An MMP, which is part of the permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers, would be implemented to ensure erosion is minimized and the enhancing structures are functioning successfully.	X	X	X	—	—	X	—	—
	• Remove vegetation only when necessary and make every effort to conserve topsoil for reuse in re-vegetation of disturbed areas.[2]	X	—	X	—	X	X	X	—
	• Stabilize and revegetate all disturbed soil surfaces before the rainy season.[2]	X	—	X	—	X	X	—	—
	• Restrict stockpiling of construction materials to the designated construction staging areas and exclusive of habitats and their buffer zones.[2]	X	X	X	—	X	X	—	—
	• Employ BMPs that prevent soil or sediment from leaving construction sites, monitor them for effectiveness, and maintain them throughout the construction operations and between construction seasons. Standard measures include installation of sediment basins and traps in conjunction with grading operations; development of slope drains; stabilization of stream banks; use of hydraulic mulch, hydroseeding, straw, mulch anchored with a tackifier, polyacrylamide, rolled erosion control products (e.g., blankets and mats), earth dikes, drainage swales, and velocity dissipation devices; and installation of silt fences, fiber rolls, gravel bag berms, sandbag barriers, storm drain inlet protection, and check dams.[2]	X	—	X	—	X	X	—	—

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	• Limit to the dry season any construction activities within an area of the OHW line of drainages and lakes. Limit any construction activities within a floodplain, but above an OHW line, to those actions that can adequately withstand high river flows without resulting in the inundation of and entrainment of materials in flood flows.[2]	X	X	X	—	X	X	X	—
	• Have a professional hydrologist or licensed engineer develop an erosion control and water quality protection plan to avoid habitat degradation and ensure compliance with local and state erosion- and sedimentation-related requirements. The plan should be integrated into the construction schedule and describe how site cleanup and regrading will affect current physical conditions.[2]	X	X	X	—	X	X	X	—
	• Locate projects away from areas with unsuitable soils or steep slopes.[2]	X	—	X	—	X	X		—
	• Implement all requirements under Air Quality, above.	X	X	X	X	X	X	X	X
Greenhouse Gas Emissions	• Preserve known GHG sinks to the extent feasible and limit GHG sources as a component of project design.[2]	X	X	X	X	X	X	X	X
	• Preserve or replace onsite trees or contribute to a mitigation program providing carbon storage.[2]	X	X	X	X	X	X	X	X
	• Implement local air district controls to reduce criteria pollutant emissions and help to minimize GHG emissions. Measures to reduce vehicle trips and promote use of alternative fuels, as well as clean diesel technology and construction equipment retrofits, should be considered.[5]	X	X	X	X	X	X	X	X
	• Fuel, oil, and other petroleum products will be stored only at designated sites.	X	X	X	X	X	X	X	—
Hazards and Hazardous Materials	• Hazardous materials containment containers will be clearly labeled with the identity of the hazardous materials contained therein, handling and safety instructions, and emergency contact.	X	X	X	X	X	X	X	X
	• Storage, use, or transfer of hazardous materials in or near wet or dry streams will be consistent with California Fish and Game Code (Section 5650) and/or with the permission of CDFW.	X	X	X	X	X	X	X	X
	• Material Safety Data Sheets will be made readily available to the contractor's employees and other personnel at the work site.	X	X	X	X	X	X	X	X
	• The accumulation and temporary storage of hazardous wastes will not exceed 90 days.	X	X	X	X	X	X	X	—
	• Soils contaminated by spills or cleaning wastes will be contained and removed to an approved disposal site.	X	X	X	X	X	X	X	X
	• Hazardous waste generated at work sites, such as contaminated soil, will be segregated from other construction spoils and properly handled, hauled, and disposed of at an approved disposal facility by a licensed hazardous waste hauler in accordance with state and local regulations. The contractor will obtain permits required for such disposal.	X	X	X	X	X	X	X	—
	• Provide hazardous materials and worksite safety training for construction workers in accordance with local, state, and federal requirements including, but not limited to the Occupational Safety and Health Act, Title 9 of the Code of Federal Regulations, and Title 8 of the California Code of Regulations.[2]	X	X	X	X	X	X	X	—

