Executive Summary

ES.1 Introduction

This Delta Conveyance Project Final Environmental Impact Report (Final EIR) is prepared by the California Department of Water Resources (DWR) as Lead Agency to meet the requirements of the California Environmental Quality Act (CEQA). The purpose of the proposed Delta Conveyance Project, as more fully described below and in Chapter 2, *Purpose and Project Objectives*, is to restore and protect the reliability of State Water Project (SWP) water deliveries and, potentially, Central Valley Project (CVP) water deliveries south of the Delta, consistent with the *California Water Resilience Portfolio* (California Natural Resources Agency et al. 2020:7) in a cost-effective manner. The objectives focus on the SWP's ability to respond to sea level rise and climate change, minimize water delivery disruption due to Delta seismic risk, improve water supply reliability, and provide operational flexibility to improve aquatic conditions in the Delta.

ES.1.1 Background and Context

The Sacramento–San Joaquin Delta (Delta), shown in Figure ES-1, is an expansive inland river delta and estuary in Northern California. Portions of six counties—Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo—make up the Delta located at the confluence of the Sacramento and San Joaquin Rivers on the western edge of the Central Valley. The watersheds of the Sacramento and San Joaquin Rivers are at the core of California's SWP and CVP water systems, which convey water to millions of Californians in Northern California, the San Francisco Bay Area, Central Valley, Central Coast, and Southern California.

The Delta is also important for reasons other than water supply. It provides rich and productive habitat for more than 500 species of fish and wildlife and supports a number of endangered and threatened species. Delta agriculture and the food and beverage industries it supports accounted for $2.7 billion in economic output in five[1] Delta counties alone, and about $4.6 billion statewide in 2016 (Delta Protection Commission 2020:38). The Delta is also a recreational destination. Its waterways and managed wetlands support many activities, including fishing, boating, and hunting. Many of the Delta islands sustain productive agricultural operations. Its waterways, habitat areas, and agricultural lands support a wide variety of plants, animals, and special-status species. Also, it sustains distinctive geographical and cultural characteristics and is home to extensive infrastructure of statewide importance, such as: aqueducts, natural gas pipelines, and electricity transmission lines; railroads, commercial navigation (ports and shipping channels), and recreational navigation (marinas, docks, launch ramps); wildlife refuges; public and private levee systems; and highways. The ports of Stockton and West Sacramento are focal points of regional economic development and rely on through-Delta shipping channels. State Route (SR) 12, SR 4, and through-Delta railways are also important links in the Delta transportation system (Delta Protection Commission 2012:166–167, 207). More detail on these resources is provided in Chapters 7 through 32.

[1] Only a very small section of Alameda County is located in the statutory Delta and is mostly in pasture (Delta Protection Commission 2020:5).

Prior to the 1850s, when Delta reclamation began, the Delta region was largely natural habitat for wildlife: seasonal wetlands crossed by rivers and sloughs that flooded frequently. These natural assets were also favorable to habitation, resource collection, or other uses by early Native Americans. Since the 1850s, the hydrodynamics of the Delta, as well as downstream locations including Suisun Bay and Suisun Marsh, have been transformed by reclamation, flood control projects, water supply projects, sedimentation from upstream mining, and navigation improvements. Water development and management included construction of the SWP and CVP, including export facilities located in the south Delta, in the early to mid-1900s. In-Delta water supply facilities were also developed to support agriculture, towns and cities, and recreation (Public Policy Institute of California 2007:4, 19, 31).

Since the SWP became operational, SWP operations have changed largely in response to regulatory changes intended to better protect fish and wildlife resources in the Delta, as described in Chapter 1, *Introduction*. In recent years, water diversions at the existing south Delta facilities have been limited during certain times of the year to protect aquatic resources, which has resulted in overall reduced and less reliable water supply for SWP users. In addition, recent dry and drought periods have further reduced the quantity and reliability of SWP deliveries.

As described in Chapter 30, *Climate Change,* future conditions associated with climate change, such as more extreme variability of annual precipitation and associated sea level rise are anticipated to further diminish overall water supplies and delivery reliability. Climate change (average weather over a long period of time) has already become manifest in increased average surface temperatures around the world, raised sea levels, and changed snowpack and runoff patterns in mountainous regions like the Sierra Nevada. Anticipated climate change–related effects include changes in precipitation within the watersheds upstream of the Delta, increased surface water temperatures associated with increases in average air temperatures, changes in weather patterns that could affect the frequency and magnitude of storms and storm-related high flows, and raised sea levels with a corresponding increase in seawater and brackish water entering the Delta from the west.

These changes are likely to reduce water quality in Delta, increase risk of interruptions to SWP operations, reduce the amount of water stored in the mountains as snowpack, reduce operational flexibility due to the need to limit seawater intrusion into the Delta, and result in larger peak inflows as more precipitation falls in the form of rain instead of snow. In addition, flooding of Delta islands due to a levee breach could cause seawater to be drawn into the Delta, severely reducing water quality and potentially causing Delta export operations to be halted for extended periods of time. Sea level rise, earthquakes, oxidization of peat soils, which has led to island subsidence, and weakening due to burrowing animals also put Delta levees at risk.

Despite statewide efforts to improve water conservation, recycling, groundwater management, and build the resilience of local water systems across the state, the SWP remains a critical component to California's water system and serves as a foundation for important local water supplies and resiliency programs. Failure to protect the SWP from future changes would put California's water supply and economy at risk.

Delta water management planning efforts in the past 20 years, including CALFED, the Delta Vision, the Bay Delta Conservation Plan, and California WaterFix, have been proposed to address the need for improved water supply reliability associated with the existing SWP and CVP Delta export facilities. In the past two decades, the reliability of water supply exports has decreased because of

seasonal export restrictions, reoccurring drought conditions, and the potential for Delta levee failures from earthquakes, levee conditions, Delta island subsidence, and sea level rise.

The current Delta Conveyance Project planning effort resulted from Governor Gavin Newsom's Executive Order N-10-19 to reduce the size of previously proposed California WaterFix conveyance facilities consistent with a broad new portfolio approach to build the resilience of local water systems across the state, as described further below and more fully in Chapter 1.

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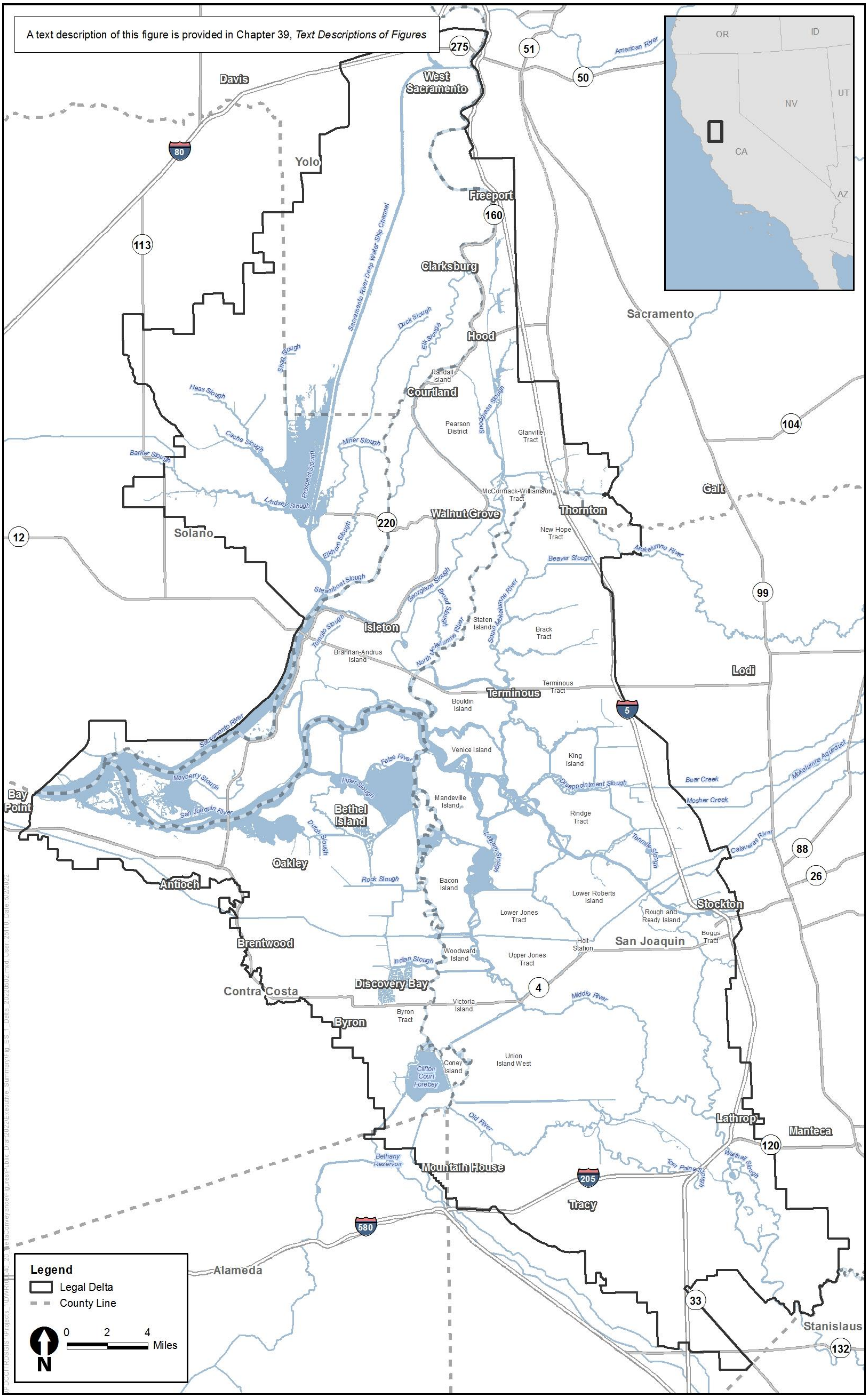

Figure ES-1. Sacramento–San Joaquin Delta

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ES.1.2 Project Purpose and Objectives

DWR's fundamental purpose in proposing the project is to develop new diversion and conveyance facilities in the Delta that are necessary to restore and protect the reliability of SWP water deliveries, and potentially CVP water deliveries south of the Delta, consistent with the state's Water Resilience Portfolio (California Natural Resources Agency et al. 2020:7) in a cost-effective manner. This fundamental purpose, in turn, gives rise to the following project objectives.

- To help address anticipated rising sea levels and other reasonably foreseeable consequences of climate change and extreme weather events.
- To minimize the potential for public health and safety impacts from reduced quantity and quality of SWP water deliveries, and potentially CVP water deliveries south of the Delta, as a result of a major earthquake that could cause breaching of Delta levees and the inundation with brackish water in the areas where existing SWP and CVP pumping plants operate in the southern Delta.
- To protect the ability of the SWP, and potentially the CVP, to deliver water when hydrologic conditions result in the availability of sufficient amounts, consistent with the requirements of state and federal law, including the California and federal Endangered Species Acts and Delta Reform Act, as well as the terms and conditions of water delivery contracts and other existing applicable agreements.
- To provide operational flexibility to improve aquatic conditions in the Delta and better manage risks of further regulatory constraints on project operations.

ES.1.3 Public Scoping and Issues of Known Controversy

Scoping for preparation of this Final EIR took place from the release of the Notice of Preparation (NOP) of an EIR on January 15, 2020, to April 17, 2020. The scoping period was originally scheduled for 65 days, ending on March 20, 2020, but was extended 28 days to allow for additional time to review project information and to accommodate the unprecedented circumstances related to the coronavirus disease 2019 (COVID-19) pandemic. During this period, the public was invited to participate in the scoping process, and DWR accepted public comments on the preparation of the EIR for the proposed project. Eight public scoping meetings were held in February and March 2020 to gather public input on the scope of the EIR and to involve interested parties, other agencies, and the public early to identify issues and concerns to examine during the preparation of the EIR. Over 2,000 individuals, organizations, and agencies submitted comments to DWR during the scoping period.

More detailed information on the scoping process is provided in Chapter 35, *Public Involvement*. The scoping report is provided in Appendix 1A, *July 2020 Delta Conveyance Project Scoping Summary Report and Addenda*, of this Final EIR and includes the NOP of an EIR, as well as written comments and testimony from agencies and the public from the public scoping meetings. Comments received have been considered throughout the planning effort, including preparation of this Final EIR, and are part of the administrative record.

CEQA requires that a lead agency, in preparing an EIR, identify issues of known controversy that were raised during the scoping process and throughout the development of the project alternatives. DWR considered these issues in the development of the proposed project and in preparation of the

EIR. The following list outlines the issues that were identified by governmental agencies and the public during scoping and points the reader to where these issues are discussed in the Final EIR.

- **Purpose and Objectives.** Commenters varied on whether they agreed with the purpose and objectives stated in the NOP, with some expressing the opinion that SWP export areas should find alternative sources of water. Other commenters requested a broader project purpose and objectives that should include ecosystem restoration and flood safety. The project purpose and objectives are laid out in Chapter 2, *Purpose and Project Objectives*.
- **Range of Alternatives.** The range and adequacy of alternatives is an issue of concern to the public as well as to governmental agencies. The development and screening process of alternatives is discussed in Appendix 3A, *Identification of Water Conveyance Alternatives,* which provides additional details on the information that was used in developing the alternatives.
- **Water Supply and Surface Water Resources.** The reliability of water supply and surface water resources, in relation to the SWP, are key drivers for development of the proposed project and its alternatives. Water supply and surface water resources are controversial issues for a wide array of interested parties (e.g., agricultural interests, hunting and fishing interests, water agencies, local jurisdictions) because of the concern about potential changes in Delta hydrodynamic conditions that might be attributable to changes in the SWP points of diversion in the Delta. DWR will seek to obtain authorization from the State Water Resources Control Board (State Water Board) for new SWP points of diversion. Such changes would not include changes to increase water rights; however, there are concerns that the project could result in the potential for increased exports and reliance on water that is exported from the Delta. Water supply and surface water impacts on the Trinity River and Klamath areas were of interest. There was a focus on future impacts both related and unrelated to the project operations as well (e.g., sea level rise, flooding, and degradation of adjacent levees). These issues are primarily addressed in Chapter 5, *Surface Water*, and Chapter 6, *Water Supply.*
- **Flood Protection.** Flood protection is a controversial issue because of concerns that the project would entail modification of some existing levees as well as changes in flood flow regimes. These issues are addressed in Chapter 7, *Flood Protection.*
- **Water Quality.** Water quality is an issue of controversy because of concerns regarding construction activities associated with the conveyance facilities and facility operation that could potentially change surface water flows, which commenters allege could lead to discharge of sediment, possible changes in salinity patterns, and potential water quality changes. Constituents of primary interest to commenters were cyanobacteria harmful algal blooms (CHABs) and salinity. These issues are addressed in Chapter 9, *Water Quality*.
- **Climate Change.** The likely effects of climate changes on water supplies and the Delta ecosystem are of concern to interested parties. The potential effects of climate change on resources are factored into the analysis of each resource, primarily in the resource chapter-associated appendices. The approach to analyzing climate change impacts is further discussed in Chapter 4, *Framework for the Environmental Analysis*. Chapter 30, *Climate Change,* presents the latest climate change science and discusses the impacts of the project alternatives and climate change, and Appendix 5A, *Modeling Technical Appendix*, describes how climate change was modeled for the project.
- **Biological Resources.** Concerns have been raised about the project's potential environmental impacts on the aquatic ecosystem and fish species and on the terrestrial ecosystem and plant

and wildlife species. For aquatic biological resources, there were concerns about fish in the Klamath, Trinity, Sacramento, American, and San Joaquin River watersheds. For terrestrial biological species, commenters expressed concern regarding effects on upland habitat as well as impacts on wetlands. The impacts on fish and aquatic biological resources are addressed in Chapter 12, *Fish and Aquatic Resources*, and impacts on terrestrial biological resources are addressed in Chapter 13, *Terrestrial Biological Resources*.

- **Agricultural Resources.** Since the project area is largely devoted to agricultural uses, the potential effects of the project on existing agricultural activities are a matter of concern, as expressed in scoping comments. In addition to conversion of agricultural lands to other uses (i.e., water conveyance facilities and lands used for compensatory mitigation), the analysis also addresses other potential effects from construction and operation of alternatives. The impacts on agricultural resources are addressed in Chapter 15, *Agricultural Resources*.
- **Recreation.** Concerns relating to recreation include potential conflicts between construction and operation of new conveyance facilities and ongoing Delta recreational activities (e.g., boating, fishing, hunting, enjoyment of marinas). Commenters were especially interested in potential impacts on navigable waterways. The impacts are discussed in Chapter 16, *Recreation,* Chapter 17, *Socioeconomics,* and Chapter 20, *Transportation.*
- **Socioeconomics.** The key socioeconomic concerns are the negative effects of construction activities on the local economy of Delta communities and the potential for loss of revenue and employment associated with a decrease in agricultural production resulting from conversion of agricultural land to other uses. A comparative discussion of the socioeconomic effects that would result under each alternative is provided in Chapter 17, *Socioeconomics*.
- **Aesthetics/Visual Resources.** Potential effects of new facilities on aesthetics and visual resources are controversial to local Delta residents as well as others (such as recreationists) who utilize the Delta. These concerns focus largely on the proposed intake facilities and other proposed facilities such as the Southern Forebay. Potential impacts are discussed in Chapter 18, *Aesthetics and Visual Resources*.
- **Environmental Justice and Disadvantaged Communities.** The potential for the Delta Conveyance Project to cause a disproportionately high amount of environmental impacts on minority and low-income communities is a concern that was raised during scoping. These issues are addressed in Chapter 29, *Environmental Justice.*
- **Growth.** One of the project objectives is to increase water supply reliability to SWP public water agencies south of the Delta. Concerns regarding the potentially growth-inducing consequences of the proposed Delta Conveyance Project generally focused on the potential effects of a stabilized future water supply to the southern part of the state. Concerns also focused on local growth inducement caused by increased employment in the Delta, as well as from roadway improvements made to facilitate construction or to mitigate potential traffic impacts in the Delta. The potential for growth resulting under each alternative is discussed in Chapter 31, *Growth Inducement*.
- **Cultural and Tribal Resources.** Concerns were expressed regarding the potential of the project to damage or destroy cultural and Tribal cultural resources, including disturbing sensitive archaeological resources such as burial sites. These issues are addressed in Chapter 19, *Cultural Resources*, and Chapter 32, *Tribal Cultural Resources.*

- **Community Issues.** Community issues, such as construction noise, air quality, and traffic circulation effects, conversion of existing land uses, access to private lands, and changes in the character of Delta communities are areas of concern for Delta residents. These issues have been addressed through evaluation of a wide range of resource impacts in Chapter 24, *Noise and Vibration*; Chapter 23, *Air Quality and Greenhouse Gases*; Chapter 20, *Transportation*; Chapter 26, *Public Health;* Chapter 14, *Land Use*; and Chapter 17, *Socioeconomics.*

ES.2 Final EIR Approach and Uses

This Final EIR is composed of the main body of the document, generally encompassing a description of the proposed project and alternatives and analysis of impacts on resources and mitigation, organized as Chapters 1 through 37, and a series of appendices that provide additional information in support of the chapters. Final EIR resource chapters focus on evaluating the impacts of nine project alternatives (described below in Section ES.3, *Alternatives*). The impacts of the alternatives occur within a study area that includes the physical facility footprint defined for each alternative. The study area can extend beyond the project footprint boundaries, depending on the resource topic evaluated (Chapter 1, Section 1.4, *Project Area and Study Areas*). This Final EIR, consistent with the requirements of CEQA, discloses the impacts of the alternatives in a comparative and synthesized format to facilitate public and agency review, as described below.

ES.2.1 Analysis of Alternatives

Each resource chapter provides analyses of the construction, operations, and maintenance impacts of the project alternatives in a comparative format. Impact analyses assume project alternative conditions compared to existing conditions in 2020 at the time of issuance of the NOP. To facilitate understanding the differences in impacts among the project alternatives, all of the project alternatives are evaluated together in a synthesized manner for each impact described for a resource topic.

CEQA significance conclusions are provided for each of the numbered direct or indirect impacts on the physical environment based on substantial evidence provided in the project alternative analyses and judged against defined impact significance thresholds. If impacts are judged to be significant, potentially feasible mitigation measures are identified to reduce significant impacts of the proposed project and project alternatives. The level of significance after mitigation measures are implemented is identified as either less than significant, if the impact is reduced to a level below the significance threshold, or significant and unavoidable, if the impact is not reduced below the threshold level, or if there is uncertainty about whether the mitigation would reduce the impact to a less-than-significant level.

Consistent with the CEQA Guidelines requirement to discuss the impacts of mitigation, the effects of implementing resource-specific mitigation measures and the Compensatory Mitigation Plan (CMP) are evaluated for each numbered impact in addition to the impacts of the project alternatives.

For each of the resource topics, the Final EIR also analyzes whether cumulatively significant impacts may occur, and if so, determines whether each project alternative's incremental effect is cumulatively considerable when evaluated together with past, present, and probable future projects.

ES.2.2 Final EIR Review and Project Approvals

This Final EIR is intended to meet CEQA's requirements and is expected to provide sufficient analysis to support Lead Agency DWR's certification of the Final EIR and, if appropriate, approval of the Delta Conveyance Project. The Final EIR discloses the impacts of the alternatives to the public and is expected to be used by responsible and trustee agencies, as defined by CEQA, consistent with each agency's CEQA requirements. The Final EIR informs other interested agencies, and other local state and federal permitting agencies. The following agencies have some form of regulatory authority or input on the proposed Delta Conveyance Project.

- U.S. Army Corps of Engineers
- U.S Fish and Wildlife Service
- National Marine Fisheries Service
- U.S Environmental Protection Agency
- U.S. Bureau of Reclamation
- U.S. Coast Guard
- California Department of Fish and Wildlife
- State Water Resources Control Board and Central Valley and San Francisco Regional Water Quality Control Boards
- Delta Stewardship Council
- California Department of Parks and Recreation
- California Department of Transportation
- Central Valley Flood Protection Board

In addition, coordination or approvals may also be required by regional air districts, California Air Resources Board, California Department of Public Health, DWR Division of Safety of Dams, California Public Utilities Commission, State Historic Preservation Officer, Natural Resource Conservation Service, State Water Contractors, and potentially CVP contractors. An overview of the permits and coordination required for these agencies is provided in Chapter 1, Section 1.5.2, *Use of This Final EIR by Other Entities*.

ES.3 Alternatives

ES.3.1 Development Process

As part of the preparation of an EIR and the decision-making process for the proposed project, a lead agency is required to consider a range of alternatives to the proposed project. CEQA requires that an EIR include a detailed analysis of a range of reasonable alternatives to a proposed project that are potentially feasible and would attain most of the basic project objectives while avoiding or substantially lessening potentially significant project impacts. A range of reasonable alternatives was analyzed to define the issues and provide a clear basis for choice among the options. CEQA requires that the EIR also evaluate a No Project Alternative along with its impacts.

An EIR must describe and evaluate only those alternatives necessary to permit a reasonable choice and "to foster meaningful public participation and informed decision making" (CEQA Guidelines § 15126.6(f)). Consideration of alternatives focuses on those that can achieve most of the basic project objectives- and either avoid or substantially reduce significant adverse environmental impacts of the proposed project; alternatives considered in this context may include those that are more costly and those that could impede to some degree the attainment of the project objectives (CEQA Guidelines § 15126.6(b)). However, an EIR need not consider every conceivable alternative to a project. Rather it must consider a range of potentially feasible alternatives that would foster informed decision making and public participation. DWR, as lead agency, will be the CEQA decision maker in determining the final form of what it ultimately approves.

DWR considered alternatives suggested during the current EIR scoping period by interested parties and technical experts and during past planning efforts (including the Bay Delta Conservation Plan and California WaterFix). For more details regarding what was evaluated, see Appendix 3A.

After an initial assessment and identification of alternatives that could be feasible and meet the project purpose, 21 potential alternatives to the proposed project were screened through a two-level filtering process. Filter 1, Project purpose and objectives, assessed whether a proposed alternative could meet the project purpose and most of the objectives based on the following four criteria.

- Climate resiliency. Addresses consequences of anticipated sea level rise and other reasonably foreseeable consequences of climate change and extreme weather events.
- Seismic resiliency. Minimizes health and safety risks to the public from earthquake-caused reductions in water delivery quality and quantity from the SWP.
- Water supply reliability. Restores and protects the ability of the SWP to deliver water in compliance with regulatory and contractual constraints.
- Operational resiliency. Provides operational flexibility to improve aquatic conditions and manage future regulatory constraints.

Alternatives that met two or more of the four Filter 1 criteria were carried forward for screening under Filter 2, Lessens environmental impacts. Filter 2 examined whether the remaining alternatives would avoid or lessen environmental impacts compared to the proposed project.

Of the 21 individual or grouped alternatives, 11 alternatives or groups were eliminated in Filter 1 (Appendix 3A, Table 3A-2). The remaining alternatives were screened through Filter 2 to evaluate whether they lessened environmental impacts compared to the proposed project (Appendix 3A, Table 3A-3). Only the dual conveyance Bethany Reservoir alignment passed Filter 2 screening for its potential to avoid or reduce impacts compared to the proposed project and has, therefore, been carried forward in this Final EIR as Alternative 5.

ES.3.2 Proposed Project and Alternatives Overview

The 2020 NOP identified the proposed project as a 6,000 cubic feet per second (cfs) diversion capacity alternative, which was proposed to be located on either a central or eastern alignment from intakes in the north Delta to pumping facilities in the south Delta near Clifton Court Forebay. In 2021, when conveyance facility engineering and environmental analyses had progressed further, DWR finalized the process for formally identifying the proposed project. This process considered the

feasibility, logistics, cost, and function of each of the alternatives on the central, eastern, and Bethany Reservoir alignments. Based on the engineering feasibility, conceptual design, constructability, and the potential to reduce key environmental impacts on cultural resources, wetlands and other waters of the United States, wildlife habitat, transportation, air quality, noise, and Delta community effects, DWR selected the Bethany Reservoir alignment at 6,000 cfs conveyance capacity as the proposed project, which is presented as Alternative 5 in this Final EIR. Figure ES-2 illustrates the alternative alignments and major project facilities considered in this Final EIR. Additional figures and mapbooks in Chapter 3, *Description of the Proposed Project and Alternatives*, provide additional details for each alternative.

Alternative 5, the Bethany Reservoir alignment, consists of the construction, operation, and maintenance of new SWP water diversion and conveyance facilities in the Delta that would be operated in coordination with the existing SWP facilities. The new water conveyance facilities would divert up to 6,000 cfs of water from two new north Delta intakes through state-of-the-art fish screens and convey it via a single tunnel on an eastern alignment directly to a new pumping plant and aqueduct complex between Byron Highway and Mountain House Road near Mountain House in the south Delta, discharging it to the Bethany Reservoir for delivery to existing SWP export facilities. This complex is called the Bethany Complex and is described in detail in Chapter 3, Section 3.14, *Alternative 5, Bethany Reservoir Alignment, 6,000 cfs, Intakes B and C (Proposed Project)*.

Under the alternatives to the proposed project, the tunnel would convey water from the new north Delta intakes through one tunnel on a central alignment (Alternatives 1, 2a, 2b, and 2c) or an eastern alignment (Alternatives 3, 4a, 4b, and 4c) to existing SWP conveyance facilities and potentially to existing CVP facilities (Alternatives 2a and 4a) via a new pumping plant and Southern Forebay on Byron Tract and other appurtenant facilities in the south Delta ("Southern Complex"), sited adjacent to the Clifton Court Forebay. The new Southern Forebay would provide an additional isolated south Delta water balancing facility that would also be operated to provide flexibility for operating both the new and existing facilities.