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	• Provide hazardous materials accidental spill response plans (and/or Hazardous Materials Management Program) and training that would outline methods, materials, and responsibilities for the response to, and clean-up of, an accidental hazardous material spill during construction of the project. At a minimum, the plans should include provisions for immediate response, containment, and cleanup of a spill, including excavation and disposal of contaminated soil and notification responsibilities. Materials needed for potential cleanup activities should be kept onsite.[2]	X	X	X	X	X	X	X	—
	• Provide a health and safety plan for construction workers that is prepared by a certified industrial hygienist; complies with all appropriate local, state, and federal regulations; and identifies specific safety measures to be followed during all phases of construction and long-term operation.[2]	X	X	X	X	X	X	X	—
	• Label all hazardous materials onsite to inform users of potential risks and train users in appropriate handling, storage, and disposal procedures.[2]	X	X	X	X	X	X	X	—
	• Protect sites from unmonitored access with fencing and signs to prevent accidental health hazards to the nearby residents.[2]	X	X	X	X	X	X	X	—
	• Identify local laws, ordinances, and building codes related to fire prevention, burning, welding, and blasting, etc., to obtain any necessary permits and adhere to permit conditions.[2]	—	—	—	X	X	—	X	—
	• Maintain an adequate number of fire extinguishers and other tools and equipment that can be used for fighting fire onsite, and ensure that personnel are trained in their use.[2]	X	X	X	X	X	X	X	—
	• Maintain a water tender during extensive welding/cutting operations.[2]	—	—	—	X	X	X	—	—
	• Identify existing underground utility lines at excavation sites prior to construction, and avoid/relocate underground utility lines in coordination with utility company/service provider; coordinate with natural gas companies and Underground Service Alert before beginning any excavation or other construction activities to ensure that pipelines are not affected.[2, 6]	X	—	X	—	X	—	X	—
	• Ensure that project activities do not weaken nearby levees.[2]	X	X	X	—	X	X	X	—
	• Prior to construction, perform pre-construction hazardous waste evaluations through record searches and on-site evaluations to potentially identify leaking underground storage tanks, facilities that have received CDOs or CAOs for hazardous materials, or where soil contamination may be suspected (e.g., through soil discoloration or other indicators). If soil contamination is identified, test soil prior to excavation to determine if construction site would be located in area with soil contamination. Areas to be excavated will undergo soil and/or groundwater testing (if groundwater is present in excavated area) at a certified laboratory, provided existing data cannot characterize the nature and concentration of the contamination. Where concentrations exceed applicable federal or state thresholds, contaminated areas will be avoided or soil and/or groundwater will be remediated and contained in compliance with applicable state and federal laws. If hazardous materials are encountered, consultation with DTSC will be required to establish if a permit and subsequent actions are needed to appropriately handle the materials.	X	X	X	—	X	—	X	X

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Hydrology and Water Quality	• Prepare a SWPPP that includes specific types and sources of storm water pollutants, determines the location and nature of potential impacts, and specifies appropriate control measures to eliminate any potentially significant impacts from storm water runoff on receiving waters. The SWPPP will require treatment BMPs that incorporate, at a minimum, the required hydraulic sizing design criteria for volume and flow to treat projected storm water runoff. The SWPPP shall comply with the most current standards established by the regional water quality control board. BMPs shall be selected from the local agency's Storm Water Quality Control Standards.[4,6]	X	X	X	X	X	X	X	X
	• Implement turbidity monitoring during construction/removal.[6]	X	X	X	X	X	X	X	X
	See Agriculture and Forestry Resources in this table for additional applicable mitigation measures.								
Noise	• Implement noise-reducing construction practices such that noise from construction does not exceed applicable local noise standards or limits specified in the applicable county ordinances and general plan noise elements. Typically construction is limited to 7:00 am–6:00 pm on weekdays and permit no work on Saturdays, Sundays, or holidays unless appropriate city and county building officials grant prior approval.[2, 3, 5, 6]	—	—	—	X	X	X	X	X
	• Use noise-generating equipment during periods when fewer people are present near the construction area.[2]	—	—	—	X	X	X	X	X
	• Muffle or otherwise control all construction equipment with a high noise-generating potential, including all equipment powered by internal combustion engines.[2]	—	—	—	X	X	X	X	X
	• Use newer equipment with improved noise muffling, and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators, intact and operational. Newer equipment will generally be quieter in operation than older equipment. All installation equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).[3]	—	—	—	X	X	X	X	X
	• Shroud or shield all impact tools.[2]	—	—	—	X	X	X	X	X
	• Locate all stationary noise-generating equipment, such as compressors, as far as possible from adjacent occupied offices, residents, or sensitive habitats (if they are adjacent to the project site).[2]	—	—	—	X	X	X	X	X
	• Turn off mobile equipment and machinery when not in use to reduce noise from idling equipment.[2]	—	—	—					
	• Use temporary noise barriers or curtains along installation boundaries or partial enclosures around continuously operating equipment.[2]	—	—	—	X	X	X	X	X
	• Use the shortest possible routes from construction sites to local freeways for truck delivery routes, except when selecting routes to avoid going through residential neighborhoods.[2]	—	—	—					
	• Establish an active community liaison program that notifies landowners within 300 ft of construction areas of the construction schedule, in writing, prior to construction to keep them informed of schedule changes, and designate a "disturbance coordinator" for the construction site.[2]	—	—	—	X	X	X	X	X