The proposed project or alternatives would operate the new conveyance facilities in conjunction with SWP's existing south Delta export facilities at Clifton Court Forebay, creating a *dual conveyance* system. Depending on need and conditions, water could be diverted from the new diversion facilities in the north Delta, the existing SWP south Delta export facilities, or both, to improve system reliability.

The proposed project and alternatives are as follows. Table ES-1 summarizes the key features of each alternative. The proposed project was identified in the NOP as Alternatives 1 and 3. The Final EIR presents Alternative 5 as the proposed project.

- Alternative 1—Central Alignment, 6,000 cfs, Intakes B and C
- Alternative 2a—Central Alignment, 7,500 cfs, Intakes A, B, and C
- Alternative 2b—Central Alignment, 3,000 cfs, Intake C
- Alternative 2c—Central Alignment, 4,500 cfs, Intakes B and C
- Alternative 3—Eastern Alignment, 6,000 cfs, Intakes B and C
- Alternative 4a—Eastern Alignment, 7,500 cfs, Intakes A, B, and C
- Alternative 4b—Eastern Alignment, 3,000 cfs, Intake C
- Alternative 4c—Eastern Alignment, 4,500 cfs, Intakes B and C

- Alternative 5—Bethany Reservoir Alignment, 6,000 cfs, Intakes B and C (proposed project)

Operational alternatives are related to the timing and capacity of water diversions from the Sacramento River and/or from existing SWP and CVP pumping plants in the south Delta. Different project design capacities of 3,000 cfs, 4,500 cfs, 6,000 cfs, and 7,500 cfs would affect the number and size of the facilities to be constructed. The alternatives with capacity of 7,500 cfs (Alternatives 2a and 4a) would involve a third intake on the Sacramento River and additional facilities in the south Delta to convey 1,500 cfs to the CVP C. W. "Bill" Jones Pumping Plant (Jones Pumping Plant). The proposed project, Bethany Reservoir alignment (Alternative 5), is only being considered at 6,000 cfs design capacity and would not require construction or operation of the Southern Complex. Rather, the single tunnel would deliver water directly to a new pumping plant and aqueducts at the Bethany Complex near the Bethany Reservoir for release to the Bethany Reservoir and delivery to users.

Variations in project design capacity affect the size of the areas needed for construction and/or operation of the following facilities.

- **North Delta Intakes.** Number of intakes and the size of the fish screen and intake structure, sedimentation basin, and sediment drying lagoons, flow control structure, and inlet to tunnel.
- **Tunnel.** Tunnel length and diameter.
- **Tunnel launch shaft sites.** Site size, launch shaft diameter, material removed during shaft and tunnel construction, areas for tunnel liner segment storage, areas for reusable tunnel material (RTM) handling, and RTM storage.
- **Tunnel reception and maintenance shafts sites.** Shaft diameter and material removed during shaft construction.
- **Lambert Road Concrete Batch Plant.** Two batch plants for all alternatives except Alternatives 2b and 4b, which require only one concrete batch plant for 3,000 cfs conveyance capacity.
- **South Delta Pumping Plant.** Number and capacity of pumps and size of the pumping plant and electrical building would vary with the capacity of the alternative, but the overall pumping plant footprint would be the same under all alternatives. These facilities would not be included under Alternative 5.
- **Southern Complex.** Size of excess soil/RTM stockpile areas; not included in Alternative 5.
- **South Delta Conveyance Facilities west of Byron Highway.** Additional facilities would be needed for 7,500 cfs alternatives to convey water to the Jones Pumping Plant approach channel. These facilities would not be included in Alternative 5.
- **Facilities for the Bethany Reservoir alignment.** Alternative 5 with 6,000 cfs capacity would require a larger Twin Cities Complex site to accommodate additional RTM drying without the use of mechanical dryers, a larger site on Lower Roberts Island to accommodate a double launch shaft, a different alignment south of Lower Roberts Island, a different shaft location on Upper Jones Tract, one additional maintenance shaft as compared to the eastern alignment, and a different southern site near Mountain House for the Bethany Complex, including a pumping plant, surge basin with reception shaft, a buried pipeline aqueduct system, and a discharge structure to convey water to Bethany Reservoir.

DWR directed the preparation of the *Volume 1: Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options* (C-E EPR) and the *Volume 1: Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative* (Bethany EPR) and associated technical memoranda (Delta Conveyance Design and Construction Authority 2022a, 2022b). The project also includes specific engineering refinements, which are described in *Central and Eastern Corridor Options Engineering Project Report Update* (Delta Conveyance Design and Construction Authority 2023a) and *Bethany Reservoir Alternative Engineering Project Report Update* (Delta Conveyance Design and Construction Authority 2023b). The EPRs and technical memoranda detail the engineering considerations that support project alternative design decisions.

Table ES-1. Summary of Key Project Features by Alternative

Items	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
Conveyance capacity (cfs)	6,000	7,500	3,000	4,500	6,000	7,500	3,000	4,500	6,000
Alignment	Central	Central	Central	Central	Eastern	Eastern	Eastern	Eastern	Bethany Reservoir (eastern alignment from intakes to Lower Roberts Island, then extending to the Bethany Reservoir Pumping Plant and Surge Basin without use of a forebay)
Intakes and capacity (cfs)	Intake B, 3,000 Intake C, 3,000	Intake A, 1,500 Intake B, 3,000 Intake C, 3,000	Intake C, 3,000	Intake B, 3,000 Intake C, 1,500	Intake B, 3,000 Intake C, 3,000	Intake A, 1,500 Intake B, 3,000 Intake C, 3,000	Intake C, 3,000	Intake B, 3,000 Intake C, 1,500	Intake B, 3,000 Intake C, 3,000
Main tunnel diameter (feet)	36 inside 39 outside	40 inside 44 outside	26 inside 28 outside	31 inside 34 outside	36 inside 39 outside	40 inside 44 outside	26 inside 28 outside	31 inside 34 outside	36 inside 39 outside
Main tunnel length (miles)	39	42	37	39	42	44	40	42	45
Lambert Road Concrete Batch Plants	Two plants. 15 acres for construction; 14 acres post-construction.	Two plants. 15 acres for construction; 14 acres post-construction.	One plant. 8 acres for construction; 7 acres post-construction.	Two plants. 15 acres for construction; 14 acres post-construction.	Two plants. 15 acres for construction; 14 acres post-construction.	Two plants. 15 acres for construction; 14 acres post-construction.	One plant. 8 acres for construction; 7 acres post-construction.	Two plants. 15 acres for construction; 14 acres post-construction.	Two plants. 15 acres for construction; 14 acres post-construction.

Items	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
Bethany Complex Concrete Batch Plants	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Two plants, approximately 5 acres at Bethany Reservoir Pumping Plant and Surge Basin.
South Delta Pumping Plant at the Northern Southern Forebay Embankment	Seven pumps at 960 cfs, each, including two standby pumps. Three pumps at 600 cfs, each, including one standby pump. Two portable pumps to dewater tunnel for inspection or maintenance.	Eight pumps at 960 cfs, each, including up to two standby pumps. Three pumps at 600 cfs, each, including one standby pump. Two portable pumps to dewater tunnel for inspection or maintenance.	Five pumps at 960 cfs, each, including up to two standby pumps. Three pumps at 600 cfs, each, including one standby pump. Two portable pumps to dewater tunnel for inspection or maintenance.	Six pumps at 960 cfs, each, including up to two standby pumps. Three pumps at 600 cfs, each, including one standby pump. Two portable pumps to dewater tunnel.	Seven pumps at 960 cfs, each, including two standby pumps. Three pumps at 600 cfs, each, including one standby pump. Two portable pumps to dewater tunnel for inspection or maintenance.	Eight pumps at 960 cfs, each, including up to two standby pumps. Three pumps at 600 cfs, each, including one standby pump. Two portable pumps to dewater tunnel for inspection or maintenance.	Five pumps at 960 cfs, each, including up to two standby pumps. Three pumps at 600 cfs, each, including one standby pump. Two portable pumps to dewater tunnel for inspection or maintenance.	Six pumps at 960 cfs, each, including up to two standby pumps. Three pumps at 600 cfs, each, including one standby pump. Two portable pumps to dewater tunnel for inspection or maintenance.	Not applicable

Items	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
Southern Forebay	Normal operating capacity: 9,000 acre-feet. Surface area: approximately 750 acres. Average surface water elevation: 11.5 feet, or approximately the halfway point within the normal operating elevation range of 5.5 to 17.5 feet. Area: approximately 1,000 acres.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Not applicable
Dual tunnels at Southern Forebay Outlet Structure, each (diameter in feet; length in miles)	38 inside 41 outside 1.7 miles	40 inside 44 outside 1.7 miles	38 inside 41 outside 1.7 miles	38 inside 41 outside 1.7 miles	38 inside 41 outside 1.7 miles	40 inside 44 outside 1.7 miles	38 inside 41 outside 1.7 miles	38 inside 41 outside 1.7 miles	Not applicable
Single Jones Tunnel (diameter in feet/length in miles)	Not applicable	20 inside 22 outside 1.5 miles	Not applicable	Not applicable	Not applicable	20 inside 22 outside 1.5 miles	Not applicable	Not applicable	Not applicable

Items	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
Bethany Reservoir Pumping Plant and Surge Basin	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	14 pumps at 500 cfs, each, including two standby pumps. Four 75-feet diameter by 20-feet high one-way surge tanks connected to the Bethany Reservoir Pumping Plant's discharge pipelines. Two portable 60 cfs pumps to dewater main tunnel for inspection and maintenance. Four rail-mounted 100 cfs pumps to dewater Surge Basin. One 815-feet by 815-feet, 35-foot deep surge basin with surge overflow capacity.

Items	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
Bethany Reservoir Aqueduct to Bethany Reservoir Discharge Structure	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	128 acres for construction; 68 acres post-construction. Four pipelines, each 15-feet inside diameter, 15.2 feet outside diameter. 2.8 miles long. Four tunnels (1 for each pipeline) under CVP Jones discharge pipelines. 4 tunnels (1 for each pipeline) under Bethany Reservoir Conservation Easement. Riser shafts to Discharge Structure.
Bethany Reservoir Discharge Structure	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	15 acres for construction; 13 acres post-construction.

Items	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
Park-and-Ride Lots (Temporary, for construction only)	Hood-Franklin Park-and-Ride – 4.1 acres. Rio Vista Park-and-Ride – 3 acres. Charter Way Park-and-Ride – 2.4 acres. Byron Park-and-Ride – 2.1 acres. Bethany Park-and-Ride – 2.6 acres.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Hood-Franklin Park-and-Ride – 4.1 acres. Charter Way Park-and-Ride – 2.4 acres. Byron Park-and-Ride – 2.1 acres. Bethany Park-and-Ride – 2.6 acres.	Same as Alternative 3	Same as Alternative 3	Same as Alternative 3	Hood-Franklin Park-and-Ride Lot - 4.1 acres. Charter Way Park-and-Ride – 2.4 acres.
Temporary Construction and Permanent Acreage [a] for Each Alternative									
Permanent Surface area	2,808.80	3,048.50	2,477.00	2,679.70	2,336.30	2,699.40	1,974.40	2,206.00	1,328.60
Temporary Surface area	1,309.00	1,481.00	1,134.00	1,303.00	1,341.50	1,410.30	1,160.50	1,322.00	1,190.80

Note: Tunnel diameter and length are from intakes to Southern Forebay, except for Alternative 5.

cfs = cubic feet per second; CVP = Central Valley Project.

[a] Acreages include all major project features, railroad and road work, power, supervisory control and data acquisition (SCADA), and construction support facilities. Geotechnical investigation zones and fault study areas are not included.

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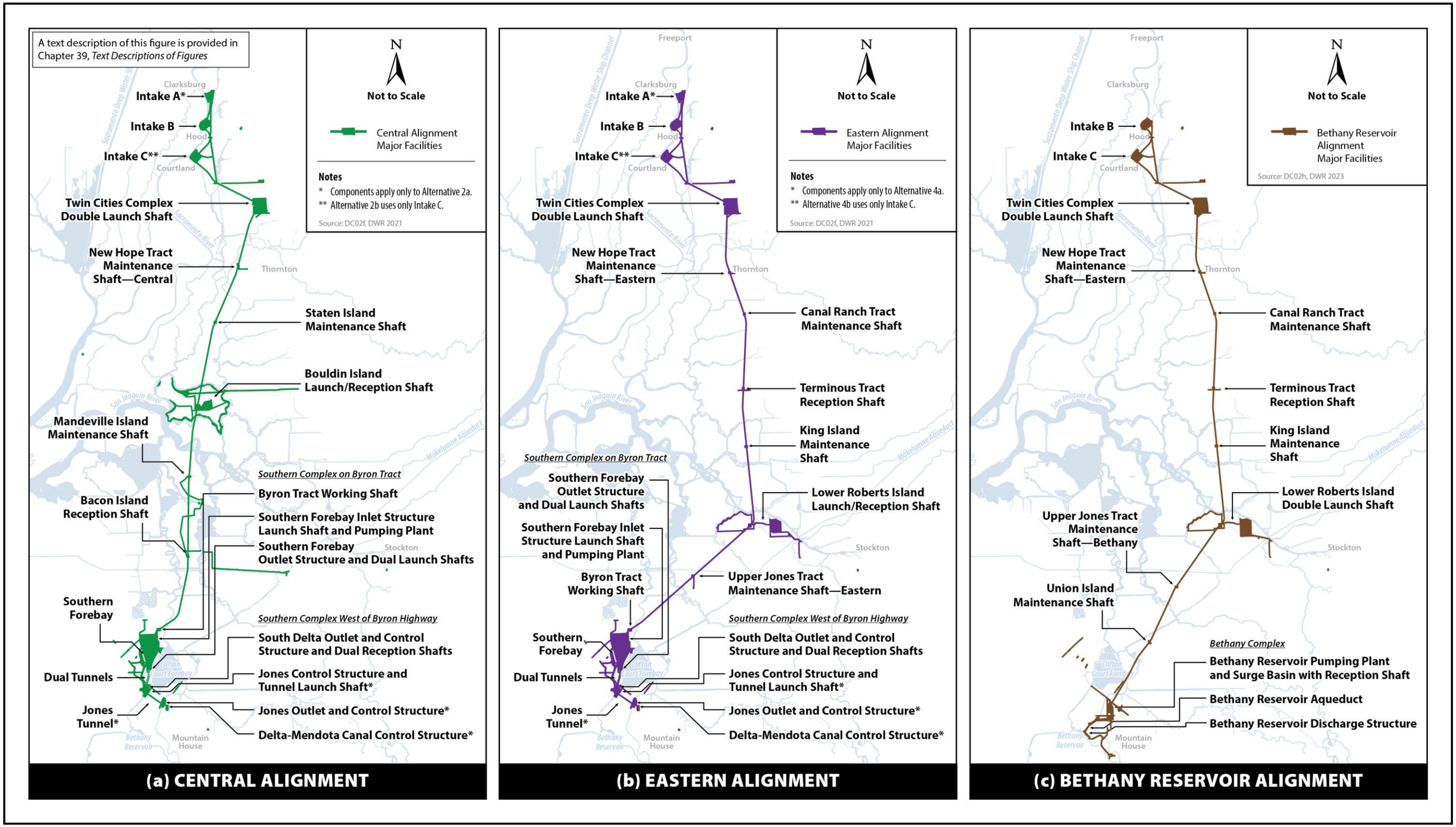

Figure ES-2. Delta Conveyance Alternative Alignments and Major Facilities

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ES.3.3 No Project Alternative

Under CEQA, an EIR is required to analyze the No Project Alternative. The No Project Alternative allows decision makers to use the EIR to compare the impacts of approving the project with the reasonably foreseeable future conditions of not approving the proposed project. Under CEQA, the No Project Alternative is not the baseline for assessing the significance of impacts of the proposed project. Rather, the "environmental setting" as it exists at the time of issuance of a NOP "will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant" (CEQA Guidelines § 15125(a)).

No project conditions may include some reasonably foreseeable changes in existing conditions and changes that would be expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services (CEQA Guidelines §15126.6(e)(2)). For purposes of this analysis, the No Project Alternative is considered at 2020, which is identical to existing conditions and is equivalent to how the project alternatives are considered. The No Project Alternative is also analyzed at 2040, which is when the Delta Conveyance Project is anticipated to be operational if it is approved.[2]

Under the No Project Alternative, DWR would continue to operate the existing SWP infrastructure to divert, store, and convey SWP water consistent with applicable laws and contractual obligations (Chapter 3, Section 3.5, *No Project Alternative*). Because of the interrelated operation of the SWP and CVP, the No Project Alternative also assumes current operation of the CVP. The SWP and the CVP are major water storage and delivery systems that store water in reservoirs upstream of the Delta, release and transport water via natural watercourses and canal systems to the Delta, and export water to areas south and west of the Delta. The SWP facilities in the Sacramento Valley include reservoirs in the Feather River watershed, and the CVP includes reservoirs on the Sacramento, American, Stanislaus, and San Joaquin Rivers.

SWP facilities in the Delta, including Clifton Court Forebay, John E. Skinner Delta Fish Protective Facility (Skinner Fish Facility), and Harvey O. Banks Pumping Plant (Banks Pumping Plant), would continue to be operated consistent with applicable laws and contractual obligations. Similarly, existing CVP facilities in the Delta, including Delta Cross Channel, Jones Pumping Plant, Tracy Fish Collection Facility, and Delta-Mendota Canal would continue to be operated consistent with applicable laws and contractual obligations.

The inherent challenge in envisioning long-term No Project conditions has required DWR to make some informed judgments about what might happen outside the immediate SWP/CVP context during such an extended time period. The analysis of the No Project Alternative in this Final EIR

[2] The No Project Alternative at 2040 includes predictable changes that would be reasonably expected to occur in the foreseeable future if the project were not approved (refer to Chapter 3, *Description of the Proposed Project and Alternatives*, and Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*). This includes a conservative climate change and sea level rise assumption, which is further described in Chapter 4, *Framework for the Environmental Analysis,* Section 4.1.1.7, *Consideration of Seismic Risks and Climate Change on Project Alternatives*; Chapter 30, *Climate Change*; and Appendix 5A*, Modeling Technical Appendix,* Section B, *Hydrology and Systems Operations Modeling,* Attachment 4, *Climate Change Development for Delta Conveyance Project*. The modeled 2040 Central Tendency (CT) climate change scenario used in the No Project Alternative at 2040 covers a 30-year period of climate model data (2026–2055) (refer to Chapter 30 and Appendix 5A). Use of the phrase "at 2040" throughout the Executive Summary or EIR means those climate change conditions under the 2040 scenario.

identifies the reasonably foreseeable types of actions of California water suppliers, other than DWR and Bureau of Reclamation (Reclamation), under a long-term scenario in which the Delta Conveyance Project is not approved or implemented. This includes ongoing and possible future actions related to water conservation programs, water recycling projects, groundwater recovery projects, desalination of seawater or brackish groundwater, surface water storage, groundwater management, or water transfers and exchanges. A full description of the No Project Alternative is provided in Chapter 3. The detailed elements of the No Project Alternative are presented in Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions.*

Accordingly, in the absence of the Delta Conveyance Project, the No Project Alternative for the Final EIR entails programs, projects, and policies included in existing conditions assumptions, as well as the types of projects that may occur in lieu of the project. These assumptions also encompass programs, projects, and polices with clearly defined management and/or operational plans, as well as facilities under construction as of January 15, 2020, because such actions and facilities are consistent with the continuation of existing management direction or level of management for plans, policies, and operations. The No Project Alternative assumptions also include facilities and programs that received approvals and permits in 2020 because those programs were consistent with existing management direction as of the NOP. Because the effects of climate change and sea level rise are reasonably foreseeable, they are also included within the No Project Alternative. Additionally, as discussed in Chapter 3, the No Project Alternative analysis includes actions required by the 2019 U.S. Fish and Wildlife Service (USFWS) Biological Opinion (BiOp), 2019 National Marine Fisheries Service (NMFS) BiOp for the long-term coordinated operations of the CVP and SWP, and actions required by the California Department of Fish and Wildlife (CDFW) Incidental Take Permit (ITP) for the long-term operation of the SWP, issued on March 31, 2020.

As is explained throughout this Final EIR, such conditions would likely entail continuing degradation of SWP/CVP south Delta exports, increasing vulnerability in the south Delta to long-term reductions in water quality due to sea level rise, and continuing vulnerability to interruption resulting from a major seismic event harming Delta facilities so as to temporarily halt export operations. Further discussion of geologic and seismic hazards is provided in Chapter 10, *Geology and Seismicity*.

While the No Project Alternative includes conditions at 2020 and includes all ongoing and reasonably foreseeable projects and programs, the analysis of the No Project Alternative within resource chapters focuses on projects and programs that could occur in the absence of the Delta Conveyance Project and the associated environmental impacts that are reasonably foreseeable results of not approving the Delta Conveyance Project. Because it is impossible to know with certainty the exact mix of projects and programs that water suppliers would implement if the Delta Conveyance Project were not approved, the No Project analysis is largely programmatic, not project specific.

ES.4 Approaches for Addressing Potential Environmental Impacts

ES.4.1 Environmental Commitments and Best Management Practices

The CEQA Guidelines instruct a lead agency to "distinguish between the measures which are proposed by project proponents to be included in the project and other measures proposed by the lead, responsible or trustee agency or other persons" in their EIRs (CEQA Guidelines § 15126.4(a)(1)(A)). As used in this Final EIR, environmental commitments and best management practices (BMPs) are project components that have been incorporated into the project design and construction. Environmental commitments are typically engineering-related and are intended to avoid, reduce, or minimize environmental or community impacts; BMPs are typically generalized measures not specific to the project location and are well-established practices or requirements that are incorporated into the project construction process. For each project alternative, DWR has committed that the environmental commitments and BMPs will be implemented as part of the project if the project is approved. Environmental commitments and BMPs are described in detail in Appendix 3B, *Environmental Commitments and Best Management Practices*. As with any project design feature, environmental commitments could be modified during the environmental review process in response to comments on the Draft EIR or as additional information is developed. Any changes to the environmental commitments are reflected in the Final EIR.

When environmental commitments or BMPs are used to partially or fully avoid or reduce an environmental impact, Chapters 7 through 32 include one or more narrative discussions explaining both how the environmental commitments /BMPs reduce the severity of environmental effects and whether the level of impact reduction is sufficient to render the effects less than significant. This approach provides a succinct presentation and analysis of each environmental commitment's/BMP's effectiveness in reducing environmental impacts in a comprehensive and understandable manner. As described below, detailed mitigation measures specific to the project and location to avoid or minimize potential significant impacts of the proposed project and alternatives are presented after the project effects have been identified and a significance determination made.

ES.4.2 Mitigation Approaches

The term *mitigation measure* (including measures in the CMP) is applied in this Final EIR to designate specific measures to reduce residual potentially significant environmental impacts after considering the application of all environmental commitments and BMPs. Specific measures are proposed when necessary to avoid, reduce, minimize, or compensate for potentially significant environmental impacts of the project alternatives. Mitigation is presented to meet CEQA's specific requirement that, whenever possible, agency decision makers adopt feasible mitigation available to reduce a project's significant impacts to a less-than-significant level. To the extent possible, project alternatives were designed to avoid and minimize surface impacts through site optimization, use of subsurface tunnels for water conveyance, reduced space requirements for intake screens, and evaluation of a range of conveyance capacities.

Where avoidance of potentially significant impacts is not possible, this Final EIR employs a variety of mitigation types to reduce significant impacts: resource-specific mitigation measures and compensatory mitigation. Each of these approaches is described below.

ES.4.2.1 Mitigation Measures

Mitigation measures are presented as actions that could fully or partially reduce potentially significant environmental effects on a specific resource. Mitigation measures generally describe who will implement the mitigation, how the mitigation will be implemented, and when and where the mitigation will occur. This Final EIR addresses whether the mitigation presented would reduce the impact to a less-than-significant level based on the thresholds of significance presented in each resource chapter. Mitigation measures included in this Final EIR are potentially feasible; however, the ultimate determination of feasibility is made by the lead agency.

Mitigation measures are presented in each resource chapter for potentially significant impacts. Resource-specific mitigation measures are numbered by the first impact to which they apply and may be used to reduce multiple significant impacts in a chapter, and in some cases, used to reduce significant impacts in other resource chapters. In cases where mitigation measures would be applicable only for specific alternatives, a subheading for the alternatives to which the mitigation measures apply is provided immediately following the mitigation measure heading. To avoid redundancy, mitigation measures are described only once and then referenced subsequently where applicable.

ES.4.2.2 Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources

The CMP has been developed in coordination with terrestrial biological resources impact analyses in Chapter 13 and the fish and aquatic biological resources impact analyses in Chapter 12. The CMP identifies potential compensatory mitigation approaches to address impacts on habitat for special-status species, as well as on jurisdictional wetlands and other waters that may result from the construction and operation of the project. The CMP describes several habitat mitigation sites where habitat creation and enhancement could potentially take place to offset losses of aquatic resources and species habitat and discusses other approaches that may be used to secure appropriate compensatory mitigation for the project. It is described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*. Additional information about how the CMP was considered in the analysis in Chapters 7 through 32 is provided in Chapter 4*s*.

The CMP outlines three primary approaches for providing compensatory mitigation to offset impacts associated with the construction and operation of the project alternatives. The first approach is to develop and implement several initial mitigation actions at specific sites that would provide compensatory mitigation for many of the affected special-status species habitats and aquatic resources. The second approach is to use existing or proposed mitigation banks to secure credits for certain types of habitats and natural communities, including vernal pools and alkaline seasonal wetlands, as well as species habitat such as for California tiger salamander (*Ambystoma californiense*) and California red-legged frog (*Rana draytonii*). This second approach also includes the potential use of site protection instruments, such as conservation easements, to protect or enhance existing land uses that provide habitat function for certain species, such as Swainson's hawk (*Buteo swainsoni*), greater sandhill crane (*Grus canadensis tabida*), and tricolored blackbird (*Agelaius tricolor*), that may use certain agricultural crops or other habitat types for foraging or

roosting and manage those lands for the target species in perpetuity. The third approach, a combination of these, is to propose a mitigation framework under which future compensatory mitigation actions may be delivered for tidal freshwater perennial aquatic (tidal channel), tidal freshwater emergent wetland, and channel margin communities. Each of these approaches is described in greater detail in Appendix 3F, Section 3F.4, *Mitigation Work Plan*.

CEQA requires that impacts of mitigation measures be evaluated in the environmental document. The CMP is sizable enough that its impacts are included in each resource chapter. Each resource chapter includes discussions of the potential impacts associated with construction, operation, and maintenance necessary to implement the compensatory mitigation.

ES.5 Summary of Impacts

This section provides a summary discussion of each impact for each resource evaluated in this Final EIR. Each summary is accompanied by an alternatives comparison table that allows readers to easily compare a specific resource impact across all project alternatives.

Table ES-2 summarizes all of the impacts across all alternatives. The summary table identifies the significance of impacts, mitigation measures that would reduce the impacts, and the impact significance after mitigation measures are applied for each resource topic addressed in Chapters 7 through 32.