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	• Regularly inspect equipment and monitor noise and vibration to ensure that all equipment on the site is in good condition and effectively muffled and that contractors take all reasonable steps to minimize impacts, particularly when near sensitive areas.[2, 3]	—	—	—	X	X	X	X	X
	• Monitor construction noise and vibrations and modify and/or reschedule construction activities if monitoring determines that maximum limits set by local or regional noise ordinances are exceeded.[2, 3]	—	—	—	X	X	X	X	X
Recreation	• Navigational buoys, lights, and signage will be installed in sloughs upstream and downstream from the barriers to advise boaters about the presence of the barriers and maintain navigation along waterways. The project proponent will coordinate with the U.S. Coast Guard on signage and buoys.	—	—	—	—	—	X	—	—
Transportation and Traffic	• Use signage, striping, fencing, barricades, and other physical structures to mark the excavated areas, promote safety, and minimize pedestrian/bicyclist accidents.[2]	X	X	X	X	X	X	X	X
Operation									
Biological Resources	• Develop a mitigation and management plan (MMP) in coordination with CDFW and USFWS to implement all appropriate measures as required by USFWS ESA Section 7 consultation and to satisfy any other local, state, and federal requirements for achieving no net loss of wetlands, riparian habitat or other critical habitat, or take of wildlife species of concern. The plan should be submitted to the local city/county environmental planning department, U.S. Army Corps of Engineers, USFWS, CDFW, applicable regional board (e.g., as part of a Clean Water Act Section 401 Water Quality Certification application), and/or other oversight agencies as applicable for approval prior to its implementation if an impact on special-status species population(s) is determined to occur based on the biological assessment and evaluation of the final project site and design.[2]	X	X	X	X	X	X	—	—
	• Properly contain or remove all trash that may attract predators to the worksite during operation.[2]	X	X	X	X	X	X	X	X
Geology and Soils	• As discussed under Biological Resources above, an MMP, which is part of the permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers, would be implemented to ensure erosion is minimized and all structures are functioning successfully.	X	X	X	—	—	X	—	—
Greenhouse Gas Emissions	• Implement local air district controls to reduce criteria pollutant emissions and help to minimize GHG emissions. Measures to reduce vehicle trips and promote use of alternative fuels, as well as clean diesel technology and construction equipment retrofits, should be considered.[5]	X	X	X	X	X	X	—	X
	• Use vehicles with zero-emission or lower-emission engines.[2]	X	X	X	X	X	X	X	X
	• Limit the unnecessary idling of vehicles and equipment.[2]	X	X	X	X	X	X	X	X
	• Use low/zero carbon/alternative fuels, such as B20 biodiesel or renewable diesel.[2]	X	X	X	X	X	X	X	X
	• Control visible emissions from off-road diesel powered equipment.[2]	X	X	X	X	X	X	X	X
	• Encourage ride sharing and use of transit transportation for construction employees commuting to the project site.[4]	X	X	X	X	X	X	X	X

Resource	Potential Mitigation Measure	Floodplain and Riparian Habitat Restoration	Gravel Augmentation	Enhanced In-Channel Complexity	Improve Temperature Conditions	Fish Screens	Physical Barriers in Southern Delta	Predatory Fish Control	Invasive Aquatic Vegetation Control
	• Use electric equipment for construction whenever possible in lieu of fossil fuel-powered equipment.[4]	X	X	X	X	X	X	X	X
Hydrology and Water Quality	• As discussed under Biological Resources above, an MMP, which is part of the permitting requirements and conditions by resource agencies including USFWS, CDFW, Central Valley Water Board, and U.S. Army Corps of Engineers, would be implemented to ensure no erosion is occurring, water quality remains the same or is improved, any changes in hydraulics are what is expected, and the project is functioning successfully.	X	X	X	X	X	X	—	X

Sources: [1]North Coast Regional Water Quality Control Board 2009, [2]Central Valley Water Board 2010a, [3]California Regional Water Quality Control Board, Los Angeles Region 2011, [4]City of Tracy 2011, [5]Central Valley Water Board 2010b, [6]DWR 2011c, [7]SFPUC 2007, [8]NMFS 2014b, [9]ICF Jones & Stokes 2013, [10]CALFED 2000b.

Notes:

[a] Until such time that these potential mitigation measures are implemented, the impacts would remain significant and unavoidable, consistent with State CEQA Guidelines Section 15091. However, it is likely that impacts would be mitigated to less than significant once mitigation measures were implemented.

[b] Potential mitigation measures for conflicts with habitat conservation plans, natural community conservation plans, or other plans, policies, and regulations protecting biological species and resources that maybe attributable to land use and planning are presented in the Biological Resources sections in this table.