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Table ES-2. Summary of Delta Conveyance Project Impacts and Mitigation Measures

Pursuant to CEQA Guidelines Section 15126.2(b), an EIR must, "Describe any significant impacts, including those which can be mitigated but not reduced to a level of insignificance. Where there are impacts that cannot be alleviated without imposing an alternative design, their implications and the reasons why the project is being proposed, notwithstanding their direct effect, should be described." The following table summarizes the impact conclusions before mitigation, proposed mitigation to alleviate impacts, and the final significance conclusions after mitigation provided in Chapters 7 through 32 of this Final EIR. Impacts that cannot be alleviated to a level of insignificance are denoted with an "SU" in the column titled "Impacts of Project plus Mitigation Measures." The conclusions for Alternatives 1 through 5 reflect implementation of project environmental commitments (described in detail in Appendix 3B, *Environmental Commitments and Best Management Practices*), which are considered a part of each project alternative. Each resource chapter also considers the impacts of implementing compensatory mitigation (described in detail in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*) and other mitigation measures (summarized in Chapter 4, *Framework for the Environmental Analysis*) and makes a finding as to whether there is any added impact to implementing the mitigation measures in addition to the project alternatives. For all project alternatives, mitigation measures proposed under one resource section (e.g., terrestrial biological resources) may also be proposed to reduce effects on other resource topics (e.g., recreation, aquatics, water quality). In these instances, the mitigation measures are cross-referenced whenever they may reduce effects. Additional discussion of each impact and mitigation measure can be found under the referenced resource-specific chapter(s). For purposes of this analysis, the No Project Alternative is considered at 2020, which is identical to existing conditions and is equivalent to how the project alternatives are considered. The No Project Alternative is also analyzed at 2040, which is when the Delta Conveyance Project is anticipated to be operational if it is approved. For the EIR analysis, the No Project Alternative additional detail on assumptions is provided in Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*. The No Project Alternative represents the anticipated effects on a resource as a result of future conditions at 2040 in the absence of the Delta Conveyance Project. Because it is impossible to know with certainty the exact mix of projects and programs that water suppliers would implement if the Delta Conveyance Project were not approved, the No Project Alternative analysis is largely programmatic, not project specific. For that reason, no CEQA Conclusion is provided in the resource chapters for the No Project Alternative and is, therefore, not shown in this table. For a discussion on the analytical approach taken, please see the *Impacts and Mitigation Approaches* section contained in each resource chapter.

Chapters 5, 6, 17, 29, 30, and 31 are not included in the table below. Chapter 5, *Surface Water*, and Chapter 6, *Water Supply,* describe potential changes to surface water resources and water supply that could result from the project alternatives. Changes to surface water resources and water supply, by themselves, are not considered an impact of the project alternatives under CEQA and, thus, are not evaluated as impacts or presented in Table ES-2. Potential impacts associated with changes in water supply and surface water are evaluated in Chapters 7 through 32. Chapter 17, *Socioeconomics*, describes the socioeconomic conditions in the study area and analyzes changes that could result from construction, operation, and maintenance of the project and the compensatory mitigation associated with other resources. Under CEQA, social or economic effects are not treated as impacts on the physical environment and are, therefore, not included in Table ES-2. Chapter 29, *Environmental Justice,* includes a discussion of environmental justice concerns and the potential effects of the project on environmental justice communities. CEQA does not require an analysis of environmental justice; therefore, while a discussion of the potential effects of the project are presented in Chapter 29, those effects are not considered an impact under CEQA and are not presented in Table ES-2. Chapter 30, *Climate Change,* analyzes how climate change is projected to affect the study area, how anticipated resource impacts from the project may be affected by climate change, and how project alternatives may improve the study area's resiliency and adaptability to climate change, and these are fundamentally different analyses from those presented in other resource chapters. CEQA does not require an analysis of climate change; therefore, while a discussion of the potential effects of the project in combination with climate change is presented in Chapter 30, those effects are not considered an impact under CEQA and are not presented in Table ES-2. Chapter 31, *Growth Inducement,* addresses the growth inducement potential of the project alternatives. CEQA Guidelines Section 15126.2(e) requires an analysis of the project's potential to foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. However, growth inducement is not included in the CEQA Guidelines Appendix G checklist and is, therefore, not listed in this table. Refer to Chapter 31 for an analysis of the potential impacts of the project alternatives on inducing growth.

Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact FP-1: Cause a Substantial Increase in Water Surface Elevations of the Sacramento River between the American River Confluence and Sutter Slough	2a and 4a	S	MM FP-1: Phased Construction of the Proposed North Delta Intakes	LTS
Impact FP-1: Cause a Substantial Increase in Water Surface Elevations of the Sacramento River between the American River Confluence and Sutter Slough	1, 2b, 2c, 3, 4b, 4c, 5	LTS	Not applicable	LTS
Impact FP-2: Alter the Existing Drainage Pattern of the Site or Area, including through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding On- or Off-Site or Impede or Redirect Flood Flows	All project alternatives	LTS	Not applicable	LTS
Impact GW-1: Changes in Stream Gains or Losses in Various Interconnected Stream Reaches	All project alternatives	LTS	MM GW-1: Maintain Groundwater Supplies in Affected Areas	LTS
Impact GW-2: Changes in Groundwater Elevations	All project alternatives	LTS	MM GW-1: Maintain Groundwater Supplies in Affected Areas	LTS
Impact GW-3: Reduction in Groundwater Levels Affecting Supply Wells	All project alternatives	LTS	MM GW-1: Maintain Groundwater Supplies in Affected Areas	LTS

Level of Significance:

SU = significant and unavoidable (any mitigation not sufficient to render impact less than significant).
S = significant.
LTS = less than significant.
NI = no impact.

CMP = Compensatory Mitigation Plan; MM = Mitigation Measure.

Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact GW-4: Changes to Long-Term Change in Groundwater Storage	All project alternatives	LTS	MM GW-1: Maintain Groundwater Supplies in Affected Areas	LTS
Impact GW-5: Increases in Groundwater Elevations near Project Intake Facilities Affecting Agricultural Drainage	All project alternatives	LTS	MM GW-5: *Reduce Potential Increases in* Groundwater Elevations Near Project Intake Facilities	LTS
Impact GW-6: Damage to Major Conveyance Facilities Resulting from Land Subsidence	All project alternatives	LTS	Not applicable	LTS
Impact GW-7: Degradation of Groundwater Quality	All project alternatives	LTS	Not applicable	LTS
Impact WQ-1: Impacts on Water Quality Resulting from Construction of the Water Conveyance Facilities	All project alternatives	LTS	Not applicable	LTS
Impact WQ-2: Effects on Boron Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-3: Effects on Bromide Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-4: Effects on Chloride Resulting from Facility Operations and Maintenance	All project alternatives	LTS	MM WQ-4: Contra Costa Water District Interconnection Facility	LTS
Impact WQ-5: Effects on Electrical Conductivity Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-6: Effects on Mercury Resulting from Facility Operations and Maintenance	All project alternatives	LTS	MM WQ-6: Develop and Implement a Mercury Management and Monitoring Plan	LTS[3]
Impact WQ-7: Effects on Nutrients Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-8: Effects on Organic Carbon Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-9: Effects on Dissolved Oxygen Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-10: Effects on Selenium Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-11: Effects on Pesticides Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-12: Effects on Trace Metals Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-13: Effects on Turbidity/Total Suspended Solids Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-14: Effects on Cyanobacteria Harmful Algal Blooms Resulting from Facility Operations and Maintenance	All project alternatives	LTS	Not applicable	LTS
Impact WQ-15: Risk of Release of Pollutants from Inundation of Project Facilities	All project alternatives	LTS	Not applicable	LTS
Impact WQ-16: Effects on Drainage Patterns as a Result of Project Facilities	All project alternatives	LTS	Not applicable	LTS

[3] The project alternatives would not result in significant water quality effects associated with mercury. However, there could be significant impacts with the implementation of the CMP. Those impacts could be reduced to a less-than-significant level with Mitigation Measure WQ-6.

Level of Significance:

SU = significant and unavoidable (any mitigation not sufficient to render impact less than significant).	LTS = less than significant.
S = significant.	NI = no impact.

CMP = Compensatory Mitigation Plan; MM = Mitigation Measure.

Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact WQ-17: Consistency with Water Quality Control Plans	All project alternatives	NI	Not applicable	LTS
Impact GEO-1: Loss of Property, Personal Injury, or Death from Structural Failure Resulting from Rupture of a Known Earthquake Fault or Based on Other Substantial Evidence of a Known Fault	All project alternatives	LTS	Not applicable	LTS
Impact GEO-2: Loss of Property, Personal Injury, or Death from Strong Earthquake-Induced Ground Shaking	All project alternatives	LTS	Not applicable	LTS
Impact GEO-3: Loss of Property, Personal Injury, or Death from Earthquake-Induced Ground Failure, including Liquefaction and Related Ground Effects	All project alternatives	LTS	Not applicable	LTS
Impact GEO-4: Loss of Property, Personal Injury, or Death from Ground Settlement, Slope Instability, or Other Ground Failure	All project alternatives	LTS	Not applicable	LTS
Impact GEO-5: Loss of Property, Personal Injury, or Death from Structural Failure Resulting from Project-Related Ground Motions	All project alternatives	LTS	Not applicable	LTS
Impact GEO-6: Loss of Property, Personal Injury, or Death from Seiche or Tsunami	All project alternatives	LTS	Not applicable	LTS
Impact SOILS-1: Accelerated Soil Erosion Caused by Vegetation Removal and Other Disturbances as a Result of Constructing the Proposed Water Conveyance Facilities	All project alternatives	LTS	Not applicable	LTS
Impact SOILS-2: Loss of Topsoil from Excavation, Overcovering, and Inundation as a Result of Constructing the Proposed Water Conveyance Facilities	All project alternatives	LTS	Not applicable	LTS
Impact SOILS-3: Property Loss, Personal Injury, or Death from Instability, Failure, and Damage as a Result of Constructing the Proposed Water Conveyance Facilities on or in Soils Subject to Subsidence	All project alternatives	LTS	Not applicable	LTS
Impact SOILS-4: Risk to Life and Property as a Result of Constructing the Proposed Water Conveyance Facilities in Areas of Expansive or Corrosive Soils	All project alternatives	LTS	Not applicable	LTS
Impact SOILS-5: Have Soils Incapable of Adequately Supporting the Use of Septic Tanks or Alternative Wastewater Disposal Systems Where Sewers Are Not Available for the Disposal of Wastewater	All project alternatives	S	MM SOILS-5: Conduct Site-Specific Soil Analysis and Construct Alternative Wastewater Disposal System as Required	LTS
Impact AQUA-1: Effects of Construction of Water Conveyance Facilities on Fish and Aquatic Species	All project alternatives	S	MM AQUA-1a: Develop and Implement an Underwater Sound Control and Abatement Plan MM AQUA-1b: Develop and Implement a Barge Operations Plan MM AQUA-1c: Develop and Implement a Fish Rescue and Salvage Plan MM WQ-6: Develop and Implement a Mercury Management and Monitoring Plan CMP-23: Tidal Perennial Habitat Restoration for Construction Impacts on Habitat for Fish and Aquatic Resources CMP-24: Channel Margin Habitat Restoration for Construction Impacts on Habitat for Fish and Aquatic Resources	LTS
Impact AQUA-2: Effects of Operations and Maintenance of Water Conveyance Facilities on Sacramento River Winter-Run Chinook Salmon	All project alternatives	S	CMP-25: Tidal Habitat Restoration to Mitigate North Delta Hydrodynamic Effects on Chinook Salmon Juveniles CMP-26: Channel Margin Habitat Restoration for Operations Impacts on Chinook Salmon Juveniles	LTS
Impact AQUA-3: Effects of Operations and Maintenance of Water Conveyance Facilities on Central Valley Spring-Run Chinook Salmon	All project alternatives	S	CMP-25: Tidal Habitat Restoration to Mitigate North Delta Hydrodynamic Effects on Chinook Salmon Juveniles CMP-26: Channel Margin Habitat Restoration for Operations Impacts on Chinook Salmon Juveniles	LTS
Impact AQUA-4: Effects of Operations and Maintenance of Water Conveyance Facilities on Central Valley Fall-Run/Late Fall–Run Chinook Salmon	All project alternatives	LTS	CMP-25: Tidal Habitat Restoration to Mitigate North Delta Hydrodynamic Effects on Chinook Salmon Juveniles CMP-26: Channel Margin Habitat Restoration for Operations Impacts on Chinook Salmon Juveniles	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact AQUA-5: Effects of Operations and Maintenance of Water Conveyance Facilities on Central Valley Steelhead		S	MM CMP: Compensatory Mitigation Plan	LTS
Impact AQUA-6: Effects of Operations and Maintenance of Water Conveyance Facilities on Delta Smelt	All project alternatives	S	MM CMP: Compensatory Mitigation Plan CMP-27: Tidal Habitat Restoration for Operations Impacts on Delta Smelt	LTS
Impact AQUA-7: Effects of Operations and Maintenance of Water Conveyance Facilities on Longfin Smelt	All project alternatives	S	MM CMP: Compensatory Mitigation Plan CMP-28: Tidal Habitat Restoration for Operations Impacts on Longfin Smelt	LTS
Impact AQUA-8: Effects of Operations and Maintenance of Water Conveyance Facilities on Southern DPS Green Sturgeon	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-9: Effects of Operations and Maintenance of Water Conveyance Facilities on White Sturgeon	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-10: Effects of Operations and Maintenance of Water Conveyance Facilities on Pacific Lamprey and River Lamprey	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-11: Effects of Operations and Maintenance of Water Conveyance Facilities on Native Minnows (Sacramento Hitch, Sacramento Splittail, Hardhead, and Central California Roach)	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-12: Effects of Operations and Maintenance of Water Conveyance Facilities on Starry Flounder	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-13: Effects of Operations and Maintenance of Water Conveyance Facilities on Northern Anchovy	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-14: Effects of Operations and Maintenance of Water Conveyance Facilities on Striped Bass	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-15: Effects of Operations and Maintenance of Water Conveyance Facilities on American Shad	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-16: Effects of Operations and Maintenance of Water Conveyance Facilities on Threadfin Shad	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-17: Effects of Operations and Maintenance of Water Conveyance Facilities on Black Bass	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-18: Effects of Operations and Maintenance of Water Conveyance Facilities on California Bay Shrimp	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-19: Effects of Operations and Maintenance of Water Conveyance Facilities on Southern Resident Killer Whale	All project alternatives	LTS	Not applicable	LTS
Impact AQUA-20: Effects of Construction of Water Conveyance Facilities on California Sea Lion	All project alternatives	LTS	MM AQUA-1a: Develop and Implement an Underwater Sound Control and Abatement Plan MM AQUA-1b: Develop and Implement a Barge Operations Plan MM CMP: Compensatory Mitigation Plan MM WQ-6: Develop and Implement a Mercury Management and Monitoring Plan	LTS
Impact BIO-1: Impacts of the Project on the Tidal Perennial Aquatic Natural Community	All project alternatives	S	MM CMP: Compensatory Mitigation Plan	LTS
Impact BIO-2: Impacts of the Project on Tidal Freshwater Emergent Wetlands	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement	LTS
Impact BIO-3: Impacts of the Project on Valley/Foothill Riparian Habitat	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
			MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement	
Impact BIO-4: Impacts of the Project on the Nontidal Perennial Aquatic Natural Community	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants	LTS
Impact BIO-5: Impacts of the Project on Nontidal Freshwater Perennial Emergent Wetland	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants	LTS
Impact BIO-6: Impacts of the Project on Nontidal Brackish Emergent Wetland	All project alternatives	NI	MM CMP: Compensatory Mitigation Plan	LTS[4]
Impact BIO-7: Impacts of the Project on Alkaline Seasonal Wetland Complex	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement	LTS
Impact BIO-8: Impacts of the Project on Vernal Pool Complex	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities	LTS
Impact BIO-9: Impacts of the Project on Special-Status Vernal Pool Plants	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities	LTS
Impact BIO-10: Impacts of the Project on Special-Status Alkaline Seasonal Wetland Complex Plants	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities	LTS
Impact BIO-11: Impacts of the Project on Special-Status Grassland Plants	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities	LTS
Impact BIO-12: Impacts of the Project on Tidal Freshwater Emergent Wetland Plants	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities	LTS
Impact BIO-13: Impacts of the Project on Special-Status Nontidal Perennial Aquatic Plants	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities	LTS
Impact BIO-14: Impacts of the Project on Vernal Pool Aquatic Invertebrates	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-14: Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp	LTS
Impact BIO-15: Impacts of the Project on Conservancy Fairy Shrimp	All project alternatives	NI	MM CMP: Compensatory Mitigation Plan	LTS[5]

[4] There would be no impact from the project alternatives on nontidal brackish emergent wetland. However, there could be significant impacts with the implementation of the CMP. Those impacts could be reduced to a less-than-significant level with mitigation strategies included in the CMP.

[5] There would be no impact from the project alternatives on conservancy fairy shrimp. However, there could be significant impacts with the implementation of the CMP. Those impacts could be reduced to a less-than-significant level with mitigation strategies included in the CMP.

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact BIO-16: Impacts of the Project on Vernal Pool Terrestrial Invertebrates	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-14: Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp	LTS
Impact BIO-17: Impacts of the Project on Sacramento and Antioch Dunes Anthicid Beetles	All project alternatives	NI	MM CMP: Compensatory Mitigation Plan	LTS[6]
Impact BIO-18: Impacts of the Project on Valley Elderberry Longhorn Beetle	All project alternatives	S	MM CMP: Compensatory Mitigation Plan CMP-18a: Sandhill Crane Roosting Habitat CMP-18b: Sandhill Crane Foraging Habitat CMP-19a: Swainson's Hawk Nesting Habitat CMP-19b: Swainson's Hawk Foraging Habitat CMP-22a: Tricolored Blackbird Nesting Habitat CMP-22b: Tricolored Blackbird Breeding Foraging Habitat MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-18: Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle	LTS
Impact BIO-19: Impacts of the Project on Delta Green Ground Beetle	All project alternatives	NI	MM CMP: Compensatory Mitigation Plan	LTS[5]
Impact BIO-20: Impacts of the Project on Curved-Foot Hygrotus Diving Beetle	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-14: Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp	LTS
Impact BIO-21: Impacts of the Project on Crotch Bumble Bee	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-21: Avoid and Minimize Impacts on Crotch Bumble Bee	LTS
Impact BIO-22: Impacts of the Project on California Tiger Salamander	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22a: Avoid and Minimize Impacts on California Tiger Salamander MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife	LTS
Impact BIO-23: Impacts of the Project on Western Spadefoot Toad	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-23: Avoid and Minimize Impacts on Western Spadefoot Toad	LTS
Impact BIO-24: Impacts of the Project on California Red-Legged Frog	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities	LTS

[6] There would be no impact from the project alternatives on Sacramento and Antioch Dunes anthicid beetles or on Delta green ground beetle. However, there could be significant impacts with the implementation of the CMP. Those impacts could be reduced to a less-than-significant level with mitigation strategies included in the CMP.

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			MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-24a: Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat MM BIO-24b: Compensate for Impacts on California Red-Legged Frog Habitat Connectivity	
Impact BIO-25: Impacts of the Project on Western Pond Turtle	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-25: Avoid and Minimize Impacts on Western Pond Turtle MM WQ-6 Develop and Implement a Mercury Management and Monitoring Plan	LTS
Impact BIO-26: Impacts of the Project on Coast Horned Lizard	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles	LTS
Impact BIO-27: Impacts of the Project on Northern California Legless Lizard	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles	LTS
Impact BIO-28: Impacts of the Project on California Glossy Snake	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles	LTS
Impact BIO-29: Impacts of the Project on San Joaquin Coachwhip	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles	LTS
Impact BIO-30: Impacts of the Project on Giant Garter Snake	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-30: Avoid and Minimize Impacts on Giant Garter Snake MM WQ-6 Develop and Implement a Mercury Management and Monitoring Plan	LTS
Impact BIO-31: Impacts of the Project on Western Yellow-Billed Cuckoo	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-31: Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo	LTS
Impact BIO-32: Impacts of the Project on California Black Rail	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
			MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-32: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail	
Impact BIO-33: Impacts of the Project on Greater Sandhill Crane and Lesser Sandhill Crane	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-33: Avoid and Minimize Disturbance of Sandhill Cranes	LTS
Impact BIO-34: Impacts of the Project on California Least Tern	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-34: Avoid California Least Tern Nesting Colonies and Minimize Indirect Effects on Colonies	LTS
Impact BIO-35: Impacts of the Project on Cormorants, Herons, and Egrets	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-35: Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries	LTS
Impact BIO-36: Impacts of the Project on Osprey, White-Tailed Kite, Cooper's Hawk, and Other Nesting Raptors	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-36a: Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors MM BIO-36b: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite	LTS
Impact BIO-37: Impacts of the Project on Golden Eagle and Ferruginous Hawk	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
			MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-37: Conduct Surveys for Golden Eagle and Avoid Disturbance of Occupied Nests	
Impact BIO-38: Impacts of the Project on Ground-Nesting Grassland Birds	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-36a: Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors	LTS
Impact BIO-39: Impacts of the Project on Swainson's Hawk	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-39: Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk	LTS
Impact BIO-40: Impacts of the Project on Burrowing Owl	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-40: Conduct Surveys and Minimize Impacts on Burrowing Owl	LTS
Impact BIO-41: Impacts of the Project on Other Nesting Special-Status and Non–Special-Status Birds	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-36a: Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Raptors and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors	LTS
Impact BIO-42: Impacts of the Project on Least Bell's Vireo	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
			MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-42: Conduct Surveys and Minimize Impacts on Least Bell's Vireo	
Impact BIO-43: Impacts of the Project on Suisun Song Sparrow and Saltmarsh Common Yellowthroat	All project alternatives	NI	MM CMP: Compensatory Mitigation Plan	LTS
Impact BIO-44: Impacts of the Project on Tricolored Blackbird	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM NOI-1: Develop and Implement a Noise Control Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-2c: Electrical Power Line Support Placement MM BIO-44: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird	LTS
Impact BIO-45: Impacts of the Project on Bats	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-45a: Compensate for the Loss of Bat Roosting Habitat on Bridges and Overpasses MM BIO-45b: Avoid and Minimize Impacts on Roosting Bats	LTS
Impact BIO-46: Impacts of the Project on San Joaquin Kit Fox	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-46: Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures	LTS
Impact BIO-47: Impacts of the Project on American Badger	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-47: Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures	LTS
Impact BIO-48: Impacts of the Project on San Joaquin Pocket Mouse	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife	LTS
Impact BIO-49: Impacts of the Project on Salt Marsh Harvest Mouse	All project alternatives	NI	Not applicable	NI
Impact BIO-50: Impacts of the Project on Riparian Brush Rabbit	All project alternatives	NI	Not applicable	NI
Impact BIO-51: Substantial Adverse Effect on State- or Federally Protected Wetlands and Other Waters through Direct Removal, Filling, Hydrological Interruption, or Other Means	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities	LTS
Impact BIO-52: Impacts of Invasive Species Resulting from Project Construction and Operations on Established Vegetation	All project alternatives	LTS	Not applicable	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact BIO-53: Interfere Substantially with the Movement of Any Native Resident or Migratory Fish or Wildlife Species or with Established Native Resident or Migratory Wildlife Corridors, or Impede the Use of Native Wildlife Nursery Sites	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife MM BIO-53: Avoid and Minimize Impacts on Terrestrial Wildlife Connectivity and Movement	LTS
Impact BIO-54: Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Other Approved Local, Regional, or State Habitat Conservation Plan	All project alternatives	S	MM CMP: Compensatory Mitigation Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-14: Avoid and Minimize Impacts on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp MM BIO-18: Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle MM BIO-22a: Avoid and Minimize Impacts on California Tiger Salamander MM BIO-24a: Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat MM BIO-25: Avoid and Minimize Impacts on Western Pond Turtle MM BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles MM BIO-30: Avoid and Minimize Impacts on Giant Garter Snake MM BIO-31: Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo MM BIO-32: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail MM BIO-33: Minimize Disturbance of Sandhill Cranes MM BIO-35: Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries MM BIO-36a: Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors MM BIO-36b: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite MM BIO-39: Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk MM BIO-40: Conduct Surveys and Minimize Impacts on Burrowing Owl MM BIO-44: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird MM BIO-47: Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures MM AG-1: Preserve Agricultural Land	LTS
Impact BIO-55: Conflict with Any Local Policies or Ordinances Protecting Biological Resources, Such as a Tree Preservation Policy or Ordinance	All project alternatives	S	MM CMP: Compensatory Mitigation Plan	LTS
Impact BIO-56: Substantial Adverse Effects on Fish and Wildlife Resources Regulated under California Fish and Game Code Section 1600 *et seq*.	All project alternatives	S	MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM AQUA-1a: Develop and Implement an Underwater Sound Control and Abatement Plan MM AQUA-1b: Develop and Implement a Barge Operations Plan MM AQUA-1c: Develop and Implement a Fish Rescue and Salvage Plan MM BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-18: Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle MM BIO-22a: Avoid and Minimize Impacts on California Tiger Salamander	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
			MM BIO-24a: Avoid and Minimize Impacts on California Red-Legged Frog and Critical Habitat MM BIO-25: Avoid and Minimize Impacts on Western Pond Turtle MM BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles MM BIO-30: Avoid and Minimize Impacts on Giant Garter Snake MM BIO-31: Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo MM BIO-32: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail MM BIO-33: Minimize Disturbance of Sandhill Cranes MM BIO-35: Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries MM BIO-36a: Conduct Nesting Surveys for Special-Status and Non–Special-Status Birds and Implement Protective Measures to Avoid Disturbance of Nesting Birds and Raptors MM BIO-36b: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite MM BIO-39: Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk MM BIO-40: Conduct Surveys and Minimize Impacts on Burrowing Owl MM BIO-44: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird MM BIO-45b: Avoid and Minimize Impacts on Roosting Bats MM BIO-46: Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures MM BIO-47: Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures	
Impact BIO-57: Impacts of the Project on Monarch Butterfly	All project alternatives	LTS	MM BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities MM BIO-21: Avoid and Minimize Impacts on Crotch Bumble Bee MM CMP: Compensatory Mitigation Plan	LTS
Impact LU-1: Displacement of Existing Structures and Residences and Effects on Population and Housing	All project alternatives	LTS	Not applicable	LTS
Impact LU-2: Incompatibility with Applicable Land Use Designations, Goals, and Policies, Adopted for the Purpose of Avoiding or Mitigating an Environmental Effect as a Result of the Project	All project alternatives	LTS	Not applicable	LTS
Impact LU-3: Create Physical Structures Adjacent to and through a Portion of an Existing Community that Would Physically Divide the Community as a Result of the Project	All project alternatives	NI	Not applicable	NI
Impact AG-1: Convert a Substantial Amount of Prime Farmland, Unique Farmland, Farmland of Local Importance, or Farmland of Statewide Importance as a Result of Construction of Water Conveyance Facilities	All project alternatives	S	MM AG-1: Preserve Agricultural Land	SU
Impact AG-2: Convert a Substantial Amount of Land Subject to Williamson Act Contract or under Contract in Farmland Security Zones to a Nonagricultural Use as a Result of Construction of Water Conveyance Facilities	All project alternatives	S	MM AG-1: Preserve Agricultural Land	SU
Impact AG-3: Other Impacts on Agriculture as a Result of Constructing and Operating the Water Conveyance Facilities Prompting Conversion of Prime Farmland, Unique Farmland, Farmland of Local Importance, or Farmland of Statewide Importance	All project alternatives	S	MM AG-3: Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties MM GW-1: Maintain Groundwater Supplies in Affected Areas	LTS
Impact REC-1: Increase the Use of Existing Neighborhood and Regional Parks or Other Recreational Facilities Such That Substantial Physical Deterioration of the Facility Would Occur or Be Accelerated	All project alternatives	LTS	Not applicable	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact REC-2: Include Recreational Facilities or Require the Construction or Expansion of Recreational Facilities That Might Have an Adverse Physical Effect on the Environment	All project alternatives	LTS	Not applicable	LTS
Impact AES-1: Substantially Degrade the Existing Visual Character or Quality of Public Views (from Publicly Accessible Vantage Points) of the Construction Sites and Visible Permanent Facilities and Their Surroundings in Nonurbanized Areas	All project alternatives	S	MM AES-1a: Install Visual Barriers between Construction Work Areas and Sensitive Receptors MM AES-1b: Apply Aesthetic Design Treatments to Project Structures MM AES-1c: Implement Best Management Practices in Project Landscaping Plan	SU
Impact AES-2: Substantially Damage Scenic Resources including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings Visible from a State Scenic Highway	All project alternatives	S	MM AES-1b: Apply Aesthetic Design Treatments to Project Structures MM AES-1c: Implement Best Management Practices in Project Landscaping Plan	SU
Impact AES-3: Have Substantial Significant Impacts on Scenic Vistas	All project alternatives	S	MM AES-1a: Install Visual Barriers between Construction Work Areas and Sensitive Receptors MM AES-1b: Apply Aesthetic Design Treatments to Project Structures MM AES-1c: Implement Best Management Practices in Project Landscaping Plan	SU
Impact AES-4: Create New Sources of Substantial Light or Glare That Would Adversely Affect Daytime or Nighttime Views of the Construction Areas or Permanent Facilities	All project alternatives	S	MM AES-1b: Apply Aesthetic Design Treatments to Project Structures MM AES-1c: Implement Best Management Practices in Project Landscaping Plan MM AES-4a: Limit Construction Outside of Daylight Hours within 0.25 Mile of Residents at the Intakes MM AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction MM AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences	LTS
Impact CUL-1: Impacts on Built-Environment Historical Resources Resulting from Construction and Operation of the Project	All project alternatives	S	MM CUL-1a: Avoid Impacts on Built-Environment Historical Resources through Project Design MM CUL-1b: Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties	SU
Impact CUL-2: Impacts on Unidentified and Unevaluated Built-Environment Historical Resources Resulting from Construction and Operation of the Project	All project alternatives	S	MM CUL-2: Conduct a Survey of Inaccessible Properties to Assess Eligibility and Determine Whether These Properties Will Be Adversely Affected by the Project	SU
Impact CUL-3: Impacts on Identified Archaeological Resources Resulting from the Project	All project alternatives	S	MM CUL-3a: Prepare and Implement an Archaeological Resources Management Plan MM CUL-3b: Conduct Cultural Resources Sensitivity Training MM CUL-3c: Implement Archaeological Protocols for Field Investigations	SU
Impact CUL-4: Impacts on Unidentified Archaeological Resources That May Be Encountered in the Course of the Project	All project alternatives	S	MM CUL-3a: Prepare and Implement an Archaeological Resources Management Plan MM CUL-3b: Conduct Cultural Resources Sensitivity Training MM CUL-3c: Implement Archaeological Protocols for Field Investigations	SU
Impact CUL-5: Impacts on Buried Human Remains	All project alternatives	S	MM CUL-3a: Prepare and Implement an Archaeological Resources Management Plan MM CUL-3b: Conduct Cultural Resources Sensitivity Training MM CUL-3c: Implement Archaeological Protocols for Field Investigations MM CUL-5: Follow State and Federal Law Governing Human Remains If Such Resources Are Discovered during Construction	SU
Impact TRANS-1: Increased Average VMT Per Construction Employee versus Regional Average	All project alternatives	S	MM TRANS-1: Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan	SU
Impact TRANS-2: Conflict with a Program, Plan, Ordinance, or Policy Addressing the Circulation System	All project alternatives	LTS	Not applicable	LTS
Impact TRANS-3: Substantially Increase Hazards from a Geometric Design Feature (e.g., Sharp Curves or Dangerous Intersections) or Incompatible Uses (e.g., Farm Equipment)	All project alternatives	S	MM TRANS-1: Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan	LTS
Impact TRANS-4: Result in Inadequate Emergency Access	All project alternatives	S	MM TRANS-1: Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan	LTS
Impact TRANS-5: Potential Effects on Marine Navigation Caused by Construction, Operation, and Maintenance of Intakes	All project alternatives	LTS	Not applicable	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact UT-1: Result in Substantial Physical Impacts Associated with the Provision of, or the Need for, New or Physically Altered Governmental Facilities, the Construction of Which Could Cause Significant Environmental Impacts on Public Services Including Police Protection, Fire Protection, Public Schools, and Other Public Facilities (e.g., Libraries, Hospitals)	All project alternatives	LTS	MM TRANS-1: Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan	LTS
Impact UT-2: Require or Result in the Relocation or Construction of New or Expanded Service System Infrastructure, the Construction or Relocation of Which Could Cause Significant Environmental Impacts for Any Service Systems Such as Water, Wastewater Treatment, Stormwater Drainage, Electric Power Facilities, Natural Gas Facilities, and Telecommunications Facilities	All project alternatives	LTS	Not applicable	LTS
Impact UT-3: Exceed the Capacity of the Wastewater Treatment Provider(s) that Would Serve the Alternative's Anticipated Demand in Addition to the Provider's Existing Commitments	All project alternatives	LTS	Not applicable	LTS
Impact UT-4: Generate Solid Waste in Excess of Federal, State or Local Standards, or Be in Excess of the Capacity of Local Infrastructure, or Otherwise Impair the Attainment of Solid Waste Reduction Goals	All project alternatives	LTS	Not applicable	LTS
Impact ENG-1: Result in Substantial Significant Environmental Impacts Due to Wasteful, Inefficient, or Unnecessary Consumption of Energy Resources during Project Construction or Operation	All project alternatives	LTS	Not applicable	LTS
Impact ENG-2: Conflict with or Obstruct Any State/Local Plan, Goal, Objective, or Policy for Renewable Energy or Energy Efficiency	All project alternatives	NI	Not applicable	NI
Impact AQ-1: Result in Impacts on Regional Air Quality within the Sacramento Metropolitan Air Quality Management District	All project alternatives	S	MM AQ-1: Offset Construction-Generated Criteria Pollutants in the Sacramento Valley Air Basin	LTS
Impact AQ-2: Result in Impacts on Regional Air Quality within the San Joaquin Valley Air Pollution Control District	All project alternatives	S	MM AQ-2: Offset Construction-Generated Criteria Pollutants in the San Joaquin Valley Air Basin	LTS
Impact AQ-3: Result in Impacts on Regional Air Quality within the Bay Area Air Quality Management District	All project alternatives	S	MM AQ-3: Offset Construction-Generated Criteria Pollutants in the San Francisco Bay Area Air Basin	LTS
Impact AQ-4: Result in Impacts on Air Quality within the Yolo-Solano Air Quality Management District	All project alternatives	LTS	Not applicable	LTS
Impact AQ-5: Result in Exposure of Sensitive Receptors to Substantial Localized Criteria Pollutant Emissions	All project alternatives	S	MM AQ-5: Avoid Public Exposure to Localized Particulate Matter and Nitrogen Dioxide Concentrations	SU
Impact AQ-6: Result in Exposure of Sensitive Receptors to Substantial Toxic Air Contaminant Emissions	2a, 4a	S	MM AQ-6: Avoid Residential Exposure to Localized Diesel Particulate Matter	SU
Impact AQ-6: Result in Exposure of Sensitive Receptors to Substantial Toxic Air Contaminant Emissions	1, 2b, 2c, 3, 4b, 4c, 5	LTS	Not applicable	LTS
Impact AQ-7: Result in Exposure of Sensitive Receptors to Asbestos, Lead-Based Paint, or Fungal Spores That Cause Valley Fever	All project alternatives	LTS	Not applicable	LTS
Impact AQ-8: Result in Exposure of Sensitive Receptors to Substantial Odor Emissions	All project alternatives	LTS	Not applicable	LTS
Impact AQ-9: Result in Impacts on Global Climate Change from Construction and O&M	All project alternatives	S	MM AQ-9: Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero	LTS
Impact AQ-10: Result in Impacts on Global Climate Change from Land Use Change	1, 2a, 2b, 2c, 5	LTS	Not applicable	LTS
Impact AQ-10: Result in Impacts on Global Climate Change from Land Use Change	3, 4a, 4b, 4c	S	MM CMP: Compensatory Mitigation Plan	LTS