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16.7 Cumulative Impacts

This section evaluates the cumulative impacts associated with other indirect actions, additional actions, and methods of compliance described in Sections 16.2, *Lower San Joaquin River Alternatives—Other Indirect Actions*, 16.3, *Lower San Joaquin River Alternatives— Non-Flow Measures,* and 16.4, *Southern Delta Water Quality Alternatives— Reasonably Foreseeable Methods of Compliance*. Cumulative impacts are defined in the State CEQA Guidelines (Cal. Code Regs., tit. 14, § 15355) as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." A cumulative impact occurs from "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (Cal. Code Regs., tit. 14, § 15355, subd. (b).) State CEQA Guidelines recommend either a list or projection approach, the use of which must be guided by the standards of practicality and reasonableness. The State Water Board has decided to prepare a cumulative impact discussion for all actions presented in this chapter to disclose potential cumulative effects. However, given the lack of specificity for the actions described in this chapter over time, and in particular geographies, the analysis is necessarily general and broad. Furthermore, while lead agencies or other entities could take one or more of the actions described in this chapter, the combination of indirect actions, non-flow measures, and other actions in response to the alternatives is speculative and unknowable and, as such, the number of actions taken over time and in different locations cannot be identified. For example, not any one non-flow measure alone could fully inform adaptive implementation and, as such, various actions and measures may be combined. Specific combinations of measures cannot be predictably aligned with the alternatives because entities could take one or more of these non-flow measures and the combination of measures that entities would take under each alternative is speculative and unknowable. Because of the unknown location, scope, timing, and magnitude of potential impacts described in Sections 16.2 through 16.4, projects or programs adequately similar in nature, location, and type cannot be identified that would result in a meaningful comparative analysis. As such, to the extent feasible, possible impacts on each resource area are considered cumulatively in this section in combination with similar possible impacts in the plan area and the extended plan area, without reference to specific contributing projects.

Potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, are also incorporated and discussed, if appropriate. In some circumstances, the effects prior to implementing the mitigation measures would not be cumulatively considerable because of the localization of potential effects or the possible separation in time and space of potential effects. In these cases, the mitigation measures would serve to further reduce potential cumulatively considerable effects. In other circumstances, the mitigation measures may reduce cumulative effects to less than cumulatively considerable; however, the potential mitigation measures cannot be enforced by the State Water Board because they require actions by lead agencies or third parties over which the State Water Board has no decision-making authority. As such, the discussion identifies whether mitigation may help to reduce cumulatively considerable impacts. However, it necessarily concludes if impacts cannot be mitigated because they are beyond the enforcement of the State Water Board, cumulative impacts would be significant and unavoidable.

Aesthetics

Construction of activities described in this chapter could have temporary effects on aesthetics and the visual character and quality of an area due to the location of construction equipment, personnel, or modifying landscape features under construction. Because construction typically does not permanently alter the aesthetic quality of an area, it is unlikely that aesthetic impacts during construction would result in substantial cumulative effects in association with other construction activities and the visual character and quality in a given area. As such, impacts would not be cumulatively considerable.

Construction could create temporary light and glare during potentially needed nighttime construction periods. Given the potential location of these and the low likelihood of other sources of nighttime light and glare, this likely would not result in a cumulatively considerable impact if mitigation measures identified in Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures,* are employed. If mitigation measures are not incorporated by lead agencies or third-parties, impacts would be cumulatively considerable when considered in combination with other similar impacts in a given area.

The potential cumulative aesthetic effects depend on the location of the action, how intact and complete the visual character is of the location, and the types of sensitive viewers (e.g., recreationists) that may experience a change in the view. New facilities or structures could affect the visual character and quality of the surrounding area depending on the presence or absence of other permanent structures the type (e.g., size, bulk) of the permanent structures. If actions occur in primarily urban areas and result in new facilities or infrastructure, impacts likely would not be cumulatively considerable. If actions occur in areas without existing infrastructure, and in existing natural landscapes, the size and scale of new infrastructure could result in a substantial degradation of the surrounding visual character or quality. As such, impacts would be cumulatively considerable. Operation of the facilities could result in new sources of light or glare, that, when in combination with proximity to existing facilities could result in substantial increases in light or glare and result in cumulatively considerable impacts. Implementation of mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures,* with respect to light and glare would likely reduce cumulative effects. If mitigation measures are not incorporated by lead agencies or third-parties, impacts would be cumulatively considerable.

Operations that do not require new facilities and do not permanently and substantially alter a landscape that is intact with scenic views, or designations of scenic highways or wild and scenic rivers generally lack the potential to affect the visual character and quality of the surrounding area when considered with other projects in the general vicinity that may affect aesthetics. Impacts would not be cumulatively considerable. However, operations that permanently convert large landscapes that contain scenic views, scenic highways, or wild and scenic rivers would result in cumulative impacts because of the expected substantial change in the unique visual landscape in which the change was occurring. Permanent changes of this nature and magnitude could not be mitigated, and impacts would be cumulatively considerable.

Agricultural Resources

Agricultural land has been converted to nonagricultural uses in the Central Valley, including the plan area, due to urbanization and changing landscape. The California Department of Conservation

(CDC) indicates that since 1984 the average annual net conversation of Prime Farmland, Farmland of Statewide Importance and Unique Farmland has been approximately 38,000 (CDC 2015a). While urbanization accounts for the majority of the total loss of agricultural lands (approximately 1.1 million) between 1984 and 2010, there are other causes for farmland loss including ecological restoration projects that totaled a loss of more than 291,000 acres between 1984 and 2010 (CDC 2015a). Trends in San Joaquin, Stanislaus, and Merced Counties generally show a decline in agricultural lands as supported by the statewide trend (CDC 2015b). However, there are also tradeoffs between Prime, Unique, and Farmland of Statewide Importance where Prime Farmland may annually decrease but Unique Farmland increase (CDC 2015b). The construction and operation of most of the activities described in this chapter would not result in temporary or permanent impacts on agricultural resources. This is because either the location of the activity would not be in or adjacent to agricultural uses or because the activity would support agricultural uses. However, if the activities result in the permanent removal of agricultural lands because of the conversion of agricultural lands to nonagricultural uses significant and unavoidable cumulative impacts could occur. While potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, identify mitigation, if permanent loss occurs because significant acreage is converted to nonagricultural use (e.g., restoration projects), impacts would be cumulatively considerable, when considering the larger context for the loss of designated agricultural lands.

Forests are typically managed in California for multiple purposes including recreation and resource extraction. Trees are periodically harvested and replanted depending on a particular forest management plan and projected demand for timber within an area. It is unlikely that there would be another project similar to that of new surface water reservoirs that would completely and permanently remove forestland. As such, while the impact is significant, it would not be cumulatively considerable because no other project is expected to have a similar type of impact.

Air Quality

Construction emissions associated with actions described in this chapter would be short term. Because cumulative impacts, by definition, are long-term, construction emissions are not anticipated to result in cumulatively considerable impacts on air quality. Additionally, implementation of potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, for air quality emissions generated during construction would serve to further reduce, or minimize, or eliminate air quality emissions for actions identified in this chapter. Air quality emissions from vehicle trips used for either monitoring or maintenance, or from back-up generators could result. Vehicle trips would be limited in duration and would occur discretely over time and in many different locations. As such, these emissions would not be cumulatively considerable.

The air basins where potential actions could be located (i.e., SJVAB, MCAB, GBVAB) are in nonattainment for a variety of emissions (e.g., ozone, PM2.5, PM10). As such, air quality emissions from regularly operating new equipment could generate long-term emissions that contribute to nonattainment because of the daily operation of different facilities, in different locations over the lifetime of the facility. In addition, if numerous truck trips are required under operating conditions to transport or dispose of materials, the number of trucks, duration of the trips generated, and travel routes could result in cumulative air quality impacts within these air quality basins or others that are in nonattainment. Although implementation of mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, could reduce the generation of emissions during operating conditions, impacts would be cumulatively considerable. If mitigation measures are not incorporated by lead agencies or third parties, impacts would be cumulatively considerable.

Biological Resources

The plan area, and to a lesser extent, the extended plan area, has been subjected to extensive changes due to land conversion to agricultural and urban uses, water development, population growth, and recreation. These changes have altered the physical and biological integrity of the Central Valley, causing loss of native riparian vegetation along river systems, loss of wetlands, and loss of native habitat for plant and wildlife species. Many of the biological impacts from the actions evaluated in this chapter can be mitigated, due to the temporary nature (short duration in time and location) of construction, with potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*. If, depending on the project-specific construction timeline and type of construction, the impacts are short in duration, temporary, and localized and do not result in *take* of a species, then impacts would not be cumulatively considerable. However, if mitigation measures are not incorporated by lead agencies or third parties, impacts would be cumulatively considerable.

Construction may permanently remove or substantially degrade sensitive habitat, remove species, and result in *take* because of the potential mechanisms needed for construction (e.g., building cofferdams). As such, the potential mitigation measures may not be sufficient to reduce effects during construction. The cumulative impact of the significant reduction in quality habitat and the take of individual listed plants or wildlife species would be cumulatively considerable when viewed in combination with similar impacts in the area.

Operation could result in effects on biological species if they represent a continual degradation or on-going effect on existing special-status species or habitat. While monitoring, or potentially adaptive management, could be done to assess the effects of the operation on biological resources, and adjustments of operation could be made, impacts would be cumulatively considerable when viewed in combination with similar impacts in the area.

Cultural

Ground-disturbing activities associated with most of the actions evaluated in this chapter could result in cumulatively considerable effects on cultural resources if performed in combination with other ground-disturbing activities. Effects would be localized and primarily related to construction because ground-disturbing during construction tends to result in discovery of cultural resources and can result in the potential destruction of those resources. Implementation of potential mitigation measures for cultural resources identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, during construction would reduce the contribution to this impact to a level that is not cumulatively considerable. The potential mitigation measures would ensure identification of cultural resources and minimization of impacts on identified resources either through removal and preservation or modification of project location or construction methods. If mitigation measures are not incorporated by lead agencies or third-parties, impacts would be cumulatively considerable when viewed in combination with similar impacts in the area. In addition, even with mitigation, due to the potential expansive and large scale ground disturbing activities associated with the construction of new surface water reservoirs, impacts would remain cumulatively considerable because they could result in the complete destruction of known or unknown cultural resources.