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact NOI-1: Generate a Substantial Temporary or Permanent Increase in Ambient Noise Levels in the Vicinity of the Project in Excess of Standards Established in the Local General Plan or Noise Ordinance, or Applicable Standards of Other Agencies	All project alternatives	S	MM NOI-1: Develop and Implement a Noise Control Plan	SU[7]
Impact NOI-2: Generate Excessive Groundborne Vibration or Groundborne Noise Levels	All project alternatives	LTS	Not applicable	LTS
Impact NOI-3: Place Project-Related Activities in the Vicinity of a Private Airstrip or an Airport Land Use Plan, or, Where Such a Plan Has Not Been Adopted, within 2 Miles of a Public Airport or Public Use Airport, Resulting in Exposure of People Residing or Working in the Project Area to Excessive Noise Levels	All project alternatives	NI	Not applicable	NI
Impact HAZ-1: Create a Substantial Hazard to the Public or the Environment through the Routine Transport, Use, or Disposal of Hazardous Materials	All project alternatives	LTS	Not applicable	LTS
Impact HAZ-2: Create a Significant Hazard to the Public or the Environment through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials into the Environment	All project alternatives	S	MM HAZ-2: Perform a Phase I Environmental Site Assessment Prior to Construction Activities and Remediate	LTS
Impact HAZ-3: Expose Sensitive Receptors at an Existing or Proposed School Located within 0.25 Mile of Project Facilities to Hazardous Materials, Substances, or Waste	1, 2a, 2b, 2c, 3, 4a, 4b, 4c	NI	Not applicable	NI
Impact HAZ-3: Expose Sensitive Receptors at an Existing or Proposed School Located within 0.25 Mile of Project Facilities to Hazardous Materials, Substances, or Waste	5	LTS	Not applicable	LTS
Impact HAZ-4: Be Located on a Site That Is Included on a List of Hazardous Materials Sites Compiled Pursuant to Government Code Section 65962.5 and, as a Result, Create a Substantial Hazard to the Public or the Environment	All project alternatives	S	MM HAZ-2: Perform a Phase I Environmental Site Assessment Prior to Construction Activities and Remediate	LTS
Impact HAZ-5: Result in a Safety Hazard Associated with an Airport or Private Airstrip	1, 2a, 2b, 2c, 3, 4a, 4b, 4c	S	MM HAZ-5: Wildlife Hazards Management Plan and Wildlife Deterrents	LTS
Impact HAZ-5: Result in a Safety Hazard Associated with an Airport or Private Airstrip	5	LTS	Not applicable	LTS
Impact HAZ-6: Impair Implementation of or Physically Interfere with an Adopted Emergency Response Plan or Emergency Evacuation Plan	All project alternatives	S	MM TRANS-1: Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan	LTS
Impact HAZ-7: Expose People or Structures, Either Directly or Indirectly, to a Substantial Risk of Loss, Injury, or Death Involving Wildland Fires	All project alternatives	LTS	Not applicable	LTS
Impact PH-1: Increase in Vector-Borne Diseases	All project alternatives	S	MM PH-1a: Avoid Creating Areas of Standing Water During Preconstruction Future Field Investigations and Project Construction MM PH-1b: Develop and Implement a Mosquito Management Plan for Compensatory Mitigation Sites on Bouldin Island and at I-5 Ponds	LTS
Impact PH-2: Exceedance(s) of Water Quality Criteria for Constituents of Concern Such That Drinking Water Quality May Be Affected	All project alternatives	LTS	Not applicable	LTS
Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate	All project alternatives	LTS	Not applicable	LTS
Impact PH-4: Adversely Affect Public Health Due to Exposing Sensitive Receptors to New Sources of EMF	All project alternatives	LTS	Not applicable	LTS
Impact PH-5: Impact Public Health Due to an Increase in *Microcystis* Bloom Formation	All project alternatives	LTS	Not applicable	LTS

[7] If Mitigation Measure NOI-1 is accepted by all eligible property owners, impacts would be less than significant with mitigation.

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Potential Impact	Alternatives	Impact Conclusions before Mitigation	Proposed Mitigation	Impact of Project plus Mitigation Measures
Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of the Project	All project alternatives	NI	Not applicable	NI
Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of the Project	All project alternatives	NI	Not applicable	NI
Impact MIN-3: Loss of Availability of Locally Important Aggregate Resources (Mines and MRZs) as a Result of the Project	All project alternatives	NI	Not applicable	NI
Impact MIN-4: Loss of Availability of Locally Important Aggregate Resources as a Result of the Project	All project alternatives	NI	Not applicable	NI
Impact PALEO-1: Cause Destruction of a Unique Paleontological Resource as a Result of Surface Ground Disturbance	All project alternatives	S	MM PALEO-1a: Prepare and Implement a Monitoring and Mitigation Plan for Paleontological Resources MM PALEO-1b: Educate Construction Personnel in Recognizing Fossil Material	LTS
Impact PALEO-2: Cause Destruction of a Unique Paleontological Resource as a Result of Tunnel Construction and Ground Improvement	All project alternatives	S	No mitigation is available to address this impact.	SU
Impact TCR-1: Impacts on the Delta Tribal Cultural Landscape Tribal Cultural Resource Resulting from Construction, Operations, and Maintenance of the Project Alternatives	All project alternatives	S	MM TCR-1a: Avoidance of Impacts on Tribal Cultural Resources MM TCR-1b: Plans for the Management of Tribal Cultural Resources MM TCR-1c: Implement Measures to Restore and Enhance the Physical, Spiritual, and Ceremonial Qualities of Affected Tribal Cultural Resources MM TCR-1d: Incorporate Tribal Knowledge into Compensatory Mitigation Planning (Restoration)	SU
Impact TCR-2: Impacts on Individual Tribal Cultural Resources Resulting from Construction, Operations, and Maintenance of the Project Alternatives	All project alternatives	S	MM TCR-1a: Avoidance of Impacts on Tribal Cultural Resources MMTCR-1b: Plans for the Management of Tribal Cultural Resources MM TCR-1c: Implement Measures to Restore and Enhance the Physical, Spiritual, and Ceremonial Qualities of Affected Tribal Cultural Resources MM TCR-1d: Incorporate Tribal Knowledge into Compensatory Mitigation Planning (Restoration) MM TCR-2: Perform an Assessment of Significance, Known Attributes, and Integrity for Individual CRHR Eligibility	SU

1

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ES.5.1 Chapter Summaries

To make this Final EIR accessible and reader-friendly, summaries of each individual resource chapter are provided here and at the beginning of each resource chapter. The summaries for each chapter include text descriptions and tables that discuss and compare a selection of key impacts across all alternatives. These impacts were chosen based on their pertinence to each resource and because they are quantifiable. In several resource chapters, potential changes resulting from implementing project alternatives were estimated using hydrological modeling and other modeling tools to best demonstrate potential differences relative to existing conditions. The tables quantify the selected impacts before mitigation and depict a range of impact severity across all alternatives. The significance conclusions, after mitigation, are provided as well.

ES.5.1.1 Chapter 5, Surface Water

Table ES-3 highlights simulated river and storage conditions at select locations. This table provides information on the magnitude of the most pertinent changes to Sacramento River Basin flows and SWP/CVP reservoir storages that are expected to result from the project alternatives. Existing regulations, operational rules, and water supply allocation procedures governing SWP and CVP system operations would not change because of operation of the project alternatives. However, because of the effect that integration of the proposed north Delta intakes has on the overall system, their operation could lead to changes in river flows and upstream storages.

Generally, long-term average monthly flows for the project alternatives are similar to existing conditions for all locations examined. However, there are consistent decreases among project alternatives in long-term average flows for all months on the Sacramento River north of Courtland (i.e., downstream of the proposed north Delta intakes) due to the diversions of available excess water at the proposed north Delta intakes beyond the needs to satisfy downstream regulatory requirements in the Delta, including Delta outflows and south-of-Delta exports. Long-term average monthly flows under the No Project Alternative generally (1) increase between December and April and (2) decrease between May and October when compared to existing conditions for all locations examined. These changes are due to changes in inflow patterns to major reservoirs as a result of climate change—with a shift of precipitation distribution to be earlier, more precipitation falling as rain (rather than snow), high intensity of winter precipitation events when they occur, and an earlier snowpack melt.

Storages at SWP and CVP north-of-Delta reservoirs averaged for all years and for dry/critical years under the project alternatives are similar to existing conditions for all time periods examined (i.e., end-of-May, end-of-June, end-of-August, and end-of-September periods). For Trinity Lake, Shasta Lake, Lake Oroville, and Folsom Lake, storage changes are extremely minimal. There are more substantial changes in storage in San Luis Reservoir as long-term averages show increases for all of the project alternatives when compared to existing conditions for all time periods examined (i.e., end-of-May, end-of-June, end-of-August, and end-of-September periods). Increases in San Luis Reservoir storage during the winter and spring are due to diversions at the proposed north Delta intakes. Some of this increased storage is used to support deliveries during the summer, although some carries over into September and is used for Article 56 carryover (i.e., SWP contractor deliveries that were allocated in the previous year, but were stored in SWP storage before being delivered in the current year). A similar pattern is present for most of the dry/critical year averages, although there are decreases in the end-of-September storages. This decrease in end-of-September

storage is due to increased SWP allocations in the prior spring. SWP and CVP reservoir storage averages for all years simulated under the No Project Alternative generally decrease when compared to existing conditions for all time periods examined. These decreases are most pronounced for the end-of-August and end-of-September periods and are due to altered inflow patterns as a result of climate change.

Changes to surface water resources, by themselves, are not considered an impact of the project under CEQA and thus are not evaluated as impacts in this chapter. Instead, a description of potential changes to surface water resources is presented in this introductory chapter to provide a basis for understanding the potential effects on other surface water–related resources in this Final EIR.

Table ES-3. Comparison of Surface Water Resources by Project Alternative

Chapter 5, Surface Water	Existing Conditions	Project Alternative								
		1	2a	2b	2c	3	4a	4b	4c	5
Sacramento River Basin Flows, Sacramento River at Freeport (Long-Term Annual Average [a] [cfs])	21,160	21,150	21,149	21,150	21,153	21,150	21,149	21,150	21,153	21,149
Sacramento River Basin Flows, Sacramento River at Freeport (Dry/Critical Years [b] [cfs])	12,213	12,295	12,279	12,272	12,294	12,295	12,279	12,272	12,294	12,291
Sacramento River Basin Flows, Sacramento River North of Courtland (Long-Term Annual Average [a] [cfs])	21,464	20,429	20,382	20,681	20,522	20,429	20,382	20,681	20,522	20,419
Sacramento River Basin Flows, Sacramento River North of Courtland (Dry/Critical Years [b] [cfs])	12,484	12,116	12,065	12,197	12,163	12,116	12,065	12,197	12,163	12,111
SWP and CVP Reservoir Storage, San Luis Reservoir (End-of-September Storage; Long-Term Average [a] [TAF])	619	699	699	695	696	699	699	695	696	700
SWP and CVP Reservoir Storage, San Luis Reservoir (End-of-September Storage; Dry/Critical Years [b] [TAF])	379	358	362	366	362	358	362	366	362	358

cfs = cubic feet per second; CVP = Central Valley Project; SWP = State Water Project; TAF = thousand acre-feet.

[a] Long-term average is the average annual flow or storage for the period October 1921–September 2015 simulated in CalSim 3.

[b] Water year types are State Water Resources Control Board Water Right Decision 1641 40-30-30 water year types as computed in CalSim 3 for the period October 1921–September 2015. Dry/critical year averages are for those two water year types combined.

ES.5.1.2 Chapter 6, Water Supply

Table ES-4 provides a summary comparison of modeled changes to SWP and CVP south of delta water supply by alternative. Some potential water supply changes are not included in the modeling, including the potential benefit associated with having a backup water supply to help prepare for earthquake risk.

Changes to water supply, by themselves, are not considered an impact under CEQA and are not evaluated as impacts in this chapter. Potential changes to SWP and CVP water supply are described in this introductory chapter to provide a basis for understanding the impact assessments associated with other resource chapters in this document. The project alternatives do not include any actions that would modify water deliveries to non-SWP and non-CVP water rights holders, including in-Delta water rights holders. Therefore, only changes to DWR, Reclamation, and SWP water users and CVP water service contractors are included. No specific impact assessment results are presented in this chapter because the effects of these changes are not considered environmental impacts under CEQA.

Table ES-4. Water Supply for Existing Conditions and the Project Alternatives (thousand acre-feet)

Chapter 6 – Water Supply	Existing Conditions	Project Alternative								
		1	2a	2b	2c	3	4a	4b	4c	5
Total Annual SWP Deliveries Long-Term Average [a, d] (SWP Contract Year; January–December)	2,429	2,968	2,959	2,838	2,923	2,968	2,959	2,838	2,923	2,972
Total Annual SWP Deliveries, Average of Dry and Critical Water Years [b, d] (SWP Contract Year; January–December)	1,317	1,634	1,605	1,541	1,589	1,634	1,605	1,541	1,589	1,633
Total Annual South-of-Delta [c] CVP Deliveries, Long-Term Average [a] (CVP Contract Year; March–February)	1,587	1,634	1,678	1,610	1,629	1,634	1,678	1,610	1,629	1,633
Total Annual CVP South-of-Delta Deliveries, Average of Dry and Critical Water Years [b] (CVP Contract Year; March–February)	945	963	996	963	970	963	996	963	970	963

[a] Long-term average is the average annual for the period October 1921–September 2015 simulated in CalSim 3.

[b] Dry and critical is the average annual for the State Water Resources Control Board Water Right D-1641 40-30-30 dry and critical years for the period October 1921–September 2015 simulated in CalSim 3.

[c] Values do not include deliveries to exchange contractors.

[d] Values do not include deliveries to senior water right holders in the Feather River Service Area under various settlement agreements.

ES.5.1.3 Chapter 7, Flood Protection

Table ES-5 provides a summary comparison of impacts on flood protection by project alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied.

Consistent with the evaluation of potential impacts on other resources, the qualitative and quantitative analyses discussed in this section assess the significance of project impacts in relation to existing conditions. All project alternatives are for water supply purposes and, with the exception of modifications to levees at intake locations, include no changes in flood management infrastructure in the Sacramento River Basin and in the Delta, including the reservoirs of the SWP and CVP, and associated flood operation rules and management, which contribute to the flood protection afforded by the Sacramento River Flood Control Project (SRFCP). Therefore, the impacts from project alternatives were evaluated for flood protection of nearby urban and nonurban areas along the reach of the Sacramento River from the American River confluence to Sutter Slough, where the drainage of floodwater may be affected by the construction and operation of the intakes. Potential impacts from project facilities impeding or redirecting localized flood flow were also evaluated. All of these impacts are contained in the Delta, which constitutes the study area. The analysis of flood-related impacts included a quantitative and qualitative approach, depending on the location where these impacts may occur. These two categories of analysis require different settings to accommodate the different regulatory frameworks associated with applicable flood management practices. This section provides a summary of these two categories of impact assessments, including the reasons for selecting the associated existing conditions and No Project Alternative and the resulting flood control impacts.

The assessment of potential flood control impacts on the passage of floodwater in the Sacramento River was conducted to be consistent with the *2022 Central Valley Flood Protection Plan (CVFPP) Update* (2022 CVFPP Update) (California Department of Water Resources 2022), based on consultation with the Central Valley Flood Protection Board (CVFPB). Consistency with the 2022 CVFPP Update is important because the channel and levees of this section of the Sacramento River are part of the State Plan of Flood Control (SPFC), as defined in California Water Code (Wat. Code) Section 9110(f). The 2022 CVFPP Update, which is the long-term plan for areas protected by the SPFC, has a 50-year planning horizon from 2022 for analysis purposes and for developing assessment strategy. Therefore, the analysis for potential flood control impacts on the area protected by the SPFC was conducted using a similar approach and planning horizon. To maintain consistency with the regulatory and planning purposes, flood control impact analyses along the Sacramento River protected by the SPFC used the years 2022 and 2072 as reference years for existing conditions and the No Project Alternative, respectively. This change from the approach used in other resource assessments (existing conditions at 2020 and No Project at 2040) is considered necessary for the flood control impact assessment to be consistent with the SPFC.

The proposed north Delta intake structures require placement along the bank of the Sacramento River, with a portion of the structure projecting into the flowing water. This could effectively constrict the conveyance capacity of the river along the respective length of each intake, resulting in a rise in water surface elevation (WSE) upstream of the intakes. The corresponding WSE increase is dependent on the combination of intakes used to achieve project needs, the facility configuration, and the phase of construction for each intake.

Hydraulic analyses examined the effect of the project on WSEs in the Sacramento River between the American River confluence and Sutter Slough. The effects of the intakes on the WSE are expected to occur only within this reach of the Sacramento River. This reach of the river, which includes urban levees extending south from the American River confluence to around the location of the Freeport Regional Water Authority intake, protects Sacramento urban areas; these areas are subject to Urban Level of Flood Protection (i.e., 200-year level of flood protection). The rest of the levees further downstream along the Sacramento River are considered rural levees or nonurban levees that are not subject to the Urban Level of Flood Protection. Therefore, for completeness of the assessment for each project alternative, it was necessary to evaluate the impacts on WSEs of the Sacramento River for 100- and 200-year flood events under existing conditions (i.e., 2022 conditions) and future conditions (i.e., 2072 conditions) with climate change, including corresponding hydrologic change and sea level rise. The results of the hydraulic analyses indicate that WSE increases in the Sacramento River between the American River confluence and Sutter Slough during the 100-year and 200-year flood events would result in a less-than-significant impact on flood protection during construction and during operations with permanent facilities, except that Alternatives 2a and 4a, where all three intakes are used, would increase Sacramento River WSE upstream of the intakes between 0.11 and 0.12 foot during construction and result in a significant impact. Mitigation Measure FP-1: *Phased Construction of the Proposed North Delta Intakes* would reduce the magnitude of WSE increases during the 100-year and 200-year flood event to a less-than-significant level.

The assessment for potential flood protection impacts from the permanent project facilities during operations was also evaluated using flood flows consistent with those used to develop the 1957 U.S. Army Corps of Engineers (USACE) Sacramento River Project Levee design profiles. The 1957 design profile assessment is required by USACE and CVFPB as part of their corresponding permitting process for the project to demonstrate that project operations would not impede the continued functions of the levees and channels as originally designed. The 1957 levee design profiles were not considered as part of the CEQA impact assessment because the CEQA impact thresholds used by DWR in this Final EIR are more stringent than the 1957 profiles. The details and results of the analysis using the 1957 levee profiles are provided in Appendix 7B, *Evaluation against U.S. Army Corps of Engineers 1957 Design Profiles*.

For the impact assessment on localized flood flow impacts from various project facilities, an approach consistent with the assessment of other resources in this Final EIR was applied. This portion of the flood assessment compared changes in conditions resulting from the project with existing conditions. Existing conditions include existing facilities and ongoing programs that existed as of January 15, 2020 (i.e., the publication date of the Notice of Preparation). The No Project Alternative includes reasonably foreseeable changes in existing conditions (such as sea level rise and climate change) and changes that would be expected to occur in the year 2040 if the project were not approved.

The project would include permanent facilities within the 100-year flood hazard area, and therefore, where necessary to protect the water conveyance infrastructure from flooding, facilities would be conservatively designed to withstand a 200-year flood event with projected climate change hydrology for 2100 and extreme sea level rise during operations (Delta Conveyance Design and Construction Authority 2022a:62, 2022b:42). For launch shaft sites at Bouldin and Lower Roberts Islands, the levees would be improved to meet the Delta-specific Public Law (PL) 84-99 standards, where applicable, which is an improvement to existing conditions. As a result, these areas would be out of the projected 100-year flood hazard area due to the levee improvement, alleviating the need to assess potential impacts on local flood flows. This approach was not proposed for the Twin Cities

Complex, and therefore a two-dimensional (2-D) hydraulic analysis for the Twin Cities Complex was conducted. The analysis showed limited increases in flood depth and area around the Twin Cities Complex during construction (which includes a ring levee to minimize impacts on the surrounding lands) and operations. The flood effects analysis for the Twin Cities Complex site found that the ring levee (during construction) and stockpile storage areas (during operations) for all project alternatives would increase the 100-year flood depth by a maximum of approximately 0.4 foot and would increase the 100-year floodplain by approximately 15 acres when compared to existing conditions (i.e., 2022 conditions). The ring levee associated with construction at the Twin Cities Complex site exhibited the largest increases to the depth and areal extent of the 100-year flood event. The extent and change of the maximum WSE during a 100-year flood event was considered a less-than-significant impact. All launch, maintenance, and reception shaft sites would enact nonstructural flood risk management measures.

The Southern Forebay is not located in the 100-year flood hazard zone and would be designed in accordance with DWR Division of Safety of Dams (DSOD) requirements for jurisdictional dams based on the anticipated maximum embankment height and storage volume. The Southern Forebay includes an overflow emergency spillway that would be used in the unlikely condition that the forebay water level continued to rise above the design maximum elevation. The emergency spillway would discharge flow from the Southern Forebay into Italian Slough, which flows into Old River. To accommodate this, a portion of the existing Italian Slough levee would be removed. New levees would be constructed to channelize and contain the spillway discharge flows between the outboard toe of the spillway and the existing levee along Italian Slough. The discharge into Italian Slough would initially be contained within the slough's existing levees but would, over a short distance, converge with Old River. The connection to Old River and the broader Delta waterways would allow spillway flows to be absorbed during any emergency discharge.

The potential hydraulic impact of the Southern Forebay Emergency Spillway on the existing levee system of Italian Slough and Old River was evaluated using a one-dimensional (1-D) hydraulic model. The change in WSEs was compared between the different operational scenarios (i.e., spillway releases of 3,000, 4,500, 6,000, and 7,500 cfs) and the baseline (i.e., no spill event). The 7,500 cfs scenario exhibited the largest increases in WSEs when compared to the baseline for both the 100-year flood event and the mean higher high-water event (Delta Conveyance Design and Construction Authority 2022c:Att 2-5). For the 100-year flood event, the 7,500 cfs scenario increased WSEs by 0.44 foot when compared to the baseline with the affected area extending 2.47 miles upstream and 1.55 miles downstream of the spillway location. For the mean higher high-water event, the 7,500 cfs scenario increased WSEs by 0.67 foot when compared to the baseline with the affected area extending 2.47 miles upstream and 1.94 miles downstream of the spillway location. Although the spillway was assumed to flow for 12 hours, peak WSEs were achieved in 2 hours or less for the scenarios modeled. In the scenarios modeled, the peak WSE was located upstream of the spillway location due to backwater effects from the additional flow entering Italian Slough from the spillway. None of the scenarios analyzed resulted in overtopping levees of the main Italian Slough channel or Old River due to the releases from the Southern Forebay Emergency Spillway.

Constructions of the facilities under various project alternatives involve excavation, grading, stockpiling, soil compaction, and dewatering that could result in alterations to runoff, drainage patterns, erosion, stream courses, and WSEs during construction of facilities. All project features would be constructed to not increase peak runoff flows into adjacent storm drains, drainage ditches, or rivers and sloughs. All surface water runoff and dewatering flows or additional runoff during construction would be captured, treated, stored, and, if possible, reused on-site. If additional stored water is not needed, the treated runoff flows would be released in a manner that would not increase peak WSEs in adjacent channels. Shallow flooding has historically occurred at the sites of the proposed north Delta intakes due to natural depressions. Therefore, the project alternatives include drainage and pump enhancements to ensure intake facilities would not be subject to flooding during operation. During construction, the local drainage at intake facility sites would be managed to minimize local flooding through installing temporary pumps if necessary to allow continued construction activities. Because drainage and pump enhancements are included in facility design, the potential impacts of localized flooding at the intakes would be minimized. Overall, the project alternatives would have less-than-significant impacts on existing drainage patterns of the facility site or surrounding area.

Table ES-5. Comparison of Impacts on Flood Protection by Alternative

Chapter 7 – Flood Protection	Project Alternative 1	2a	2b	2c	3	4a	4b	4c	5
Impact FP-1: Cause a Substantial Increase in Water Surface Elevations of the Sacramento River between the American River Confluence and Sutter Slough	LTS	S (LTS with mitigation)	LTS	LTS	LTS	S (LTS with mitigation)	LTS	LTS	LTS
Construction Phase									
River Reaches with Urban Levees – Max WSE Difference Relative to EC (feet) *100-Year Flood Event*	0.08	0.10	≤0.08	≤0.08	0.08	0.10	≤0.08	≤0.08	0.08
River Reaches with Urban Levees – Max WSE Difference Relative to EC (feet) *200-Year Flood Event*	0.08	0.10	≤0.08	≤0.08	0.08	0.10	≤0.08	≤0.08	0.08
River Reaches with Nonurban Levees – Max WSE Difference Relative to EC (feet) *100-Year Flood Event*	0.10	0.11	≤0.10	≤0.10	0.10	0.11	≤0.10	≤0.10	0.10
River Reaches with Nonurban Levees – Max WSE Difference Relative to EC (feet) *100-Year Flood Event with Mitigation*	N/A	0.09	N/A	N/A	N/A	0.09	N/A	N/A	N/A
River Reaches with Nonurban Levees – Max WSE Difference Relative to EC (feet) *200-Year Flood Event*	0.10	0.12	≤0.10	≤0.10	0.10	0.12	≤0.10	≤0.10	0.10
River Reaches with Nonurban Levees – Max WSE Difference Relative to EC (feet) *200-Year Flood Event with Mitigation*	N/A	0.09	N/A	N/A	N/A	0.09	N/A	N/A	N/A
Operations Phase									
River Reaches with Urban Levees – Maximum WSE Difference Relative to EC (feet) *100-Year Flood Event*	0.04	0.05	≤0.04	≤0.04	0.04	0.05	≤0.04	≤0.04	0.04
River Reaches with Urban Levees – Maximum WSE Difference Relative to EC (feet) *200-Year Flood Event*	0.04	0.05	≤0.04	≤0.04	0.04	0.05	≤0.04	≤0.04	0.04

Chapter 7 – Flood Protection	Project Alternative 1	2a	2b	2c	3	4a	4b	4c	5
River Reaches with Nonurban Levees – Maximum WSE Difference Relative to EC (feet) *100-Year Flood Event*	0.04	0.05	≤0.04	≤0.04	0.04	0.05	≤0.04	≤0.04	0.04
River Reaches with Nonurban Levees – Maximum WSE Difference Relative to EC (feet) *200-Year Flood Event*	0.04	0.05	≤0.04	≤0.04	0.04	0.05	≤0.04	≤0.04	0.04
Impact FP-2: Alter the Existing Drainage Pattern of the Site or Area, including through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding On- or Off-Site or Impede or Redirect Flood Flows	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

Note: Alternatives 2b, 2c, 4b, and 4c (3,000-cfs and 4,500-cfs capacity alternatives) were not modeled since WSE impacts would be similar to, or less than, the corresponding alternatives of the same alignment but larger capacity (i.e., Alternatives 1 and 3 [6,000-cfs capacity alternatives]).

cfs = cubic feet per second; EC = existing conditions; N/A = not applicable; WSE = water surface elevation; LTS = less than significant; S = significant.

ES.5.1.4 Chapter 8, Groundwater

Table ES-6 provides a summary comparison of anticipated impacts by alternative, as described in Chapter 3, on groundwater. This table provides information on the magnitude of the most pertinent and quantifiable impacts on groundwater that are expected to result from operation of the project alternatives, and is based on quantitative analyses conducted to assess impacts on groundwater levels, groundwater storage, and interconnected surface water flows. The table presents the CEQA findings after all mitigation is applied. A regional scale integrated groundwater and surface water model, called the Delta Groundwater (DeltaGW) model (Chapter 8, Section 8.3, *Environmental Impacts*), was used as the analytical tool for quantitative analysis of impacts on groundwater from project operations. The impacts on groundwater from construction and maintenance are discussed qualitatively, as are impacts related to groundwater quality and inelastic land subsidence resulting from groundwater pumping.

The DeltaGW Model simulation results and associated evaluations (including those for qualitative assessments) indicate that no significant groundwater impacts are expected to occur as a result of project operations. All groundwater impacts are under established thresholds for each impact area. There are slight changes in stream losses/gains, groundwater elevations, and groundwater in storage resulting from project operations, but these changes are less than significant and often within the margin of error for the model simulation results. However, during project construction and maintenance, there is a potential for temporary localized changes in groundwater elevations from dewatering at construction and maintenance sites. These localized impacts could affect water wells near the project sites, cause changes in groundwater elevation to mobilize existing contaminant plumes, or result in the migration of lower-quality groundwater into areas of higher-quality groundwater. Implementation of Mitigation Measure GW-1: *Maintain Groundwater Supplies in Affected Areas*, during construction and maintenance, would address unforeseen localized impacts on groundwater.

Impacts resulting in increases in agricultural drainage due to project construction and operations are considered to be less than significant. Mitigation Measure GW-5: *Reduce Potential Increases in Groundwater Elevations Near Project Intake Facilities* would further reduce risks of impacts on agricultural drainage.

Table ES-6. Comparison of Impacts of Project Operations on Groundwater by Alternative

	Alternative								
Groundwater Impact Mechanism	1	2a	2b	2c	3	4a	4b	4c	5
Impact GW-1: Changes in Stream Gains or Losses in Various Interconnected Stream Reaches (%)	-0.82% LTS	-1.19% LTS	-0.64% LTS	-0.67% LTS	-0.85% LTS	-1.21% LTS	-0.64% LTS	-0.77% LTS	-0.81% LTS
Impact GW-2: Changes in Groundwater Elevations	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS
Impact GW-3: Reduction in Groundwater Levels Affecting Supply Wells	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS	0 LTS
Impact GW-4: Changes to Long-Term Change in Groundwater Storage (AF/acre per year)	0.00018LTS	0.00032LTS	0.00011 LTS	0.00016 LTS	0.00017 LTS	0.00031 LTS	0.00011 LTS	0.00015 LTS	0.00026 LTS
Impact GW-5: Increases in Groundwater Elevations near Project Intake Facilities Affecting Agricultural Drainage (%)	+0.06% LTS	+0.10% LTS	+0.09% LTS	+0.04% LTS	+0.08% LTS	+0.12% LTS	+0.11% LTS	+0.06% LTS	+0.07% LTS
Impact GW-6: Damage to Major Conveyance Facilities Resulting from Land Subsidence	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact GW-7: Degradation of Groundwater Quality	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

LTS = less than significant.

ES.5.1.5 Chapter 9, Water Quality

The analysis of environmental impacts on surface water quality from the project alternatives addressed impacts from construction and from facility operations and maintenance. Impacts resulting from the proposed CMP are also described. In addition, the potential impacts from the release of pollutants from facility inundation, changes in drainage patterns, and consistency with water quality control plans (WQCPs) are described.

Construction of the project alternatives has the potential to affect water quality because activities would result in land disturbance and the transport and handling of a variety of hazardous and nonhazardous substances. DWR would be required to obtain authorization for the construction activities under the State Water Board National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ/NPDES Permit No. CAS000002). Furthermore, the project alternatives include on-site treatment of runoff and dewatering water prior to discharge and construction-related environmental commitments and BMPs defined in Appendix 3B. The impact on water quality from construction of the project alternatives would be less than significant.

Operation of project alternatives' facilities has the potential to affect water quality through differences in Delta inflows from the Sacramento River, relative to existing conditions, resulting in increased proportions of the other Delta inflow waters (eastside tributaries, San Francisco Bay, San Joaquin River) in some regions of the Delta. The discussion of impacts on water quality from facility operations in this chapter addresses boron, bromide, chloride, electrical conductivity (EC), mercury, nutrients, organic carbon, dissolved oxygen, selenium, pesticides, trace metals, total suspended solids (TSS) and turbidity, and CHAB. The focus on these constituents within this chapter is based on an analysis presented in Appendix 9A, *Screening Analysis*. Impact assessments are based, in part, on modeling results presented in Appendix 9B, *Source Water Fingerprinting*; Appendix 9C, *Boron*; Appendix 9D, *Bromide*; Appendix 9E, *Cyanobacteria Harmful Algal Blooms*; Appendix 9F, *Chloride*; Appendix 9G, *Electrical Conductivity*; Appendix 9H, *Mercury*; Appendix 9I, *Organic Carbon*; Appendix 9J, *Selenium*; and Appendix 9K, *Trace Metals*. Appendix 9L, *Water Quality 2040 Analysis*, provides information regarding projected conditions for the project alternatives at 2040 compared to the No Project Alternative at 2040 and the No Project Alternative at 2040 compared to existing conditions. Facility operations would have minimal effects on boron, mercury, nutrients, organic carbon, dissolved oxygen, selenium, pesticides, trace metals, and TSS and turbidity, relative to existing conditions, and impacts would be less than significant. There would be increases in bromide, chloride, and EC at some Delta locations, primarily in the western and southern Delta, relative to existing conditions, which also would be less than significant. Facility operations also could affect CHAB potential at some locations within the Delta, although impacts would be less than significant.

The impact on water quality from maintenance of the project alternatives would be less than significant.

Table ES-7 provides a summary comparison of important impacts on water quality by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. The information in Table ES-7 focuses on key aspects of the impact discussions presented in Chapter 9, Section 9.3.3.2, *Impacts of the Project Alternatives on Water Quality*. The impact assessments for bromide, chloride, and EC relied on modeling output for 11 Delta locations. The CHABs impact assessment relied on modeling output for

residence time, channel velocity, and temperature, among other factors. Because condensing the entirety of modeling output is difficult to present, a single key effect was selected for each constituent in this summary to illustrate the impacts of the project alternatives, relative to existing conditions. Refer to Chapter 9, Section 9.3.3.2 for a detailed assessment of all potential water quality impacts.

The project alternatives would result in the potential for increased concentrations of bromide at some Delta locations. The assessment considered the potential frequency that bromide concentrations would exceed 300 micrograms per liter (µg/L), which is the concentration a panel of three water quality and treatment experts, engaged by the California Urban Water Agencies, determined would provide water suppliers adequate flexibility in their choice of drinking water treatment method (California Urban Water Agencies 1998:ES-2). The greatest potential increases in bromide at the Delta assessment locations would occur in the western Delta. In the San Joaquin River at Antioch, which is located in the western Delta, the frequency that monthly average bromide concentrations would potentially exceed 300 µg/L would not increase under the project alternatives, relative to existing conditions based on the modeling results shown in Table ES-7. Modeling results similarly show no increased exceedance of 300 µg/L at interior Delta locations, such as Barker Slough at the North Bay Aqueduct and South Fork Mokelumne River at Terminous, and a decrease of up to 5% at Banks Pumping Plant. The frequency that modeled monthly average bromide concentrations exceed 300 µg/L increased by 3% at Victoria Canal, 2% in the Sacramento River at Emmaton, and 1% or less at the remaining Delta assessment locations under the project alternatives, relative to existing conditions.

The project alternatives would potentially result in increased concentrations of chloride at some Delta locations. At Contra Costa Pumping Plant #1, which has an applicable chloride objective within the *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary* (Bay-Delta WQCP), modeled monthly average chloride concentrations under the project alternatives are up to 12 milligrams per liter (mg/L) higher than under existing conditions for the full simulation period (Table ES-7). Increases in modeled monthly chloride concentrations are higher at western Delta locations and lower at interior Delta locations. However, the project alternatives would not cause chloride concentrations to exceed water quality objectives for the protection of municipal and industrial uses contained in the Bay-Delta WQCP, as facility operations under the project alternatives would be operated to the chloride objectives, as implemented through State Water Board Water Right Decision 1641 (D-1641).

The project alternatives would potentially result in increased EC at some Delta locations. However, the project alternatives would not cause more frequent exceedance of the Bay-Delta WQCP water quality objectives for protection of agricultural, and fish and wildlife beneficial uses, as facility operations under the project alternatives would be operated to the EC objectives, as implemented through D-1641. In the Sacramento River at Threemile Slough, a compliance point specified in DWR's contract with the North Delta Water Agency, modeling indicates that long-term average EC would increase (Table ES-7). However, the increases in EC at Threemile Slough would not increase the frequency at which contract EC thresholds would be exceeded.

The CMP would have less-than-significant impacts on all constituents except for mercury. The CMP (Appendix 3F), which includes the creation of freshwater emergent perennial wetlands, seasonal wetlands, and tidal habitats, could result in new sources of methylmercury within the Delta relative to existing conditions. There is uncertainty regarding the compensatory mitigation sites becoming new sources for methylmercury loading to the Delta; the sites also could minimally affect methylmercury loading in the Delta. Thus, the compensatory mitigation impact on mercury is potentially significant. Mitigation, which consists of developing and implementing a Mercury Management and Monitoring Plan, would reduce the CMP mercury impact to less than significant for mercury.

Table ES-7. Summary Comparison of Impacts on Water Quality by Alternative

Chapter 9 – Water Quality	Alternatives								
	1	2a	2b	2c	3	4a	4b	4c	5
Impact WQ-3: Effects on Bromide Resulting from Facility Operations and Maintenance Frequency Monthly Average Concentrations would Exceed 300 µg/L in San Joaquin River at Antioch	69% LTS	69% LTS	69% LTS	69% LTS	69% LTS	69% LTS	69% LTS	69% LTS	69% LTS
Impact WQ-4: Effects on Chloride Resulting from Facility Operations and Maintenance Highest Monthly Average Increase in Chloride Concentration at Contra Costa Pumping Plant #1 [a]	10 mg/L LTS	10 mg/L LTS	8 mg/L LTS	12 mg/L LTS	10 mg/L LTS	10 mg/L LTS	8 mg/L LTS	12 mg/L LTS	10 mg/L LTS
Impact WQ-5: Effects on Electrical Conductivity Resulting from Facility Operations and Maintenance Highest Monthly Average Increase in Electrical Conductivity in the Sacramento River at Threemile Slough [a]	61 µmhos/cm LTS	61 µmhos/cm LTS	49 µmhos/cm LTS	54 µmhos/cm LTS	61 µmhos/cm LTS	61 µmhos/cm LTS	49 µmhos/cm LTS	54 µmhos/cm LTS	62 µmhos/cm LTS
Impact WQ-6: Effects on Mercury Resulting from Facility Operations and Maintenance	CMP tidal wetland PS/LTS [b]	CMP tidal wetland PS/LTS [b]	CMP tidal wetland PS/LTS [b]	CMP tidal wetland PS/LTS [b]	CMP tidal wetland PS/LTS [b]	CMP tidal wetland PS/LTS [b]	CMP tidal wetland PS/LTS [b]	CMP tidal wetland PS/LTS [b]	CMP tidal wetland PS/LTS [b]
Impact WQ-14: Effects on Cyanobacteria Harmful Algal Blooms Resulting from Facility Operations and Maintenance	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

CMP = Compensatory Mitigation Plan; LTS = less than significant; PS/LTS = potentially significant without mitigation/less than significant with mitigation; µg/L = micrograms per liter; µmhos/cm = micromhos per centimeter; mg/L = milligrams per liter.

[a] Average is for the water year 1923–2015 simulation period.

[b] The impact determinations are as a result of the CMP effects on mercury. Facility operations and maintenance impacts would be less than significant for all project alternatives.

ES.5.1.6 Chapter 10, Geology and Seismicity

Table ES-8 provides a summary comparison of important impacts on geology and seismicity by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. Important potential impacts that were considered include any differences in the potential for surface fault rupture, level of earthquake shaking, liquefaction susceptibility, ground failure, tunnel flotation, and likelihood for a seiche to occur for a given alternative. Only Alternative 5 would not be subject to a potential earthquake-induced seiche. The potential hazard of a seiche for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would be addressed through detailed design, such that there would be a less-than-significant impact for all alternatives with respect to a seiche.

Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c vary from Alternative 5 with respect to the location of a given impact mechanism, but all the alternatives have similar impact mechanisms and magnitudes in common and therefore have the same impact conclusions.

Table ES-8. Comparison of Impacts on Geology and Seismicity by Alternative

Chapter 10 – Geology and Seismicity	Alternative								
	1	2a	2b	2c	3	4a	4b	4c	5
Impact GEO-1: Loss of Property, Personal Injury, or Death from Structural Failure Resulting from Rupture of a Known Earthquake Fault or Based on Other Substantial Evidence of a Known Fault	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact GEO-2: Loss of Property, Personal Injury, or Death from Strong Earthquake-Induced Ground Shaking	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact GEO-3: Loss of Property, Personal Injury, or Death from Earthquake-Induced Ground Failure, including Liquefaction and Related Ground Effects	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact GEO-4: Loss of Property, Personal Injury, or Death from Ground Settlement, Slope Instability, or Other Ground Failure	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact GEO-5: Loss of Property, Personal Injury, or Death from Structural Failure Resulting from Project-Related Ground Motions	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact GEO-6: Loss of Property, Personal Injury, or Death from Seiche or Tsunami	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

LTS = less than significant.

ES.5.1.7 Chapter 11, Soils

Table ES-9 provides information on the magnitude of the most pertinent and quantifiable impacts on soils that are expected to result from the alternatives and the compensatory mitigation. The table presents the CEQA finding after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied.

Overall, the alternatives would be constructed on near-surface soils having very similar water erosion and wind erosion hazards. Although the southernmost portion of Alternative 5 is in an area where the near-surface soils have a slightly higher water erosion hazard than that of the soils of the other alternatives, this would be offset by the fact that the disturbance area and therefore the area of potential erosion is less because no Southern Forebay would be constructed under Alternative 5. Therefore, the overall potential impact of accelerated water and wind erosion would be similar among the alternatives.

Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c vary somewhat with respect to the extent of topsoil that would be lost from excavation and overcovering. Overall, Alternative 5 would result in a loss of topsoil less than that of the other alternatives.

Parts of all nine of the alternatives would be constructed on or in soil materials that are subject to subsidence, with the alternatives based on the eastern alignment and Alternative 5 comparatively less so because overall they would be constructed where the soil materials have a lower organic matter content or a thinner peat layer.

The alternatives overall would be constructed in areas of near-surface soils having similar expansion potential and corrosivity to concrete and uncoated steel, but with the southern portion of Alternative 5 being underlain by near-surface soils that have relatively low corrosivity to concrete. Therefore, the potential impact of corrosive soils would be lower with Alternative 5.

All of the alternatives would entail construction of temporary and permanent septic tanks or alternative wastewater disposal systems on near-surface soils that are rated as being very limited for such use. Consequently, the potential impact of a wastewater disposal system failure would be similar among all of the project alternatives.

Table ES-9. Comparison of Impacts on Soils by Alternative

	Alternative								
Chapter 11 – Soils	1	2a	2b	2c	3	4a	4b	4c	5
Impact SOILS-1: Accelerated Soil Erosion Caused by Vegetation Removal and Other Disturbances as a Result of Constructing the Proposed Water Conveyance Facilities	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact SOILS-2: Loss of Topsoil from Excavation, Overcovering, and Inundation as a Result of Constructing the Proposed Water Conveyance Facilities	2,797 acres/ LTS	3,052 acres/ LTS	2,465 acres/ LTS	2,668 acres/ LTS	2,324 acres/ LTS	2,703 acres/ LTS	1,963 acres/ LTS	2,194 acres/ LTS	1,302 acres/ LTS
Impact SOILS-3: Property Loss, Personal Injury, or Death from Instability, Failure, and Damage as a Result of Constructing the Proposed Water Conveyance Facilities on or in Soils Subject to Subsidence	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact SOILS-4: Risk to Life and Property as a Result of Constructing the Proposed Water Conveyance Facilities in Areas of Expansive or Corrosive Soils	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

	Alternative								
Chapter 11 – Soils	1	2a	2b	2c	3	4a	4b	4c	5
Impact SOILS-5: Have Soils Incapable of Adequately Supporting the Use of Septic Tanks or Alternative Wastewater Disposal Systems Where Sewers Are Not Available for the Disposal of Wastewater	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

1 LTS = less than significant.

ES.5.1.8 Chapter 12, Fish and Aquatic Resources

Table ES-10 provides a summary comparison of significant impacts requiring mitigation on fish and aquatic resources by alternative. The table presents the CEQA findings after all mitigation is applied. This table provides information on the magnitude of the most pertinent and quantifiable impacts on fish and aquatic resources that are expected to result from the alternatives. Potentially significant impacts requiring mitigation include Impact AQUA-1: *Effects of Construction of Water Conveyance Facilities on Fish and Aquatic Species*; Impact AQUA-2: *Effects of Operations and Maintenance of Water Conveyance Facilities on Sacramento River Winter-Run Chinook Salmon*; Impact AQUA-3: *Effects of Operations and Maintenance of Water Conveyance Facilities on Central Valley Spring-Run Chinook Salmon*; Impact AQUA-5: *Effects of Operations and Maintenance of Water Conveyance Facilities on Central Valley Steelhead*; Impact AQUA-6: *Effects of Operations and Maintenance of Water Conveyance Facilities on Delta Smelt*; and Impact AQUA-7: *Effects of Operations and Maintenance of Water Conveyance Facilities on Longfin Smelt*. Impacts AQUA-1, AQUA-2, AQUA-3, AQUA-5, AQUA-6, and AQUA-7 are less than significant with mitigation.

Less-than-significant impacts include Impact AQUA-4: *Effects of Operations and Maintenance of Water Conveyance Facilities on Central Valley Fall-Run/Late Fall–Run Chinook Salmon*; Impact AQUA-8: *Effects of Operations and Maintenance of Water Conveyance Facilities on Southern DPS Green Sturgeon*; Impact AQUA-9: *Effects of Operations and Maintenance of Water Conveyance Facilities on White Sturgeon*; Impact AQUA-10: *Effects of Operations and Maintenance of Water Conveyance Facilities on Pacific Lamprey and River Lamprey*; Impact AQUA-11: *Effects of Operations and Maintenance of Water Conveyance Facilities on Native Minnows (Sacramento Hitch, Sacramento Splittail, Hardhead, and Central California Roach)*; Impact AQUA-12: *Effects of Operations and Maintenance of Water Conveyance Facilities on Starry Flounder*; Impact AQUA-13: *Effects of Operations and Maintenance of Water Conveyance Facilities on Northern Anchovy*; Impact AQUA-14: *Effects of Operations and Maintenance of Water Conveyance Facilities on Striped Bass*; Impact AQUA-15: *Effects of Operations and Maintenance of Water Conveyance Facilities on American Shad*; Impact AQUA-16: *Effects of Operations and Maintenance of Water Conveyance Facilities on Threadfin Shad*; Impact AQUA-17: *Effects of Operations and Maintenance of Water Conveyance Facilities on Black Bass*; Impact AQUA-18: *Effects of Operations and Maintenance of Water Conveyance Facilities on California Bay Shrimp*; Impact AQUA-19: *Effects of Operations and Maintenance of Water Conveyance Facilities on Southern Resident Killer Whale*; and Impact AQUA-20: *Effects of Construction of Water Conveyance Facilities on California Sea Lion*.