Geology and Soils

Geology and soils could be affected during construction activities associated with the actions evaluated in this chapter because of disturbance of soil. Construction effects on geology and soils would generally be localized and temporary. In many instances, it would also be relatively short in duration. As such, it is unlikely that cumulatively considerable effects on geology and soils would occur in association with other construction activities in any given area. Therefore, the impacts would not be cumulatively considerable. In addition, potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, would serve to further reduce impacts during construction associated with geology and soils.

Once facilities are in place, operating conditions would not bring or expose people to significant risk of earthquakes, landslides, unstable soils, or other geologic hazards, and therefore could not result in a continued disturbance of soils or geology. However, if operations result in continued or increased groundwater pumping at levels that would lead to overdraft conditions in the groundwater basin, they could result in a continued disturbance of soils or geology.

Greenhouse Gases/Climate Change

Unlike other air quality emissions (e.g., criteria pollutants), GHG emissions occur at a global level. The relatively long lifespan and persistence of GHGs require that climate change be considered a cumulative and global impact. While it is unlikely that increases in global temperature or sea level could be attributed to the emissions resulting from a single project, it is appropriate to conclude the GHG emissions from the actions described in this chapter (if they were to occur) would combine with GHG emissions in California, the United States, and the globe to cumulatively contribute to global climate change. In addition, given the ZEL standard recently implemented by the SJVAPCD, GHG impacts from implementation of these activities may not be negligible. Because it is unknown to what extent climate change would be affected by the incremental GHG emissions produced, the impact on GHG and climate change would be cumulatively considerable. Implementation of potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, for the actions identified above, would result in lower GHG emissions levels than had they not been incorporated. However, these mitigation measures would not completely eliminate GHG emissions. As such, impacts would be cumulatively considerable.

Hydrology and Water Quality

Urbanization and the development of agriculture has led to significant alteration of hydrology and water quality in the plan area and extended plan area over time. The alteration has led to surface water resources that are fully managed in accordance with a complex set of existing laws, regulations, and policies and by multiple dams and diversions. Groundwater resources have been less managed than surface water resources; however, they, too, have been greatly altered and substantially reduced through urbanization and the development of agriculture.

During construction of some of the actions evaluated in this chapter, the disturbance of soil and working within or adjacent to rivers and water ways could result in localized and temporary effects on hydrology and water quality. As such, it is unlikely that cumulatively considerable effects would on hydrology and water quality would occur in association with other construction activities or projects in any given area, and impacts would not be cumulatively considerable. In addition, potential mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, would serve to reduce impacts during construction associated with hydrology and water quality.

Impacts would not be cumulatively considerable if there are no substantial and permanent effects on hydrology or water quality under operating conditions because of small operating footprints of the facilities, limited generation of substantial amounts of runoff or discharges, or the purpose of the activity is to treat water or wastewater prior to discharge or use. Substantial and permanent effects on hydrology and water quality could occur due to the alteration of a river through the development and operation of substantial infrastructure (e.g., new surface water reservoirs). While potential mitigation measures, alternative locations, or alternative project designs (currently unknown) could reduce cumulative effects, given the potential size and scale of infrastructure projects, impacts would be cumulatively considerable and significant.

Hazards and Hazardous Materials

Within the plan area and extended plan area, projects must comply with all existing hazardous material regulations through the local, state, and federal government. These regulations are in place to reduce the potential of accidental releases, spills, or explosions of hazardous materials and to minimize the environmental and public health impacts should one occur. Although projects cannot completely eliminate the probability associated with an accidental release, explosion, or spill, the existing regulations reduce the overall probability and minimize the impacts during a release.

Hazardous materials are typically used during construction (e.g., fuels and lubricants) of the actions evaluated in this chapter. However, the transport of significant quantities of hazardous materials or waste would not occur and would not involve the handling or disposal of significant quantities of hazardous materials or waste. In addition, the use would be temporary and localized within the area of construction. Because the hazardous material use and disposal would be intermittently located, it is unlikely that use during construction activities would result in a substantial cumulative effect in association with other uses in any given area. As such, no cumulatively considerable hazardous impacts would occur as a result of construction activities. In addition, implementation of potential mitigation measures associated with the handling of hazardous materials during construction identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, would serve to further reduce, or minimize, hazardous impacts.

Construction could result in disrupting existing underground utility lines during ground-disturbing activities. However, this would be highly localized and infrequent in time and, as such, would not result in impacts that are cumulatively considerable. In addition, mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures,* of identifying utilities prior to ground-disturbing activities would further reduce impacts. Construction activities may also disturb known or unknown hazardous materials in soil or groundwater depending on the type of ground disturbing activity and the type of activity; however, mitigation measures identified in Table 16-38 would reduce impacts to less than cumulatively considerable because materials would be remediated and removed if they were discovered. However, if mitigation measures are not incorporated by lead agencies or third-parties, impacts would be cumulatively considerable.

Activities that involve the regular handling and transport of hazardous materials could result in a cumulatively considerable impact if they do so in conjunction with many other projects that also handle and transport hazardous materials. The mitigation measures identified in Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures,* would reduce impacts to less-than-significant levels; however, given the use of hazardous materials application in the waterways and use at existing facilities, until the mitigation was implemented, impacts would be cumulatively considerable and significant.

Noise

Noise from construction activities associated with actions evaluated in this chapter would be highly localized. Because noise-sensitive land uses are intermittently located, it is unlikely that noise from construction activities would result in a substantial cumulative effect associated with other noise sources, particularly related to construction, in any given area. As such, no cumulatively considerable noise impacts would occur as a result of construction activities. In addition, implementation of potential mitigation measures associated with noise identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, generated during construction would serve to further reduce or minimize noise levels associated with construction.

Noise from operating activities could result primarily from either vehicle trips, used for monitoring or maintenance, or from operation of new equipment. Noise from vehicle trips would be spread throughout the roadway system and may contribute to traffic noise. However, monitoring or maintenance trips would be limited in duration and spread over time. As such, impacts would not be cumulatively considerable. Operation of equipment could produce permanent noise. Some of the noise generated would occur in areas with existing facilities that generate noise. While it is anticipated that noise generated by these facilities would be reduced and dampened through the use of walls, structures, or other facilities as described in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* and Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures*, unless these measures are implemented, impacts would be cumulatively considerable, given the proximity to other permanent noise-generating facilities.

Mineral Resources

Projections indicate mineral resources, particularly aggregate, is decreasing overall as population increases, which is putting pressure on existing mineral sources along the Stanislaus, Tuolumne, and Merced Rivers (Clinkenbeard 2012a; Smith and Clinkenbeard 2012). Construction and operation of the following could result in temporarily or permanently removing mineral resources from use: floodplain and riparian habitat restoration, gravel augmentation, and enhancing in-channel complexity and new surface water supplies. There is a low potential for floodplain and riparian habitat restoration and enhancing in-channel complexity to permanently remove mineral resources from use given how they would be constructed and the conditions needed for construction. However, removal of additional mineral resources, particularly under gravel augmentation and new surface water supplies, would be cumulatively considerable when considered with other similar impacts in the area. Although mitigation measures identified in Table 16-39, *Potential Mitigation Measures for Construction and Operation Activities Related to Non-Flow Measures,* could reduce impacts, until the mitigation was implemented, impacts would be cumulatively considerable and significant.

Land Use and Planning, Population and Housing, and Public Services

General and specific plans and zoning codes allow for the construction and operation of different land uses in designated areas within the jurisdiction of local agencies. Local agencies have the discretion to modify or conditionally approve uses that may not be specifically approved for a particular area. Construction and operation involving public infrastructure or facilities evaluated in this chapter are typically allowed in multiple land use designations and zoned areas (e.g., public facilities, residential, industrial, open space overlays) and, as such, have a limited potential to affect land use and planning or conflict with local policies and plans when considered with other projects that may also involve infrastructure or facilities. In addition, there would be limited potential for effects on land use and planning where construction and operation of new facilities would be at existing infrastructure or facility locations already allowed by local policies and plans. Construction and operation that does not involve infrastructure or facilities also has a limited potential to affect land use and planning. Some of these actions may occur adjacent to or within waterways, and frequently these areas are designated natural resource or open space areas by land use plans. If inconsistencies were identified, they would not result in cumulatively considerable impacts because amendments would be processed, as required, to reduce impacts. Given the above, there would be no cumulative impacts.

Construction and operation would likely not result in an increase in population, the need for housing or public services, because many of the activities would either be restoration-type activities that have no effect on population, housing, or public services or because the activities would provide replacement water supplies and, as such, would not provide a supply to meet a new or an increase in demand. As such, cumulative impacts would not occur and impacts would not be cumulatively considerable. However, new surface water reservoirs would likely require public services, depending on the size and location of the reservoir. The ability to satisfy the needed services depends on the types of services currently in place and their ability to absorb additional demand; however, this would be highly localized and as such is not expected to result in cumulatively considerable impacts. In addition, mitigation measures identified in Table 16-38 would be expected to further reduce impacts.

Construction could impair the implementation of or physically interfere with an existing emergency response or emergency preparedness plan, or require the preparation of a new emergency response or emergency preparedness plan. However, projects would be required to coordinate with all law enforcement agencies during construction of all roadway improvements to establish emergency vehicular access, ensuring continuous law enforcement access to surrounding areas. Furthermore, police and fire stations are generally distributed to facilitate quick emergency response throughout the plan area and extended plan area, as applicable. If emergency plans are affected, they would only affect emergency plans during construction. Given the infrequent of activities over time and geography and the limited nature of potential impacts, impacts would not be cumulatively considerable.