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Table ES-10. Comparison of Impacts on Fish and Aquatic Resources by Alternative [a]

	Alternative								
Chapter 12 – Fish and Aquatic Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact AQUA-1: Effects of Construction of Water Conveyance Facilities on Fish and Aquatic Species	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Tidal perennial habitat (acres)—Temporary	8.585	8.908	7.888	8.530	2.410	2.732	1.712	2.354	1.548
Tidal perennial habitat (acres)—Permanent	15.719	17.080	13.068	15.034	12.614	13.974	9.963	11.928	5.574
Channel margin habitat (feet)—Temporary	494	571	63	457	494	571	63	457	494
Channel margin habitat (feet)—Permanent	3,124	4,309	1,651	2,762	3,124	4,309	1,651	2,762	3,124
Impact pile driving for intake cofferdams and training walls (acres/day)	20–21 days (2 sites)	14-21 days (3 sites)	21 days (1 site)	14–21 days (2 sites)	20–21 days (2 sites)	14-22 days (3 sites)	21 days (1 site)	14–21 days (2 sites)	20–21 days (2 sites)
206-dB threshold	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
187-dB threshold	6.72–12.30	6.72–15.20	6.72	6.72–12.30	6.72–12.30	6.72–15.20	6.72	6.72–12.30	6.72–12.30
183-dB threshold	18.47–25.06	18.47–33.44	18.47	18.47–25.06	18.47–25.06	18.47–33.44	18.47	18.47–25.06	18.47–25.06
150-dB threshold	67.69–134.10	67.69–231.35	134.10	67.69–134.10	67.69–134.10	67.69–231.35	134.10	67.69–134.10	67.69–134.10
Impact pile driving for log booms (acres/day)	4 days (2 sites)	2–4 days (3 sites)	4 days (1 site)	2–4 days (2 sites)	4 days (2 sites)	2–4 days (3 sites)	4 days (1 site)	2–4 days (2 sites)	4 days (2 sites)
206-dB threshold	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
187-dB threshold	27.2–66.4	27.2–52.6	27.2	27.2–66.4	27.2–66.4	27.2–52.6	27.2	27.2–66.4	27.2–66.4
183-dB threshold	51.7–66.4	51.7–97.8	51.7	51.7–66.4	51.7–66.4	51.7–97.8	51.7	51.7–66.4	51.7–66.4
150-dB threshold	69.3–117.9	69.3–229.0	117.9	69.3–117.9	69.3–117.9	69.3–229.0	117.9	69.3–117.9	69.3–117.9
Impact pile driving for bridge crossings (acres/day)	5–45 days (3 sites)	5–45 days (3 sites)	5–45 days (3 sites)	5–45 days (3 sites)	5–9 days (2 sites)	5–9 days (2 sites)	5–9 days (2 sites)	5–9 days (2 sites)	5–9 days (2 sites)
206-dB threshold	0.04–0.90	0.04–0.90	0.04–0.90	0.04–0.90	0.04–0.47	0.04–0.47	0.04–0.47	0.04–0.47	0.04–0.47
187-dB threshold	4.12–20.36	4.12–20.36	4.12–20.36	4.12–20.36	4.12–12.38	4.12–12.38	4.12–12.38	4.12–12.38	4.12–12.38
183-dB threshold	7.34–27.40	7.34–27.40	7.34–27.40	7.34–27.40	7.34–12.36	7.34–12.36	7.34–12.36	7.34–12.36	7.34–12.36
150-dB threshold	25.45–108.73	25.45–108.73	25.45–108.73	25.45–108.73	12.37–25.45	12.37–25.45	12.37–25.45	12.37–25.45	12.37–25.45
Impact pile driving for test piles (acres/day)	3 days (1 site)	3 days (1 site)	3 days (1 site)	3 days (1 site)	3 days (1 site)	3 days (1 site)	3 days (1 site)	3 days (1 site)	3 days (1 site)
206-dB threshold	0.06–0.15	0.06–0.15	0.06–0.15	0.06–0.15	0.06–0.15	0.06–0.15	0.06–0.15	0.06–0.15	0.06–0.15
187-dB threshold	0.18–0.46	0.18–0.46	0.18–0.46	0.18–0.46	0.18–0.46	0.18–0.46	0.18–0.46	0.18–0.46	0.18–0.46
183-dB threshold	0.60–1.28	0.60–1.28	0.60–1.28	0.60–1.28	0.60–1.28	0.60–1.28	0.60–1.28	0.60–1.28	0.60–1.28
150-dB threshold	58.41–58.64	58.41–58.64	58.41–58.64	58.41–58.64	58.41–58.64	58.41–58.64	58.41–58.64	58.41–58.64	58.41–58.64
Suspended sediment plume downstream of each intake (acres)	4.2	5.9	2.5	4.2	4.2	5.9	2.5	4.2	4.2
Number of barge trips	186	230	90	172	188	232	92	174	188
Days of dredging for riprap	47	57	19	42	47	57	19	42	47
Impact AQUA-2: Effects of Operations and Maintenance of Water Conveyance Facilities on Sacramento River Winter-Run Chinook Salmon	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Juvenile south Delta entrainment/ Salvage-density method [b]	SWP: -10% – -6% CVP: 0% – +5%	SWP: -9% – -1% CVP: -3% – +5%	SWP: -8% – 0% CVP: 0% – +3%	SWP: -11% – -2% CVP: +1% – +5%	SWP: -10% – -6% CVP: 0% – +5%	SWP: -9% – -1% CVP: -3% – +5%	SWP: -8% – 0% CVP: 0% – +3%	SWP: -11% – -2% CVP: +1% – +5%	SWP: -10% – -6% CVP: +1% – +5%
Juvenile south Delta entrainment/ Zeug and Cavallo (2014) [b]	-17% – -1%	-18% – 0%	-13% – +1%	-15% – 0%	-17% – -1%	-18% – 0%	-13% – +1%	-15% – 0%	-18% – -1%

Chapter 12 – Fish and Aquatic Resources	Alternative 1	2a	2b	2c	3	4a	4b	4c	5
Channel velocity downstream of Intake C (September–June)/DSM2	-14% – +1%	-13% – +2%	-12% – +1%	-13% – +1%	-14% – +1%	-13% – +2%	-12% – +1%	-13% – +1%	-14% – +1%
Reverse flow downstream of Georgiana Slough (number of hours/%, September–June)/DSM2	-6.4 – +22.9 (-3% – +23%)	-7.2 – +22.3 (-3% – +23%)	-3.8 – +18.5 (-2% – +19%)	-6.6 – +21.4 (-3% – +22%)	-6.4 – +22.9 (-3% – +23%)	-7.2 – +22.3 (-3% – +23%)	-3.8 – +18.5 (-2% – +19%)	-6.6 – +21.4 (-3% – +22%)	-6.4 – +22.9 (-3% – +23%)
Juvenile through-Delta survival (September–June)/Perry et al. (2018)	-10% – +3%	-10% – +3%	-8% – +3%	-9% – +3%	-10% – +3%	-10% – +3%	-8% – +3%	-9% – +3%	-10% – +2%
Juvenile through-Delta survival/ Delta Passage Model	-3% – -1%	-3% – -1%	-2% – -1%	-3% – -1%	-3% – -1%	-3% – -1%	-2% – -1%	-3% – -1%	-3% – -1%
Riparian and wetland bench inundation (rearing habitat, linear feet)/DSM2	-2,519	-2,847	-1,613	-2,198	-2,519	-2,847	-1,613	-2,198	-2,540
Water temperature (°C)/DSM2	0	0	0	0	0	0	0	0	0
Spawner abundance/Winter Run Chinook Salmon Life Cycle Model	+5.0%	+5.9%	+5.7%	+5.9%	+5.0%	+5.9%	+5.7%	+5.9%	+5.2%
Adult female escapement/IOS	-9%	-12%	-7%	-9%	-9%	-12%	-7%	-9%	-9%
Juvenile through-Delta survival/IOS	-5% – -1%	-5% – -1%	-3% – -1%	-4% – -1%	-5% – -1%	-5% – -1%	-3% – -1%	-4% – -1%	-5% – -1%
Egg survival/IOS	0% – +3%	0% – +4%	0% – +4%	0% – +4%	0% – +3%	0% – +4%	0% – +4%	0% – +4%	0% – +3%
Fry survival/IOS	0% – +2%	0% – +3%	0% – +3%	0% – +3%	0% – +2%	0% – +3%	0% – +3%	0% – +3%	0% – +2%
River survival/IOS	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adult escapement/OBAN [c]	-13%	-3%	-6%	-7%	-13%	-3%	-6%	-7%	-12%
Impact AQUA-3: Effects of Operations and Maintenance of Water Conveyance Facilities on Central Valley Spring-Run Chinook Salmon [d]	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Juvenile south Delta entrainment/ Salvage-density method [b]	SWP: -12% – 0% CVP: 0% – +8%	SWP: -7% – 0% CVP: -3% – +7%	SWP: -3% – +3% CVP: +1% – +4%	SWP: -9% – -1% CVP: +1% – +6%	SWP: -12% – 0% CVP: 0% – +8%	SWP: -7% – 0% CVP: -3% – +7%	SWP: -3% – +3% CVP: +1% – +4%	SWP: -9% – -1% CVP: +1% – +6%	SWP: -12% – 0% CVP: 0% – +8%
Juvenile through-Delta survival/Delta Passage Model	-3% – -1%	-3% – -1%	-2% – -1%	-3% – -1%	-3% – -1%	-3% – -1%	-2% – -1%	-3% – -1%	-3% – -1%
Juvenile through-Delta survival (San Joaquin River Basin spring-run)/ Structured Decision Model	-1% – +8%	-3% – +8%	-3% – +8%	-1% – +8%	-1% – +8%	-3% – +8%	-3% – +8%	-1% – +8%	-1% – +8%
Impact AQUA-5: Effects of Operations and Maintenance of Water Conveyance Facilities on Central Valley Steelhead [d]	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Juvenile south Delta entrainment/Salvage-density method [b]	SWP: -10% – -5% CVP: +2% – +6%	SWP: -9% – 0% CVP: -1% – +5%	SWP: -7% – +3% CVP: +1% – +3%	SWP: -9% – -3% CVP: +2% – +5%	SWP: -10% – -5% CVP: +2% – +6%	SWP: -9% – 0% CVP: -1% – +5%	SWP: -7% – +3% CVP: +1% – +3%	SWP: -9% – -3% CVP: +2% – +5%	SWP: -11% – -5% CVP: +1% – +6%
Juvenile Mokelumne River south Delta entrainment (March–June south Delta exports)/CalSim	-7% – +4%	-7% – +4%	-5% – +3%	-6% – +5%	-7% – +4%	-7% – +4%	-5% – +3%	-6% – +5%	-7% – +4%
Juvenile San Joaquin River Basin through-Delta survival (February–May Vernalis flow)/CalSim	0%	0% – +1%	0%	0%	0%	0% – +1%	0%	0%	0%
Impact AQUA-6: Effects of Operations and Maintenance of Water Conveyance Facilities on Delta Smelt	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

Chapter 12 – Fish and Aquatic Resources	Alternative 1	2a	2b	2c	3	4a	4b	4c	5
Larval NDD entrainment median [range in parentheses] % of March–June Sacramento River flow diverted)/CalSim	0% – 7% (0% – 21%)	0% – 7% (0% –22%)	0% – 6% (0% – 16%)	0% – 7% (0% – 19%)	0% – 7% (0% – 21%)	0% – 7% (0% –22%)	0% – 6% (0% – 16%)	0% – 7% (0% – 19%)	0% – 7% (0% – 21%)
Adult south Delta entrainment (December–March OMR flow)/CalSim [b, e]	-3% – +34%	-3% – +39%	-7% – +19%	-4% – +29%	-3% – +34%	-3% – +39%	-7% – +19%	-4% – +29%	-3% – +35%
Larval/early juvenile south Delta entrainment (March–June OMR flow)/ CalSim [b, e]	-7% – +45%	-6% – +49%	-12% – +32%	-7% – +41%	-7% – +45%	-6% – +49%	-12% – +32%	-7% – +41%	-7% – +45%
Larval/early juvenile south Delta /DSM2-PTM [b]	-7% – +9%	-8% – +9%	-4% – +9%	-4% – +8%	-7% – +9%	-8% – +9%	-4% – +9%	-4% – +8%	-7% – +9%
NDD suspended sediment entrainment (total % of suspended sediment at Freeport, 1922–2015)/CalSim	5%	5%	4%	5%	5%	5%	4%	5%	5%
Eurytemora affinis food availability/ X2-abundance regression	-3% – -1%	-3% – -1%	-2% – -1%	-3% – -1%	-3% – -1%	-3% – -1%	-2% – -1%	-3% – -1%	-3% – -1%
Pseudodiaptomus forbesi food availability (Delta outflow, June–October)/CalSim	-14% – +1%	-14% – +2%	-11% – +2%	-13% – +1%	-14% – +1%	-14% – +2%	-11% – +2%	-13% – +1%	-14% – +1%
Pseudodiaptomus forbesi food availability (% of years with positive July–October QWEST)/CalSim	-11% – +12%	-11% – +10%	-15% – +12%	-15% – +10%	-11% – +12%	-11% – +10%	-15% – +12%	-15% – +10%	-11% – +12%
Pseudodiaptomus forbesi food availability (July–October QWEST)/CalSim [f]	-67% – +212%	-86% – +195%	-44% – +283%	-76% – +227%	-67% – +212%	-86% – +195%	-44% – +283%	-76% – +227%	-72% – +211%
NDD phytoplankton carbon entrainment (range from 5th–95th percentile entrainment at minimum and maximum Delta stock sizes)/DSM2	0.0% – 7.4%	0.0% – 8.2%	0.0% – 4.4%	0.0% – 6.0%	0.0% – 7.4%	0.0% – 8.2%	0.0% – 4.4%	0.0% – 6.0%	0.0% – 7.4%
Juvenile/subadult habitat extent (percentage of years with X2 less than 85 km, June–December)/CalSim	-5% – 0%	-3% – 0%	-5% – 0%	-8% – 0%	-5% – 0%	-3% – 0%	-5% – 0%	-8% – 0%	-5% – 0%
Predator (silversides) abundance (south Delta exports, March–May)/CalSim	-4% – +1%	-4% – +1%	-2% – +1%	-3% – +1%	-4% – +1%	-4% – +1%	-2% – +1%	-3% – +1%	-4% – +1%
Predator (silversides) abundance (Delta inflow, June–September)/CalSim	-1% – +1%	-1% – 0%	-1% – 0%	-1% – +1%	-1% – +1%	-1% – 0%	-1% – 0%	-1% – +1%	-1% – +1%
Cyanobacteria harmful algal blooms/ DSM2	LTS (See Impact WQ-14 in Chapter 9)	LTS (See Impact WQ-14 in Chapter 9)	LTS (See Impact WQ-14 in Chapter 9)	LTS (See Impact WQ-14 in Chapter 9)	LTS (See Impact WQ-14 in Chapter 9)	LTS (See Impact WQ-14 in Chapter 9)	LTS (See Impact WQ-14 in Chapter 9)	LTS (See Impact WQ-14 in Chapter 9)	LTS (See Impact WQ-14 in Chapter 9)
Selenium (increase in exceedance of threshold for physical deformities)/DSM2	0	0	0	0	0	0	0	0	0
Impact AQUA-7: Effects of Operations and Maintenance of Water Conveyance Facilities on Longfin Smelt [g]	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Larval south Delta (neutrally buoyant particles)/DSM2-PTM [b]	-3% – +11%	-4% – +12%	0% – +10%	0% – +10%	-3% – +11%	-4% – +12%	0% – +10%	0% – +10%	-2% – +11%
Larval south Delta (surface-oriented particles)/DSM2-PTM [b]	-1% – +14%	-3% – +14%	-3% – +11%	-1% – +13%	-1% – +14%	-3% – +14%	-3% – +11%	-1% – +13%	-1% – +14%

Chapter 12 – Fish and Aquatic Resources	Alternative 1	2a	2b	2c	3	4a	4b	4c	5
Larval entry into south Delta (neutrally buoyant particles)/DSM2-PTM [f]	-4% – +257%	-5% – +275%	0% – +199%	0% – +251%	-4% – +257%	-5% – +275%	0% – +199%	0% – +251%	-3% – +279%
Larval entry into south Delta (surface-oriented particles)/DSM2-PTM [f]	0% – +383%	-2% – +389%	-2% – +282%	0% – +390%	0% – +383%	-2% – +389%	-2% – +282%	0% – +390%	-1% – +393%
Larval passage past Chipps Island (neutrally buoyant particles)/DSM2-PTM	-2% – 0%	-2% – 0%	-3% – 0%	-2% – 0%	-2% – 0%	-2% – 0%	-3% – 0%	-2% – 0%	-4% – 0%
Larval passage past Chipps Island (surface-oriented particles)/DSM2-PTM	-3% – 0%	-3% – 0%	-4% – 0%	-3% – 0%	-3% – 0%	-3% – 0%	-4% – 0%	-3% – 0%	-4% – 0%
Juvenile south Delta entrainment/ OMR-salvage regression [b]	-8% – 0%	-9% – +1%	-5% – +1%	-7% – 0%	-8% – 0%	-9% – +1%	-5% – +1%	-7% – 0%	-8% – 0%
Delta outflow-abundance/Delta outflow-abundance index method	-10% – -3%	-10% – -3%	-7% – -2%	-9% – -3%	-10% – -3%	-10% – -3%	-7% – -2%	-9% – -3%	-10% – -4%

°C = degrees Celsius; dB = decibel; DSM2 = Delta Simulation Model II; km = kilometers; IOS = Interactive Object-Oriented Simulation; NBA = North Bay Aqueduct; NDD = north Delta diversions; OBAN = Oncorhynchus Bayesian Analysis; OMR = Old and Middle River; PTM = particle tracking model.

[a] First line of each impact gives level of significance (LTS = less than significant) with necessary mitigation measures. Other lines give quantities of impact (acres, etc.) prior to mitigation. Operations impacts generally give % difference compared to existing conditions, unless indicated otherwise in the leftmost column where effect and method are noted in the form 'Effect/method'; cells generally give range of differences in mean by water year type for each alternative.

[b] Various regulatory requirements from existing conditions would also be implemented into all alternatives to minimize entrainment effects.

[c] See Table 12-43 in Impact AQUA-2: *Effects of Operations and Maintenance of Water Conveyance Facilities on Sacramento River Winter-Run Chinook Salmon* for sensitivity analyses for additional through-Delta mortality of 5% and 10% representing near- or far-field mortality not captured by the OBAN model.

[d] See also results for channel velocity, juvenile through-Delta survival based on Perry et al. (2018), riparian and wetland bench inundation, and water temperature under Impact AQUA-2: *Effects of Operations and Maintenance of Water Conveyance Facilities on Sacramento River Winter-Run Chinook Salmon*.

[e] Note that large percentage changes reflect differences in low absolute values of OMR flow, particularly when bracketing zero, and do not necessarily indicate large differences in entrainment potential (see also footnote c above); see, for example, Tables 12-92 and 12-93 in Impact AQUA-6: *Effects of Operations and Maintenance of Water Conveyance Facilities on Delta Smelt*.

[f] Note that large percentage changes reflect differences in low absolute values, particularly when bracketing zero, and do not necessarily indicate large differences; see, for example, Tables 12-139 and 12-140 in Impact AQUA-7: *Effects of Operations and Maintenance of Water Conveyance Facilities on Longfin Smelt*.

[g] See also results for *Eurytemora affinis* food availability under Impact AQUA-6: *Effects of Operations and Maintenance of Water Conveyance Facilities on Delta Smelt*.

ES.5.1.9 Chapter 13, Terrestrial Biological Resources

Table ES-11 provides a summary comparison of quantitative impacts on some of the more sensitive terrestrial biological resources in the study area by alternative. These impacts include the permanent, long-term temporary (lasting more than 1 year; see discussion in Chapter 13, Section 13.3.1.2, *Evaluation of Construction Activities*), and temporary loss or conversion of natural communities, habitat for special-status plant and wildlife species, and impacts on state- and federally regulated wetlands and other waters (aquatic resources). The table presents the CEQA findings after all mitigation is applied.

Constructing the water conveyance facilities would impact areas of natural communities, occurrences and habitat for special-status plants and wildlife species, and aquatic resources in the study area. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) would generally result in greater impacts on terrestrial biological resources relative to the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment alternative (Alternative 5), which is largely due to the improvements on Bouldin Island and road improvements throughout the central alignment. Alternative 2a would result in the greatest impacts on terrestrial biological resources, which would be primarily due to the construction activities on Bouldin Island and the Southern Complex under Alternative 2a, and Alternative 5 the fewest. Alternative 4b would also have relatively fewer impacts, and for some resources, would have the fewest quantified impacts of all alternatives (e.g., valley/foothill riparian, greater and lesser sandhill cranes) primarily due to having only one intake, smaller RTM impacts associated with the Twin Cities Complex, and the smallest RTM footprint on Lower Robert's Island. Alternative 5 would have substantially fewer impacts on state- and federally regulated aquatic resources compared to the other alternatives (Table ES-11).

The CMP (Appendix 3F) would compensate for the loss of natural communities, habitats for species, and aquatic resources. The CMP together with other mitigation measures and environmental commitments to avoid and minimize effects on terrestrial biological resources would reduce impacts for all alternatives to less than significant.

This chapter also considers the potential impacts of implementing the CMP, as well as other mitigation measures, on terrestrial biological resources and concludes that impacts under all alternatives would remain less than significant with mitigation.

Table ES-11. Comparison of Impacts on Select Terrestrial Biological Resources by Alternative (acres/CEQA findings after mitigation)

	Alternative								
Chapter 13 – Terrestrial Biological Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact BIO-1: Impacts of the Project on the Tidal Perennial Aquatic Natural Community	54.66/ LTS	67.43/ LTS	50.81/ LTS	53.42/ LTS	43.32/ LTS	56.59/ LTS	39.98/ LTS	42.54/ LTS	11.13/ LTS
Impact BIO-2: Impacts of the Project on Tidal Freshwater Emergent Wetlands	1.05/ LTS	0.87/ LTS	0.87/ LTS	0.87/ LTS	0.40/ LTS	0.40/ LTS	0.40/ LTS	0.40/ LTS	0.57/ LTS
Impact BIO-3: Impacts of the Project on Valley/Foothill Riparian Habitat	72.00/ LTS	75.02/ LTS	68.15/ LTS	71.14/ LTS	27.29/ LTS	30.62/ LTS	23.76/ LTS	26.73/ LTS	29.31/ LTS
Impact BIO-4: Impacts of the Project on the Nontidal Perennial Aquatic Natural Community	1.06/ LTS	1.44/ LTS	0.78/ LTS	0.96/ LTS	0.88/ LTS	1.26 LTS	0.60/ LTS	0.78/ LTS	1.68/ LTS
Impact BIO-5: Impacts of the Project on Nontidal Freshwater Perennial Emergent Wetland	9.62/ LTS	9.57/ LTS	9.05/ LTS	9.57/ LTS	0.85/ LTS	0.85/ LTS	0.33/ LTS	0.85/ LTS	0.75/ LTS
Impact BIO-6: Impacts of the Project on Nontidal Brackish Emergent Wetland	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI	0/ NI
Impact BIO-7: Impacts of the Project on Alkaline Seasonal Wetland Complex	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	4.76/ LTS	0.76/ LTS
Impact BIO-8: Impacts of the Project on Vernal Pool Complex	19.17/ LTS	19.17/ LTS	18.85/ LTS	19.17/ LTS	19.17/ LTS	19.17/ LTS	18.85/ LTS	19.17/ LTS	26.08/ LTS
Impact BIO-12: Impacts of the Project on Tidal Freshwater Emergent Wetland Plants [a]	6.41/ LTS	7.78/ LTS	5.80/ LTS	6.27/ LTS	4.17/ LTS	5.60/ LTS	3.62/ LTS	4.09/ LTS	1.49/ LTS
Impact BIO-14: Impacts of the Project on Vernal Pool Aquatic Invertebrates [b]	79.46/ LTS	82.81/ LTS	79.46/ LTS	79.46/ LTS	79.46/ LTS	82.81/ LTS	79.46/ LTS	79.46/ LTS	12.73/ LTS
Impact BIO-18: Impacts of the Project on Valley Elderberry Longhorn Beetle [c]	72.02/ LTS	75.02/ LTS	68.14/ LTS	71.14/ LTS	27.29/ LTS	30.61/ LTS	23.74/ LTS	26.72/ LTS	29.31/ LTS
Impact BIO-22: Impacts of the Project on California Tiger Salamander	115.26/ LTS	166.29/ LTS	115.26/ LTS	115.26/ LTS	115.26/ LTS	166.29/ LTS	115.26/ LTS	115.26/ LTS	78.65/ LTS
Impact BIO-33: Impacts of the Project on Greater Sandhill Crane and Lesser Sandhill Crane [d]	1,595.93 / LTS	1,805.05 / LTS	1,304.67 / LTS	1,478.58 / LTS	1,200.73 / LTS	1,403.38 / LTS	907.75 / LTS	1,083.31 / LTS	1,427.66 / LTS
Impact BIO-39: Impacts of the Project on Swainson's Hawk	3,105.23/ LTS	3,432.44/ LTS	2,811.70/ LTS	2,985.46/ LTS	2,812.20/ LTS	3,155.33/ LTS	2,484.99/ LTS	2,679.87/ LTS	1,811.00/ LTS

	Alternative								
Chapter 13 – Terrestrial Biological Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact BIO-51: Substantial Adverse Effect on State- or Federally Protected Wetlands and Other Waters through Direct Removal, Filling, Hydrological Interruption, or Other Means	226.33/ LTS	241.07/ LTS	217.03/ LTS	223.69/ LTS	168.86/ LTS	185.91/ LTS	159.50/ LTS	166.31/ LTS	60.98/ LTS

Note: This table is a summary of the impacts on the more sensitive terrestrial biological resources in the study area by alternative. These impacts include the permanent, long-term temporary (lasting more than 1 year; see discussion in Chapter 13, Section 13.3.1.2, *Evaluation of Construction Activities*), and temporary loss or conversion of natural communities, habitat for special-status plant and wildlife species, and impacts on state- and federally regulated wetlands and other waters (aquatic resources).

CEQA findings after mitigation is applied: NI = no impact; LTS = less than significant.

[a] Impact acres presented are for Mason's lilaeopsis modeled habitat.

[b] Project impact acres include permanent, long-term temporary, temporary, and indirect impacts for vernal pool aquatic invertebrates.

[c] Impact acres presented are for the riparian portion of the species model. The "other potential habitat" portion of the model was used to identify where additional shrubs may occur and not to quantify actual impacts on habitat.

[d] Impact acres presented are for greater sandhill crane modeled habitat.

ES.5.1.10 Chapter 14, Land Use

Table ES-12 provides a summary comparison of important impacts on land use by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. This table provides information about the magnitude of the most pertinent and quantifiable impacts on land use that are expected to result from the alternatives. Important impacts to consider include conflicts with existing land uses as a result of constructing the proposed water conveyance facility. As shown in Table ES-12, each project alternative would result in incompatibilities with applicable land use designations, goals, and policies as a result of constructing the proposed water conveyance facilities. Alternative 2a would result in the most acreage with incompatibilities, with nearly 4,753 acres. Alternative 5 would result in the fewest acres with incompatibilities, with 2,667 acres. Although changes in land use could result in a conflict with policies adopted to avoid or mitigate environmental effects, these conflicts would be unlikely to result in a significant physical effect; therefore, this impact would be less than significant.

Table ES-12. Comparison of Impacts on Land Use by Alternative

	Alternative								
Chapter 14 – Land Use	1	2a	2b	2c	3	4a	4b	4c	5
Impact LU-1: Displacement of Existing Structures and Residences and Effects on Population and Housing	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact LU-2: Incompatibility with Applicable Land Use Designations, Goals, and Policies, Adopted for the Purpose of Avoiding or Mitigating an Environmental Effect as a Result of the Project (total acres)	4,340/ LTS	4,753/ LTS	3,828/ LTS	4,207/ LTS	3,909/ LTS	4,342/ LTS	3,361/ LTS	3,761/ LTS	2,667/ LTS
Impact LU-3: Create Physical Structures Adjacent to and through a Portion of an Existing Community That Would Physically Divide the Community as a Result of the Project	NI	NI	NI	NI	NI	NI	NI	NI	NI

LTS = less than significant; NI = no impact.

ES.5.1.11 Chapter 15, Agricultural Resources

Table ES-13 provides a summary comparison of important impacts on agricultural resources by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. Important impacts to consider include the conversion of Important Farmland and the conversion of farmland under Williamson Act contracts or in Farmland Security Zones on a temporary, short-term, or permanent basis.

Any alternative would result in the permanent and temporary conversion of Important Farmland. Alternative 2a would result in the greatest amount of farmland conversion (5,735.7 acres). Among all alternatives, Alternative 5 would result in the least amount of converted farmland (3,787.9 acres). Acres reported in Table ES-13 include impacts on farmland resulting from construction buildout and anticipated impacts associated with implementation of the CMP on Bouldin Island and at Interstate (I-) 5 Ponds 6, 7, and 8. The total acres reported in Table ES-13 also include "remnant farmland areas," which are generated when the margin of the construction footprint bisects an existing agricultural parcel, leaving a portion of the agricultural parcel that would not be directly permanently or temporarily converted due to construction. They nonetheless could be indirectly affected by the construction footprint. These "remnant farmland areas" could be too small in size to effectively support ongoing agricultural operations and are, therefore, conservatively considered to be permanently converted. Therefore, total acres noted for each alternative in Table ES-13 are the sum of impacts on farmland by acreage due to the project alternative, the CMP, and remnant farmland areas under each alternative.

Each alternative would result in the permanent or temporary conversion of Williamson Act farmland or farmland in a Farmland Security Zone. If the underlying Williamson Act contract or Farmland Security Zone remains in effect, the conversion to incompatible uses may result in potentially significant land use conflicts, whether from permanent or temporary conversion. Alternative 4a would cause the greatest amount of conversion of contracted land (1,355.2 acres). Alternative 2b would result in the least amount of conversion of contracted land (881.3 acres). Conversion of farmland under Williamson Act contract or under contract within a Farmland Security Zone largely represents a subset of those impacts for conversion of Important Farmland because much of the agricultural land within the study area is Important Farmland, but only a fraction of that land is under Williamson Act contract and an even smaller proportion is under contract in a Farmland Security Zone.

As noted above, the conversion of Williamson Act contracted farmland or land in a Farmland Security Zone involves not only the direct effect on the land resources, but also may create conflicts with the use restrictions that the contracts or Farmland Security Zones impose. Project activities in Farmland Security Zones are more likely to create compatible use conflicts.

Construction and operation of the project's water conveyance facilities could indirectly affect agriculture within the study area. The California Department of Water Resources (DWR) considered how construction activities for the project could affect local infrastructure supporting agricultural properties. Though agricultural properties were avoided to the greatest extent possible, additional infrastructure may be present and could permanently disrupt agricultural infrastructure. This impact would be potentially significant. Mitigation Measure AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties* would require disrupted agricultural infrastructure to be relocated or replaced; otherwise, the affected landowner would be fully compensated for any financial losses. After mitigation, this impact would be less than significant.

Table ES-13. Comparison of Impacts on Agricultural Resources by Alternative

	Alternative								
Chapter 15 – Agricultural Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact AG-1: Convert a Substantial Amount of Prime Farmland, Unique Farmland, Farmland of Local Importance, or Farmland of Statewide Importance as a Result of Construction of Water Conveyance Facilities (total acres)	5,355.1/ SU	5,735.7/ SU	4,838.1/ SU	5,211.8/ SU	4,931.7/ SU	5,380.0/ SU	4,404.1/ SU	4,812.9/ SU	3,787.9/ SU
Impact AG-2: Convert a Substantial Amount of Land Subject to Williamson Act Contract or under Contract in Farmland Security Zones to a Nonagricultural Use as a Result of Construction of Water Conveyance Facilities (total acres)	1,042.3/ SU	1,253.6/ SU	881.3/ SU	950.6/ SU	1,142.5/ SU	1,355.2/ SU	982.0/ SU	1,051.2/ SU	1,217.8/ SU
Impact AG-3: Other Impacts on Agriculture as a Result of Constructing and Operating the Water Conveyance Facilities Prompting Conversion of Prime Farmland, Unique Farmland, Farmland of Local Importance, or Farmland of Statewide Importance	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

LTS = less than significant; SU = significant and unavoidable.

ES.5.1.12 Chapter 16, Recreation

Table ES-14 provides a summary comparison of important impacts on recreation resources by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. This table provides information on the magnitude of the most pertinent and quantifiable recreation impacts that are expected to result from the project alternatives. Important impacts to consider include displacement of existing recreation facilities and the reduction of recreation opportunities.

As shown in Table ES-14, none of the alternatives would result in a significant effect or increase in the use of existing neighborhood and regional parks or other recreational facilities.

Table ES-14. Comparison of Impacts on Recreation by Alternative

	Alternative								
Chapter 16—Recreation	1	2a	2b	2c	3	4a	4b	4c	5
Impact REC-1: Increase the Use of Existing Neighborhood and Regional Parks or Other Recreational Facilities Such That Substantial Physical Deterioration of the Facility Would Occur or Be Accelerated	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact REC-2: Include Recreational Facilities or Require the Construction or Expansion of Recreational Facilities That Might Have an Adverse Physical Effect on the Environment	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

LTS = less than significant.

ES.5.1.13 Chapter 17, Socioeconomics

Table ES-15 provides a summary comparison of changes in socioeconomic conditions by alternative. This table provides information about the magnitude of the most pertinent and quantifiable changes in socioeconomic conditions that are expected to result from implementation of the alternatives. CEQA and the CEQA Guidelines do not require an assessment of impacts and significance for purely socioeconomic effects. For consistency with other chapters, Table ES-15 simply summarizes the socioeconomic effects evaluated, although none of them would cause an impact as defined by CEQA. Important effects to consider include changes in regional employment and income, and changes in agricultural production value.

As shown in Table ES-15, each alternative could have effects on regional employment and income relative to the existing conditions as a result of increased jobs in construction and operations and maintenance of water conveyance facilities. During construction, Alternative 2a would result in the greatest increase in employment and income, peaking at 3,914 construction-related jobs, whereas Alternative 4b would result in the lowest increase in employment, with 1,990 construction-related jobs in its peak year. During operations and maintenance, Alternatives 2a and 5 would result in the greatest increase in employment with a total of 53 full-time equivalent (FTE) annual jobs. Alternative 2b would result in the lowest operation and maintenance employment, with 41 FTE jobs.

Each alternative would also result in a decrease in agricultural employment as a result of the conversion of agricultural lands necessary to construct water conveyance facilities. Additional conversion of land and associated employment changes would result from the CMP (Appendix 3F). These changes are also included in Table ES-15 with annual agricultural employment changes. Alternative 4a would result in the largest estimated reduction in total agricultural employment, estimated at 68 FTE annual jobs, whereas Alternative 5 would result in smallest reduction, estimated at 48 jobs.

Each alternative would also result in a decrease in value of agricultural production as a result of farmland conversion for construction and compensatory mitigation activities. Alternative 4a would result in the largest loss of agricultural output, valued at $5.6 million per year. Alternative 2b would result in the smallest annual loss, $2.8 million per year.

Table ES-15. Comparison of Effects on Socioeconomics by Alternative [a]

Chapter 17 – Socioeconomics	Alternative								
	1	2a	2b	2c	3	4a	4b	4c	5
ECON-1: Changes in Regional Employment and Income (change in FTE jobs)									
Changes in construction employment during construction phase during peak year [a]	3,321	3,914	2,492	3,060	2,861	3,647	1,990	2,597	3,086
Changes in operations and maintenance annual employment during operations and maintenance phase	50	53	41	47	49	52	42	46	53
Changes in annual agricultural employment	-61	-67	-51	-60	-60	-68	-49	-59	-48
ECON-6: Changes in Agricultural Economics in the Statutory Delta and Project Area (change in total value of production in million $) [b]									
Changes in annual value of agricultural production	-4.3	-5.3	-2.8	-4.2	-4.5	-5.6	-3.1	-4.4	-4.5

[a] Peak construction occurs during either year 6 or 7 of the construction period across all project alternatives. Does not include construction employment associated with the Compensatory Mitigation Plan.

[b] Dollars are reported at 2020 levels.

ES.5.1.14 Chapter 18, Aesthetics and Visual Resources

Table ES-16 provides a summary comparison of important impacts on aesthetics and visual resources by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. This table provides information on the magnitude of the most pertinent and quantifiable impacts on aesthetics and visual resources that are expected to result from the project alternatives. An important impact to consider is the permanent impact on visual resources after the completion of construction of water conveyance features.

As shown in Table ES-16, construction of the water conveyance features would result in impacts on visual resources as a result of degrading existing vistas, visual character of the study area, and introduce light and glare. All alternatives would result in significant impacts on the visual character of the Delta.

Table ES-16. Comparison of Impacts on Aesthetics and Visual Resources by Alternative

	Alternative								
Chapter 18 – Aesthetics and Visual Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact AES-1: Substantially Degrade the Existing Visual Character or Quality of Public Views (from Publicly Accessible Vantage Points) of the Construction Sites and Visible Permanent Facilities and Their Surroundings in Nonurbanized Areas	SU	SU	SU	SU	SU	SU	SU	SU	SU
Impact AES-2: Substantially Damage Scenic Resources including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings Visible from a State Scenic Highway	SU	SU	SU	SU	SU	SU	SU	SU	SU
Impact AES-3: Have Substantial Significant Impacts on Scenic Vistas	SU	SU	SU	SU	SU	SU	SU	SU	SU
Impact AES-4: Create New Sources of Substantial Light or Glare That Would Adversely Affect Daytime or Nighttime Views of the Construction Areas or Permanent Facilities	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

LTS = less than significant; SU = significant and unavoidable.

ES.5.1.15 Chapter 19, Cultural Resources

Table ES-17 provides a summary comparison of important impacts on cultural resources by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. Important impacts to consider include those significant and unavoidable impacts that would permanently impact cultural resources. The analysis in this chapter is supported by Appendices 19A through 19D. Appendix 19A is the *Historical Resources Survey and Evaluation Report* for the project, which is a public appendix, and Appendix 19B is the *Archaeological Sensitivity Analysis Report*, which is a confidential appendix. Appendices 19C and 19D are public, and respectively are titled *Impact Analysis of Project Alternatives on Built-Environment Historical Resources* and *Impact Analysis of Project Alternatives on Archaeological Resources.*

The construction of the water conveyance features would occur in the vicinity of built-environment historical resources that are scattered along the alignment for the alternatives. Such activities would result in significant impacts on historical resources when they would result in material impairment of the qualities that qualify it as a historical resource. This can include physical changes ranging from demolition to introduction of incompatible features in the setting of the historical resources. For quantifiable impacts, Table ES-17 provides a breakdown for each alternative of how many of the resources that would experience significant impacts could have those impacts reduced to a less-than-significant level through mitigation and how many would remain significant and unavoidable.

All alignments are located within the Delta, an area with high sensitivity for built-environment cultural resources. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) have 27 or 28 built-environment historical resources that would be affected by the construction of water conveyance features. The eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) have 20 built-environment historical resources that would be affected by the construction of water conveyance features. The eastern alignment alternatives would have fewer impacts on built-environment historical resources because of the placement of the alignment. The Bethany Reservoir alignment (Alternative 5) has 17 built-environment historical resources that would be affected by the construction of water conveyance features.

Construction of the water conveyance features would occur in the vicinity of archaeological resources that occur within the study area. The central alignment alternatives (Alternatives 1, 2a, 2b, and 2c) have 27 to 31 archaeological resources that would be affected by the construction of water conveyance features. Of the central alignment alternatives, Alternative 2a would cause the greatest number of impacts, largely from the construction of Intake A. The eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) would have fewer impacts on archaeological resources because of the placement of shafts along the alignment. All alignments are located within the Delta, an area with high sensitivity for archaeological resources. The eastern alignment alternatives have 18 to 22 archaeological resources that would be affected by the construction of water conveyance features. Of the eastern alignment alternatives, Alternative 4a would affect the greatest number of resources, largely from the construction of Intake A. The Bethany Reservoir alignment (Alternative 5) has 13 archaeological resources that would be affected by the construction of water conveyance features.

Table ES-17. Comparison of Impacts After the Application of Mitigation Measures on Cultural Resources by Alternative [a]

Chapter 19 – Cultural Resources	Alternative								
	1	2a	2b	2c	3	4a	4b	4c	5
Impact CUL-1: Impacts on Built-Environment Historical Resources Resulting from Construction and Operation of the Project	SU 10 resources LTS 16 resources NI 2 resources	SU 13 resources LTS 13 resources NI 1 resource	SU 8 resources LTS 17 resources NI 1 resource	SU 10 resources LTS 16 resources NI 1 resource	SU 6 resources LTS 13 resources NI 0 resources	SU 9 resources LTS 11 resources NI 0 resources	SU 4 resources LTS 14 resources NI 1 resource	SU 6 resources LTS 13 resources NI 0 resources	SU 6 resources LTS 11 resources NI 0 resources
Impact CUL-3: Impacts on Identified Archaeological Resources Resulting from the Project	SU 30 Archaeol-ogical Sites	SU 31 Archaeol-ogical Sites	SU 27 Archaeol-ogical Sites	SU 28 Archaeol-ogical Sites	SU 20 Archaeol-ogical Sites	SU 22 Archaeol-ogical Sites	SU 18 Archaeol-ogical Sites	SU 20 Archaeol-ogical Sites	SU 13 Archaeol-ogical Sites

NI = no impact; LTS = less than significant; SU = significant and unavoidable.

[a] Impacts in Table ES-17 include only those that are quantifiable based on current cultural resources data.

ES.5.1.16 Chapter 20, Transportation

Table ES-18 provides a summary comparison of important impacts on transportation by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. All of the project alternatives would have the same impact conclusions because all of the project alternatives would have similar impact mechanisms, and potential effects would have similar magnitudes. For VMT analyses and effects from traffic congestion, Alternatives 2b and 4b would have the greatest increases in construction-related VMT compared to existing conditions, and Alternatives 2c, 3, and 4c would have the smallest increases in VMT compared to existing conditions. VMT analyses were used to determine that all of the project alternatives would significantly increase VMT in the study area during project construction. All of the project alternatives would have similar impacts related to effects on transit, roadways, bicycle and pedestrian facilities, rail transportation, marine transportation, and navigation.

For Impact TRANS-1: *Increased Average VMT Per Construction Employee versus Regional Average*, construction of the project alternatives would result in additional VMT to the regional transportation system and increase the total amount of driving and distances traveled for home-based work trips. Even with Mitigation Measure TRANS-1: *Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan,* Impact TRANS-1 would result in a significant and unavoidable impact.

For Impact TRANS-2: *Conflict with a Program, Plan, Ordinance or Policy Addressing the Circulation System*, potential temporary impacts on transit, bicycle/pedestrian facilities, rail service (freight and commuter), and marine traffic and conflicts with the programs, policies, and ordinances that guide these portions of the transportation circulation system would be less than significant because only minor conflicts would occur. Being a State of California agency, DWR is not subject to local programs, policies, and ordinances.

For Impact TRANS-3: *Substantially Increase Hazards from Geometric Design Feature (e.g., Sharp Curves or Dangerous Intersections) or Incompatible Uses (e.g., Farm Equipment)*, constructing the project alternatives would not substantially increase traffic hazards related to sharp curves, dangerous intersections, or other roadway design features because roadway improvements that contractors would be required to implement prior to the construction of the project would not introduce new circulation system features that would increase geometric design feature hazards. All of the project alternatives would increase the amount of construction vehicle traffic at multiple construction sites, road improvement locations, and bridges in the study area. If not mitigated this increase in employee construction traffic and increased traffic from other construction materials delivery vehicles could create the potential for traffic safety hazards related to increasing the number of trucks and construction equipment operating with commuters, farming operations, and recreational users in areas adjacent to construction sites. Mitigation Measure TRANS-1: *Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan* would reduce this impact to a less-than-significant level.

For Impact TRANS-4: *Result in Inadequate Emergency Access*, all of the project alternatives would increase the amount of traffic generated by construction employees using the road system in the study area. This increase in traffic from construction workers and other construction materials delivery traffic could create the potential for effects on emergency access and response conditions at some of the project work sites and project construction road improvements. Even with the proposed

circulation system improvements and project site emergency response plan actions, the amount of additional construction-related traffic on Delta roadways and the duration of construction activities at conveyance facility sites would increase the potential for emergency access and response time impacts and is considered significant. Because of the transportation demand management (TDM) plans and traffic management plans (TMPs) proposed for project alternatives, the reduction in potential for conflicts between construction and emergency vehicles, and Mitigation Measure TRANS-1: *Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan*, this impact would be less than significant with mitigation.

For Impact TRANS-5: *Potential Effects on Marine Navigation Caused from Construction, Operation, and Maintenance of Intakes*, vessel passage would not be impeded and changes in river flows would not be of the magnitude to restrict access; therefore, the impact of constructing and operating the project alternatives on maritime navigation would be less than significant.

Table ES-18. Comparison of Impacts on Transportation by Alternative

	Alternative								
Chapter 20 – Transportation	1	2a	2b	2c	3	4a	4b	4c	5
Impact TRANS-1: Increased Average VMT Per Construction Employee versus Regional Average (percentage change)	+14.1% SU	+14.8% SU	+20.1% SU	+10.7% SU	+8.4% SU	+17.0% SU	+22.5% SU	+11.4% SU	+14.5% SU
Impact TRANS-2: Conflict with a Program, Plan, Ordinance or Policy Addressing the Circulation System	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact TRANS-3: Substantially Increase Hazards from a Geometric Design Feature (e.g., Sharp Curves or Dangerous Intersections) or Incompatible Uses (e.g., Farm Equipment)	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact TRANS-4: Result in Inadequate Emergency Access	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact TRANS-5: Potential Effects on Marine Navigation Caused from Construction, Operation, and Maintenance of Intakes	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

LTS = less than significant; SU = significant and unavoidable; VMT = vehicle miles traveled.

ES.5.1.17 Chapter 21, Public Services and Utilities

Table ES-19 provides a summary comparison of important impacts on public services and utilities by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. Important impacts to consider include public services including police protection, fire protection, public schools, and other public facilities and the generation of solid waste. All impacts would be less than significant for all alternatives.

Compensatory mitigation would be placed on Bouldin Island and at three ponds along I-5, and tidal wetland habitat would be created as part of the proposed Tidal Habitat Mitigation Framework. Activities would involve site inundation, some excavation to allow water entry, or grading for appropriate water levels.

Table ES-19. Comparison of Impacts on Public Services and Utilities by Alternative

	Alternative								
Chapter 21 – Public Services and Utilities	1	2a	2b	2c	3	4a	4b	4c	5
Impact UT-1: Result in Substantial Physical Impacts Associated with the Provision of, or the Need for, New or Physically Altered Governmental Facilities, the Construction of Which Could Cause Significant Environmental Impacts on Public Services Including Police Protection, Fire Protection, Public Schools, and Other Public Facilities (e.g., Libraries, Hospitals)	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact UT-2: Require or Result in the Relocation or Construction of New or Expanded Service System Infrastructure, the Construction or Relocation of Which Could Cause Significant Environmental Impacts for Any Service Systems Such as Water, Wastewater Treatment, Stormwater Drainage, Electric Power Facilities, Natural Gas Facilities, and Telecommunications Facilities	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact UT-3: Exceed the Capacity of the Wastewater Treatment Provider(s) that Would Serve the Alternative's Anticipated Demand in Addition to the Provider's Existing Commitments	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact UT-4: Generate Solid Waste in Excess of Federal, State or Local Standards, or Be in Excess of the Capacity of Local Infrastructure, or Otherwise Impair the Attainment of Solid Waste Reduction Goals	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

LTS = less than significant.

ES.5.1.18 Chapter 22, Energy

Table ES-20 provides a summary comparison of important impacts on energy by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. Important impacts to consider include the energy needed to construct the alternatives and the energy required for operation.

All of the project alternatives would require the use of electricity during both construction and operation and would initially consume gasoline and diesel fuels through operation of heavy-duty construction equipment and vehicles. The maximum consumption of electricity during construction is expected to occur during tunnel boring for all project alternatives. During construction, it is expected that Alternative 4a would require the most electricity (about 2,718 gigawatt hours [GWh]), and Alternatives 2b and 4b would require the least electricity (1,020 and 1,104 GWh, respectively). Fuel consumption for on-road and off-road construction equipment is expected to be highest for Alternative 4a (about 40 million gallons of gasoline and diesel), and Alternative 2b and Alternative 4b would require the least amount of fuel (28 million gallons of gasoline and diesel).

Table ES-20. Comparison of Impacts on Energy by Alternative

	Alternative								
Chapter 22 – Energy	1	2a	2b	2c	3	4a	4b	4c	5
Impact ENG-1: Result in Substantial Significant Environmental Impacts Due to Wasteful, Inefficient, or Unnecessary Consumption of Energy Resources during Project Construction or Operation.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact ENG-2: Conflict with or Obstruct Any State/Local Plan, Goal, Objective, or Policy for Renewable Energy or Energy Efficiency	NI	NI	NI	NI	NI	NI	NI	NI	NI

LTS = less than significant; NI = no impact.

ES.5.1.19 Chapter 23, Air Quality and Greenhouse Gases

Table ES-21 provides a summary comparison of impacts on air quality and GHGs by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. This table also provides information on the magnitude of the most pertinent and quantifiable impacts on air quality and GHGs that are expected to result from construction and operation and maintenance (O&M) of the alternatives. Impacts to consider are to the extent construction and maintenance emissions of ozone precursors and criteria pollutants exceed local air district thresholds, which are designed to achieve regional attainment with federal and state ambient air quality standards. Individuals residing near the water conveyance alignment may also be exposed to increased health risks from air pollution resulting from construction and O&M activities. The analysis also considers the extent to which project construction and long-term O&M, including changes in SWP and CVP pumping operations, would generate GHG emissions and contribute to global climate change.

Air Quality

Construction of any of the project alternatives would result in emissions of nitrogen oxides (NO_X) that would exceed Sacramento Metropolitan Air Quality Management District's (SMAQMD's), San Joaquin Valley Air Pollution Control District's (SJVAPCD's), and Bay Area Air Quality Management District's (BAAQMD's) thresholds (Figure 23-1 in Chapter 23, Section 23.1.4, *Regional Climate and Meteorology*, displays the air district boundaries). Construction of any of the project alternatives would also exceed SMAQMD's daily threshold for particulate matter (PM) of 10 microns in diameter or less (PM10), and Alternatives 1, 2a, 3, and 4a would exceed SMAQMD's annual PM10 threshold. Construction of Alternative 5 would exceed SJVAPCD's PM10 threshold. None of the project alternatives would result in construction emissions above Yolo-Solano Air Quality Management District's (YSAQMD) thresholds.

The project would be built with feasible on-site environmental commitments to reduce emissions and minimize effects on air quality. Specifically, fugitive dust emissions would be reduced through a dust control plan (Environmental Commitment EC-11: *Fugitive Dust Control*) and BMPs at new concrete batch plants (Environmental Commitment EC-12: *On-Site Concrete Batching Plants*). Exhaust-related pollutants would be reduced through use of zero-emissions equipment and vehicles (where feasible), renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines*, EC-8: *On-Road Haul Trucks*, EC-9: *On-Site Locomotives*, EC-10: *Marine Vessels*, and EC-13: *DWR Best Management Practices to Reduce GHG Emissions*. These environmental commitments are in conformance with measures recommended by the BAAQMD, SJVAPCD, SMAQMD, and YSAQMD and would minimize air quality impacts through application of on-site controls to reduce construction emissions. However, even with these commitments, exceedances of air district thresholds would still occur, resulting in a significant impact before mitigation. DWR would implement mitigation measures to mitigate the remaining construction impact on air quality resources. Specifically, Mitigation Measures AQ-1: *Offset Construction-Generated Criteria Pollutants in the Sacramento Valley Air Basin*, AQ-2: *Offset Construction-Generated Criteria Pollutants in the San Joaquin Valley Air Basin*, and AQ-3: *Offset Construction-Generated Criteria Pollutants in the San Francisco Bay Area Air Basin* would mitigate NO_X and PM10 emissions, as applicable, to below SMAQMD, SJVAPCD, and BAAQMD thresholds. Accordingly, impacts would be less than significant with mitigation.

Within the SMAQMD, the amount of construction effort, and thus construction emissions, for alternatives with the same project design capacity (i.e., cubic feet per second [cfs]) would be similar. Emissions levels among Alternatives 1, 3, and 5 (6,000 cfs), Alternatives 2b and 4b (3,000 cfs), Alternatives 2c and 4c (4,500 cfs), and Alternatives 2a and 4a (7,500 cfs) would therefore be comparable. Alternatives 2a and 4a would result in the greatest overall emissions primarily because these alternatives require construction of three intake facilities. In contrast, construction of Alternatives 2b and 4b, which includes only one intake, requires less earthmoving and heavy-duty equipment and vehicles, and thus generates fewer emissions.

Within the SJVAPCD, the amount of construction equipment and vehicles, and thus construction exhaust emissions (e.g., NO_X), would be greatest under Alternatives 2a and 4a. Compared to other alternatives, Alternatives 2a and 4a require more equipment and vehicles in the SJVAPCD because of the larger proposed tunnel and additional RTM that would be extracted and handled at the Bouldin Island or Lower Roberts Island shaft locations. While Alternatives 2a and 4a would generate greater amounts of combustion pollutants, fugitive dust emissions in the SJVAPCD would be highest under Alternative 5. This is because under Alternative 5, two launch shafts would be constructed at Lower Roberts Island, effectively doubling the amount of earthmoving and vehicles traveling on unpaved surfaces at this location, compared to all other proposed alternatives.

Within the BAAQMD, construction emissions would be highest under Alternatives 2a and 4a because these alternatives would construct an additional tunnel launch shaft adjacent to the Banks Pumping Plant.

Construction activities within the YSAQMD under all alternatives would be limited to employee travel and equipment and material hauling, resulting in combustion and dust emissions from on-road vehicles. Emissions levels would be similar among all project alternatives.

Construction of all alternatives except Alternatives 2b and 2c would lead to new violations of the PM10 national ambient air quality standards (NAAQS). Construction of Alternative 2a would lead to new violations of the PM10 and PM 2.5 microns or less in diameter (PM2.5) California ambient air quality standards (CAAQS). Construction of any project alternative would potentially contribute to existing PM10 and PM2.5 violations through exceedances of the significant impact levels (SILs). Construction of Alternatives 1, 2a, 2b, 2c, and 5 would generate maximum nitrogen dioxide (NO_2) concentrations above the NAAQS. Environmental commitments would minimize localized air quality effects (Environmental Commitment EC-7 through EC-13), although emissions would still violate the ambient air quality standards and SILs. These environmental commitments represent on-site controls to reduce construction emissions. Mitigation Measure AQ-5 requires additional studies, ambient air quality monitoring, and potentially corrective actions to reduce pollutant concentrations, as necessary. While Mitigation Measure AQ-5 would lower exposure to project-generated air pollution, it may not be feasible to eliminate all localized exceedances of the ambient quality standards and SILs. Accordingly, this impact is determined to be significant and unavoidable.

Diesel particulate matter (DPM) generated during construction of Alternatives 2a and 4a would expose one receptor location north of Intake A to cancer risk above SMAQMD's threshold. Cancer and health hazards would be below all air district thresholds at all other receptor locations in the local air quality study area. DPM generated during construction of Intake A would be reduced through use of zero-emissions equipment and vehicles (where feasible), renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by environmental commitments. Mitigation Measure AQ-6 offers the affected receptor financial assistance for the

installation of high-efficiency heating, ventilation, and air conditioning (HVAC) filters or relocation. If either option were accepted by the homeowner, the impact would be reduced to less than significant. However, if the homeowner rejects DWR's assistance, the impact would be significant and unavoidable.

Long-term O&M of the project alternatives would not result in ozone precursor or criteria pollutant emissions above any air district thresholds. Localized criteria pollutant concentrations likewise would not cause or contribute to an ambient air quality violation. Mobile equipment and vehicles required for O&M would be used infrequently and would not expose receptors to substantial pollutant concentrations or result in significant cancer or noncancer health risks. Regular testing of stationary emergency generators would not result in health risk in excess of applicable local air district thresholds. In general, O&M and associated emissions would be comparable among all project alternatives.