Recreation

If construction is located near recreation facilities, and facilities may be indirectly affected by construction, cumulative impacts could occur as discussed under other resources (e.g., noise). However, these impacts would last during the construction period only and would return to levels comparable to those that existed prior to construction once construction is complete. Furthermore, in the event that patrons do visit other facilities due to project construction activities, it is not expected that patrons would use facilities in a manner that would cause or accelerate substantial physical deterioration of those facilities. It is expected that the demand for alternative recreation resources would be distributed among the large number of parks and recreational facilities in the area and region, and would likely return to original recreation resources once construction activities cease.

Activities that permanently alter or remove highly specialized or designated recreational resources (e.g., white water rafting) could have cumulative impacts (e.g., new surface water reservoirs). Depending on the type of existing activity and whether it is relatively limited in time and geography, the loss of that opportunity may be cumulatively considerable and could not be mitigated given the potential complete loss of the recreational resource.

Transportation and Traffic

Construction of the actions evaluated in this chapter has a limited potential to affect level of service on existing roads given that construction would be relatively temporary in duration and because typically, roadways return to preconstruction levels of service once the construction is completed. In addition, construction that occurs in remote areas away from other construction or operating projects would not result in cumulatively considerable impacts.

Transportation and traffic impacts from operational activities could result primarily from vehicle trips used for monitoring or maintenance. However, monitoring or maintenance trips would be limited in duration and spread over time. In addition, for those that would be located within proximity to existing facilities or infrastructure maintenance or monitoring likely would not result in any additional trips beyond what currently may be needed for existing facilities. As such, impacts would not be cumulatively considerable.

Transportation and traffic impacts from operating activities that result in a permanent and regular increase of traffic on roadways depends on frequency of trips, designated haul routes, and final destination. If haul routes are located in urban areas, on heavily traveled roads, they may result in a decrease of levels of service on existing roadways. Transportation and traffic impacts that result from the use of new amenities (e.g., recreation at a reservoir) would depend on the location of the amenity, the service provided, and the season of operation. This could be a highly localized effect. Furthermore, regional and local plans typically project traffic levels over time to accommodate increases in traffic within planning frameworks. As such, impacts would not be cumulatively considerable.

Utilities and Service Systems (Service Providers)

Construction and operation of the actions evaluated in this chapter would not be expected to exceed wastewater treatment requirements of the Central Valley Water Board either because the action would not involve the discharge of wastewater or because the action would improve wastewater discharge entering a receiving water. Additionally, most actions would not result in the discharge of wastewater and, therefore, would not require the construction or operation of wastewater treatment facilities. Most actions do not result in an increased demand for wastewater treatment and, as such, would not result in the determination by a wastewater treatment provider that it has inadequate capacity to serve the action. Accordingly, impacts would not be cumulatively considerable.

Where construction and operation of new septic or closed vault toilet systems would be required, design requirements would be followed. In addition Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* includes mitigation measures. Since the construction and operation of septic tanks or close vaulted toilet systems are relatively localized, the implementation of these mitigation measures would reduce impacts on the environment such that the construction of these facilities for new surface water storage facilities would not be cumulatively considerable when considered in combination with other projects with similar impacts.

Solid waste generated during construction of actions would be a temporary increase in the generation of solid waste and would not result in a cumulatively considerable impact on existing solid waste disposal locations. Actions that require regular disposal of waste could generate a reoccurring volume of waste depending on the generation requirements. However, disposal of all solid waste (including brine from desalination actions) would be done in accordance with all applicable federal, state, and local regulations and guidelines. Therefore, impacts would not be cumulatively considerable.

Construction or operation of new wastewater or water treatment facilities could occur. Implementation of these actions could result in impacts on multiple resources (e.g., air quality, noise, biological resources), and would be cumulatively considerable when considered with other similar impacts in the area. Although mitigation measures identified in Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* could serve to reduce impacts, until the mitigation was implemented, impacts would be cumulatively considerable and significant.

Construction and operation of the actions evaluated in this chapter would likely not require new stormwater infrastructure or the expansion of existing infrastructure. Where construction of new stormwater drainage facilities would be required, surface water drainage design would be required to be followed. In addition Table 16-38, *Potential Mitigation Measures for Construction and Operation Activities Related to Other Indirect and Additional Actions,* includes mitigation measures that require stormwater runoff control systems to fit the hydrology of the plan area, have adequate capacity, and be non-erosive. Since the construction and operation of stormwater drains are relatively localized and occur within an existing area of service, the implementation of these mitigation measures would reduce impacts on the environment such that the construction of these facilities for new surface water storage facilities would not be cumulatively considerable when considered in combination with other projects with similar impacts.

16.8 References

16.8.1 Printed References

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