There are no geologic features normally associated with naturally occurring asbestos (NOA) in or near the project area. As such, there is no potential for impacts related to NOA emissions during construction activities, and none of the project alternatives would expose sensitive receptors to substantial NOA concentrations. Construction contractors would be required to comply with existing asbestos rules and regulations, which require dust control measures to limit the potential for airborne asbestos. Asbestos-containing materials and lead-based paint may be found during demolition activities, although all project alternatives would comply with all National Emission Standards for Hazardous Air Pollutants regulations (40 Code of Federal Regulations [CFR] §§ 61.140–61.157). Similarly, implementation of all feasible dust control measures (Environmental Commitment EC-11) would minimize the risk of contracting Valley fever, if *Coccidioides immitis* fungus spores are present in the soil during earthmoving activities. While minor odors may be generated during construction and O&M, none of the project alternatives include substantial odor emitting facilities, such as wastewater treatment facilities, landfills, and refineries.

Greenhouse Gases

Construction of any of the project alternatives would result in an increase in GHG emissions. Land use changes resulting from construction activities and compensatory mitigation would alter existing GHG emissions and removals. Following construction, O&M activities and changes in CVP and SWP operational pumping would generate direct and indirect GHG emissions. These annual emissions would decline over time as improvements in engine technology and regulations to reduce combustion emissions reduce the carbon intensity of equipment, vehicles, and electricity generation.

GHG emissions generated by O&M and SWP pumping activities would not impede DWR's ability to achieve its GHG emissions reduction goals set forth in the *California Department of Water Resources Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan Update 2020* (2020 Update) (California Department of Water Resources 2020a). Total net additional emissions generated by project construction and displaced purchases of CVP electricity are estimated to be between 398,106 and 629,346 metric tons CO_2e, with Alternative 2a generating the most emissions and Alternative 5 generating the least. These emissions exceed the net zero threshold adopted by DWR for the purposes of this analysis. Mitigation Measure AQ-9, *Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero* would mitigate these emissions to net zero through the development and implementation of a GHG mitigation program. Cumulative GHG emissions from land use change emissions under Alternatives 1, 2a, 2b, 2c, and 5 are projected to decrease relative to baseline and increase under Alternatives 3,

4a, 4b, and 4c. Implementing Mitigation Measure CMP: *Compensatory Mitigation Plan* would offset land use change emissions from construction of the eastern conveyance alignment alternatives through additional habitat creation. Accordingly, through a combination of project-specific mitigation and tiering from DWR's Update 2020, none of the project alternatives would result in a cumulatively significant GHG impact, nor would any alternative contribute to a cumulatively considerable impact on global climate change.

Table ES-21. Comparison of Impacts on Air Quality and Greenhouse Gases by Alternative

	Alternative								
Chapter 23 – Air Quality and Greenhouse Gases	1	2a	2b	2c	3	4a	4b	4c	5
Impact AQ-1: Result in Impacts on Regional Air Quality within the Sacramento Metropolitan Air Quality Management District	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Max daily (lb) NO_X emissions from any construction year	699	1,046	610	754	775	1,016	659	725	627
Max daily (lb) NO_X emissions during O&M	37	39	36	37	37	39	36	37	37
Impact AQ-2: Result in Impacts on Regional Air Quality within the San Joaquin Valley Air Pollution Control District	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Max average daily (lb) NO_X emissions from any construction year	182	257	149	158	192	265	153	168	187
Max daily (lb) NO_X emissions during O&M	2	2	2	2	2	2	2	2	2
Impact AQ-3: Result in Impacts on Regional Air Quality within the Bay Area Air Quality Management District	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Max daily (lb) NO_X emissions from any construction year	264	283	259	214	288	279	257	210	159
Max daily (lb) NO_X emissions during O&M	30	30	30	30	30	30	30	30	17
Impact AQ-4: Result in Impacts on Air Quality within the Yolo-Solano Air Quality Management District	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Max daily (lb) NO_X emissions from any construction year	1	1	1	1	1	1	1	1	1
Max daily (lb) NO_X emissions during O&M	5	5	5	5	5	5	5	5	5
Impact AQ-5: Result in Exposure of Sensitive Receptors to Substantial Localized Criteria Pollutant Emissions	SU	SU	SU	SU	SU	SU	SU	SU	SU
Max 24-hour PM10 concentration from construction of any location (μ/m^3)	94	94	94	94	111	111	109	110	111

	Alternative								
Chapter 23 – Air Quality and Greenhouse Gases	1	2a	2b	2c	3	4a	4b	4c	5
Impact AQ-6: Result in Exposure of Sensitive Receptors to Substantial Toxic Air Contaminant Emissions	LTS	SU	LTS	LTS	LTS	SU	LTS	LTS	LTS
Max additional cancer risk (per million) from construction of any location	6	16	4	6	6	16	4	6	7
Max additional cancer risk (per million) from standby engine generator testing	<1	<1	<1	<1	<1	<1	<1	<1	<1
Impact AQ-7: Result in Exposure of Sensitive Receptors to Asbestos, Lead-Based Paint, or Fungal Spores That Cause Valley Fever	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact AQ-8: Result in Exposure of Sensitive Receptors to Substantial Odor Emissions	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact AQ-9: Result in Impacts on Global Climate Change from Construction and O&M	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Total net additional emissions (metric tons CO_2e) [a]	536,379	629,346	399,363	429,232	537,960	624,677	404,214	430,433	398,106
Impact AQ-10: Result in Impacts on Global Climate Change from Land Use Change	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Cumulative net additional emissions (metric tons CO_2e) [b]	-8,502 to -15,790	-8,502 to -15,790	-8,502 to -15,790	-8,502 to -15,790	22,333 to 41,475	22,333 to 41,475	22,333 to 41,475	22,333 to 41,475	-16,235 to -30,150

LTS = less than significant; SU = significant and unavoidable; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxide; μ/m^3 = micrograms per cubic meter.

[a] Net emissions from construction and displaced purchases of CVP electricity. Potential emissions from project-induced land use change assessed under Impact AQ-10.

[b] Cumulative sum of project land use emissions (including emissions associated with both new emissions and change in sequestration) minus the cumulative sum of the baseline scenario emissions and sequestration through 2070.

ES.5.1.20 Chapter 24, Noise and Vibration

Table ES-22 provides a summary comparison of important impacts on noise and vibration by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. This table provides information on the magnitude of the most pertinent and quantifiable impacts on noise and vibration that are expected to result from the project alternatives. The aspect of the project affecting the most receptors involves the construction of permanent project features, which is anticipated to occur over a duration of approximately 12 to 14 years, accounting for all features. Heavy equipment noise during construction of permanent project features from intakes, shaft sites, concrete batch plants, and a new forebay complex would affect the most receptors under Alternative 4a, with daytime criteria exceeded at 153 residences and nighttime criteria exceeded at 230 residences over the course of construction. According to modeling, construction of levee improvements, bridges, access roads, park-and-ride lots, utilities, and compensatory mitigation would exceed daytime noise criteria at nearby receptors on a short-term basis. Truck traffic on haul routes, including new access roads would exceed traffic noise criteria. Train activity on new rail spurs is not expected to exceed noise level increase criteria for rail facilities. Operation of pumping plants is not expected to be significant source of noise at the nearest receptors, as the design of these facilities would include noise-attenuating or silencing features. Groundborne vibration or noise from heavy equipment or tunnel boring machines (TBMs) is not expected to result in perceptible levels of vibration within buildings or damage to building structures. As shown in Table ES-22, Impact NOI-1: *Generate a Substantial Temporary or Permanent Increase in Ambient Noise Levels in the Vicinity of the Project in Excess of Standards Established in the Local General Plan or Noise Ordinance, or Applicable Standards of Other Agencies* would be significant and unavoidable under all project alternatives. Although mitigation measures are available to reduce Impact NOI-1 to a less-than-significant level, the voluntary participation of affected residents, which is necessary to reduce this impact, cannot be guaranteed. For this reason, Impact NOI-1 would be significant and unavoidable, even with mitigation measures.

Table ES-22. Comparison of Impacts on Noise and Vibration by Alternative

	Alternative								
Chapter 24 – Noise and Vibration	1	2a	2b	2c	3	4a	4b	4c	5
Impact NOI-1: Generate a Substantial Temporary or Permanent Increase in Ambient Noise Levels in the Vicinity of the Project in Excess of Standards Established in the Local General Plan or Noise Ordinance, or Applicable Standards of Other Agencies	SU [a]	SU [a]	SU [a]	SU [a]	SU [a]	SU [a]	SU [a]	SU [a]	SU [a]
Receptors exceeding daytime criteria – Buildout (exposure period up to 14 years) (residences)	14	20	7	14	19	25	12	19	35
Receptors exceeding daytime criteria – Pile driving (up to 21 months) (residences)	125	148	25	125	130	153	30	130	143
Receptors exceeding nighttime criteria – Concrete pours (up to 5 months) (residences)	177	193	42	177	214	230	79	214	230
Impact NOI-2: Generate Excessive Groundborne Vibration or Groundborne Noise Levels	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact NOI-3: Place Project-Related Activities in the Vicinity of a Private Airstrip or an Airport Land Use Plan, or, Where Such a Plan Has Not Been Adopted, within 2 Miles of a Public Airport or Public Use Airport, Resulting in Exposure of People Residing or Working in the Project Area to Excessive Noise Levels	NI	NI	NI	NI	NI	NI	NI	NI	NI

LTS = less than significant; NI = no impact; SU = significant and unavoidable.

[a] If all eligible property owners participate in Mitigation Measure NOI-1: *Develop and Implement a Noise Control Plan*, the impacts would be less than significant with mitigation.

ES.5.1.21 Chapter 25, Hazards, Hazardous Materials, and Wildfire

Table ES-23 provides a summary comparison of important hazards, hazardous materials, and wildfire impacts by alternative. The table presents the CEQA findings after all mitigation is applied. Under all project alternatives, there is the potential to encounter hazardous materials through the handling of RTM, excavation and tunneling near oil and natural gas production facilities, and while tunneling near gas fields.

Alternative 5 would have a greater potential to expose sensitive receptors at a school to hazardous materials, substances, or waste during construction because this alternative is the only one that has project facilities within 0.25 mile of a school.

Alternatives 3, 4a, 4b, and 4c would have the greatest potential to conflict with a known hazardous materials site and, as a result, create a potentially significant hazard to the public or environment because those alternatives would be constructed within 0.25 mile of two known hazardous materials sites. Conversely, Alternatives 1, 2a, 2b, 2c, and 5 would have the least potential to conflict with known hazardous sites because those alternatives would be constructed within 0.25 mile of only one known hazardous materials site.

The risk of wildfire is similar under all project alternatives. However, the magnitude of potential impacts during construction may be greater under Alternatives 2a, 3, 4a, 4b, 4c, and 5 because construction of these alternatives would take longer and thereby require the presence of personnel and equipment for a longer duration.

Table ES-23. Comparison of Impacts on Hazards, Hazardous Materials, and Wildfire by Alternative

Chapter 25 – Hazards, Hazardous Materials, and Wildfire	Alternative								
	1	2a	2b	2c	3	4a	4b	4c	5
Impact HAZ-1: Create a Substantial Hazard to the Public or the Environment through the Routine Transport, Use, or Disposal of Hazardous Materials	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact HAZ-2: Create a Significant Hazard to the Public or the Environment through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials into the Environment	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact HAZ-3: Expose Sensitive Receptors at an Existing or Proposed School Located within 0.25 Mile of Project Facilities to Hazardous Materials, Substances, or Waste	NI	NI	NI	NI	NI	NI	NI	NI	LTS
Impact HAZ-4: Be Located on a Site That Is Included on a List of Hazardous Materials Sites Compiled Pursuant to Government Code Section 65962.5 and, as a Result, Create a Substantial Hazard to the Public or the Environment	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact HAZ-5: Result in a Safety Hazard Associated with an Airport or Private Airstrip	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact HAZ-6: Impair Implementation of or Physically Interfere with an Adopted Emergency Response Plan or Emergency Evacuation Plan	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact HAZ-7: Expose People or Structures, Either Directly or Indirectly, to a Substantial Risk of Loss, Injury, or Death Involving Wildland Fires	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

NI = no impact; LTS = less than significant.

ES.5.1.22 Chapter 26, Public Health

Table ES-24 provides a summary comparison of important impacts on public health by alternative. The table presents the CEQA finding after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. Important impacts to consider include increases in vector-borne diseases, substantial mobilization of or increases in chemical constituents known to bioaccumulate, and adverse effects on public health due to exposure of sensitive receptors to new sources of electromagnetic fields (EMF).

Table ES-24. Comparison of Impacts on Public Health by Alternative

	Alternative								
Chapter 26 – Public Health	1	2a	2b	2c	3	4a	4b	4c	5
Impact PH-1: Increase in Vector-Borne Diseases	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact PH-2: Exceedance(s) of Water Quality Criteria for Constituents of Concern Such That Drinking Water Quality May Be Affected	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact PH-4: Adversely Affect Public Health Due to Exposing Sensitive Receptors to New Sources of EMF	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact PH-5: Impact Public Health Due to an Increase in *Microcystis* Bloom Formation	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS

EMF = electromagnetic fields; LTS = less than significant.

ES.5.1.23 Chapter 27, Mineral Resources

Table ES-25 provides a summary comparison of important impacts on mineral resources by alternative. The table presents the CEQA finding after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. Mineral resources in the area are fuel and nonfuel mineral resources, specifically natural gas fields, natural gas wells, and aggregate resources (gravel and sand) or mines. Impacts to consider are the extent to which access to, or direct impact upon these resources, occurs.

The project would have no impact on natural gas fields because the project footprint over them is small. The overlying acreages are 61.4 acres for Alternatives 1, 2a, 2b, and 2c; and 33.5 acres for Alternatives 3, 4a, 4b, 4c, and 5 compared to the 33,650 acres and 29,800 acres, respectively, of underlying natural gas fields (Table 27-4). Thus, access to the natural gas fields from the surface would not be affected. None of the project alternatives would have an impact on active natural gas wells or aggregate mines because there are none within the project footprint. All project alternatives would use aggregate for intakes, maintenance shafts, railroad spurs, park and rides, and roads. For all alternatives, the required amount of aggregate is less than 1% of the estimated 50-year permitted demand in the Sacramento and Stockton-Lodi production areas. Additionally, the aggregate use would be spread over a 12- to 14-year period after project approval. Consequently, there would be no impact on aggregate availability.

Compensatory mitigation would be placed on Bouldin Island and three ponds along I-5. Some compensatory mitigation would involve permanent or periodic inundation, excavation to allow water entry, or grading to achieve appropriate elevations for habitat restoration. There are no active natural gas wells and two dry and plugged natural gas wells in the locations where compensatory mitigation is anticipated, so there would be no impact on active locally important natural gas wells from site inundation or construction. One of the compensatory mitigation sites would overlie portions of a natural gas field. The percentage of the total area of the individual natural gas field area affected is 1.1%. Based on the small percentage of natural gas field affected and the fact that these small areas are accessible from immediately adjacent areas via directional drilling, there would be no impact on the extraction potential from natural gas fields as a result of constructing or maintaining the proposed compensatory mitigation.

There are no aggregate mines or mineral resource zones (MRZs) within the compensatory mitigation areas. Consequently, there would be no impact on MRZs. Any aggregate requirements for water entry locations or similar sites would be minimal because they are small and require minor aggregate volume. Aggregate use for compensatory mitigation construction would be minor compared to the 50-year permitted demand in the Sacramento and Stockton-Lodi production areas. There would be no impact on aggregate availability.

Table ES-25. Comparison of Impacts on Mineral Resources by Alternative

	Alternative								
Chapter 27 – Mineral Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of the Project	NI	NI	NI	NI	NI	NI	NI	NI	NI
Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of the Project (percent of natural gas fields affected)	0.18/NI	0.18/NI	0.18/NI	0.18/NI	0.11/NI	0.11/NI	0.11/NI	0.11/NI	0.11/NI
Impact MIN-3: Loss of Availability of Locally Important Aggregate Resources (Mines and MRZs) as a Result of the Project	NI	NI	NI	NI	NI	NI	NI	NI	NI
Impact MIN-4: Loss of Availability of Locally Important Aggregate Resources as a Result of the Project (Imported aggregate as percent of 50-year demand)	1.55/NI	1.93/NI	1.18/NI	1.43/NI	1.42/NI	1.82/NI	1.04/NI	1.29/NI	1.38/NI

NI = no impact.

ES.5.1.24 Chapter 28, Paleontological Resources

Table ES-26 provides a summary comparison of important impacts on paleontological resources by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. This table provides information on the magnitude of the most pertinent impacts on paleontological resources that are expected to result from the alternatives. Important impacts to consider include the large amount of excavation that would occur in geologic units sensitive (i.e., have high or undetermined sensitivity) for paleontological resources. Impacts from surface excavation would be reduced to less than significant with Mitigation Measures PALEO-1a: *Prepare and Implement a Monitoring and Mitigation Plan for Paleontological Resources,* and PALEO-1b: *Educate Construction Personnel in Recognizing Fossil Material*. The impacts of tunneling and ground improvement, however, cannot be mitigated and would, therefore, cause a significant and unavoidable impact for all project alternatives. Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, 4c, and 5 vary in magnitude of excavation required, primarily for tunneling and ground improvement. Alternative 2b would require the least and Alternative 4a would require the greatest amount of excavation and ground improvement.

Table ES-26. Comparison of Impacts on Paleontological Resources by Alternative

	Alternative								
Chapter 28 – Paleontological Resources	1	2a	2b	2c	3	4a	4b	4c	5
Impact PALEO-1: Cause Destruction of a Unique Paleontological Resource as a Result of Surface Ground Disturbance	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact PALEO-2: Cause Destruction of a Unique Paleontological Resource as a Result of Tunnel Construction and Ground Improvement	SU	SU	SU	SU	SU	SU	SU	SU	SU

LTS = less than significant; SU = significant and unavoidable.

ES.5.1.25 Chapter 29, Environmental Justice

Where the resource chapters identify significant impacts before mitigation or significant and unavoidable impacts with or without mitigation, the potential effect on environmental justice is analyzed in Chapter 29, Section 29.4.2, *Analysis of Disproportionately High and Adverse Effects*. Mitigation measures or environmental commitments to reduce significant impacts identified in the resource chapters would not result in disproportionately adverse effects on environmental justice.

The following impacts were found to be significant and unavoidable and would have a disproportionately adverse effect on environmental justice.

- Impact AG-1: *Convert a Substantial Amount of Prime Farmland, Unique Farmland, Farmland of Local Importance, or Farmland of Statewide Importance as a Result of Construction of Water Conveyance Facilities*
- Impact AG-2: *Convert a Substantial Amount of Land Subject to Williamson Act Contract or under Contract in Farmland Security Zones to a Nonagricultural Use as a Result of Construction of Water Conveyance Facilities*
- Impact AES-1: *Substantially Degrade the Existing Visual Character or Quality of Public Views (from Publicly Accessible Vantage Points) of the Construction Sites and Visible Permanent Facilities and Their Surroundings in Nonurbanized Areas*
- Impact AES-2: *Substantially Damage Scenic Resources including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings Visible from a State Scenic Highway*
- Impact AES-3: *Have Substantial Significant Impacts on Scenic Vistas*
- Impact CUL-1: *Impacts on Built-Environment Historical Resources from Construction and Operation of the Project*
- Impact CUL-2: *Impacts on Unidentified and Unevaluated Built-Environment Historical Resources Resulting from Construction and Operation of the Project*
- Impact CUL-3: *Impacts on Identified Archaeological Resources Resulting from the Project*
- Impact CUL-4: *Impacts on Unidentified Archaeological Resources That May Be Encountered in the Course of the Project*
- Impact CUL-5: *Impacts on Buried Human Remains*
- Impact AQ-5: *Result in Exposure of Sensitive Receptors to Substantial Localized Criteria Pollutant Emissions*
- Impact AQ-6: *Result in Exposure of Sensitive Receptors to Substantial Toxic Air Contaminant Emissions*
- Impact NOI-1: *Generate a Substantial Temporary or Permanent Increase in Ambient Noise Levels in the Vicinity of the Project in Excess of Standards Established in the Local General Plan or Noise Ordinance, or Applicable Standards of Other Agencies*

This chapter does not include an impact summary table.

ES.5.1.26 Chapter 30, Climate Change

The project is designed to operate within future hydrological conditions resulting from climate change, thereby accounting for those effects of climate change on project alternatives. The project design considers changing water surface elevations—water surface elevations where the project would increase in comparison to the No Project Alternative. However, under analysis of the project alternatives at 2040 and 2072, DWR determined that changing water elevations do not affect project operations (see Appendix 7A, *Flood Protection 2040/2072 Analysis*, for further detail). Although a variety of changes in climate described above, including changes in temperature, hydrology, and wildfire risk, may affect the Delta region, the future climate modeling developed for this assessment focuses on projected sea level rise and hydrologic changes (e.g., temperature and precipitation-driven shifts in surface water, groundwater, runoff) because they present the most pressing threats to project operations and design (See Appendix 5A, Section B, *Hydrology and Systems Operations Modeling*, for further detail).

The proposed intake areas will experience sea level rise and be designed to operate at water surface elevations that include climate change and sea level rise effects at year 2100 (California Department of Water Resources 2020b:3). However, intakes in the north Delta were found to *not* be vulnerable to future salinity intrusion conditions evaluated under the H++ scenario at year 2100 (10.2 feet or 3.11 meters) (Appendix 5A, *Modeling Technical Appendix,* Section F, *Sea Level Rise and Delta Water Quality Modeling*); the mixing processes between saltwater and fresh water that may be exacerbated under sea level rise do not appear to progress far above the confluence of Sacramento River, Cache Slough, and Steamboat Slough 14 to 16 miles downstream from the proposed new intake locations. Changing flooding trends, increasing water temperature, and seasonally reduced precipitation and drought (unrelated to the effects of the project alternatives) could result in decreased species populations and quality of species habitat in the study area. In response to decreased species populations and habitat, additional restoration actions could be implemented to support populations of native species populations. Appendix 5A and Appendix 6A, *Water Supply 2040 Analysis*, provide the detailed results from the climate change sensitivity analysis.

The project alternatives potentially would have negative impacts on critical fish habitat and special-status species. These include construction- and operation–related effects. Construction-related impacts include noise from pile driving and temporary and permanent loss of habitat from the aquatic portions of the construction footprint, for example. Operational impacts include factors such as less Sacramento River flow downstream of the proposed north Delta intakes, resulting in changed north Delta hydrodynamics that may reduce through-Delta survival of juvenile Chinook salmon (Oncorhynchus tshawytscha) due to flow-survival relationships that may reduce salmon rearing habitat because of a potential decrease in the inundation of riparian and wetland bench habitat, depending on the alternative, season, and location (further described in Chapter 12). As noted in Chapter 30, Section 30.2, *Affected Environment and Resources*, and Chapter 12, climate change also presents challenges to fish, fish habitat, and food availability, resulting in the potential for the project impacts on species to compound with those driven by climate change. Because riverine habitat is anticipated to continue to be stressed and vulnerable under climate change (California Natural Resources Agency et al. 2020:12), operations that affect flows to tidal and channel habitat could have both exacerbating and mitigating effects, given changes to flow and wetted areas from climate change, depending on timing and volume of those flows. However, the impact of operations and maintenance of the project alternatives would be less than significant with the restoration of tidal and channel habitat. Compensatory mitigation considers impacts of sea level rise on species' habitat (Appendix 3F). Appendix 12C, *Fish and Aquatic Resources 2040 Analysis*, compares the No

Project Alternative under the 2040 scenario to the project alternatives at 2040 using modeling tools and methods appropriate for the evaluation of impacts on fish and aquatic resources. In Appendix 12C, modeling for the No Project Alternative at 2040 and project alternatives at 2040 incorporates assumptions regarding changes to hydrology and sea level rise as a result of climate change and shows that the relative difference between the project alternatives and No Project Alternative at 2040 is generally similar to the difference between the project alternatives and existing conditions at 2020 discussed in Chapter 12.

As described in Chapter 7 and Appendix 7A, the project would involve no change in flood management operations in the SWP/CVP system, based on the 2-D steady-state Sacramento River system Hydrologic Engineering Center River Analysis System (HEC-RAS) analysis, which incorporates climate change (as described above); reservoirs upstream of the Delta would continue to operate to their permitted flood rule curves, and river flows would not change significantly with respect to channel capacity. Permanent project features would be designed to accommodate the 200-year flood event with climate change induced hydrology and sea level rise for year 2100 (i.e., 10.2 feet at the San Francisco Bay gage). The impact of the project on water surface elevation upstream or downstream of north Delta intakes under 2072 conditions would be similar to 2022 conditions, and the project would not affect the level of flood protection afforded by the federal levees near the intakes in the study area. Therefore, project alternatives would not result in an increase in flood risk (i.e., levee overtopping) or reduce flexibility for flood management in the Delta when compared to existing conditions.

In order to represent the broad range of potential future climate and sea level rise conditions, Alternative 5 and No Project Alternative were analyzed under three different representations of climate change and sea level rise projections at 2040 (the 2026–2055 climate period). The first is the 2040 Central Tendency (CT) climate scenario with 1.8 feet of sea level rise, which is the same scenario analyzed in the 2040 appendices to the Final EIR, for example, Appendix 5B, *Surface Water 2040 Analysis*. Two additional 2040 climate change and sea level rise scenarios were also used for comparison. These are a 2040 CT climate scenario with 0.5 foot of sea level rise and a 2040 Median climate scenario with 1.8 feet of sea level rise.

Analysis of these three 2040 scenarios for the No Project Alternative showed at least some climate sensitivity of SWP and CVP reservoir storages, river flows, Delta exports, salinity, and X2 position. Storage is generally higher in the 2040 CT with 0.5-foot sea level rise scenario and lower in the 2040 Median with 1.8-foot sea level rise scenario compared to the 2040 CT with 1.8-foot sea level rise scenario. River flows and Delta outflow also varied between the two 2040 CT scenarios and the 2040 Median scenario, with flows often lower in the 2040 Median scenario, except in May to July on the American River where flows are higher. These flows were not affected by sea level rise. Compared to the 2040 CT with 1.8-foot sea level rise scenario, exports are higher in the 2040 CT with 0.5-foot sea level rise scenario and lower in the 2040 Median with 1.8-foot sea level rise scenario. X2 position during winter and spring and salinity during summer and fall also vary according to the climate scenario, with the 2040 Median with 1.8-foot sea level rise scenario having the most eastward X2 positions and highest salinities, and the 2040 CT with 0.5-foot sea level rise scenario having the most westward X2 positions and lowest salinities.

Climate change sensitivity was generally similar in Alternative 5 as in the No Project Alternative for the factors described above. Differences between Alternative 5 and the No Project Alternative were also generally similar in the three climate scenarios. Compared to the No Project Alternative, in all three climate scenarios, Alternative 5 has (1) either equivalent or slightly increased reservoir

storages in drier conditions, especially in September, (2) equivalent flows, (3) an approximately 1 kilometer eastward shift of X2 from December through March, and (4) slightly higher salinities during the September through January period. Exports increase similarly under Alternative 5 in all three climate scenarios, but NDD annual exports are slightly higher in the 2040 CT with 0.5-foot sea level rise scenario (mostly in the wettest years) and are lower in the 2040 Median with 1.8-foot sea level rise scenario, compared to the 2040 CT with 1.8-foot sea level rise scenario.

Generally, these sensitivities to climate change are consistent with prior review of climate projections for related variables, and the project is designed to account for the range of results. More information about the sensitivity analysis for Alternative 5 can be found in Appendix 30A, *CalSim 3 Results Sensitivity to 2040 Climate Change and Sea Level Projections.*

Resilience and Adaptation Benefits

Under Assembly Bill 2800, state agencies must take climate change into account in planning, design, construction, operation, and maintenance (Pub. Resources Code § 71155). The project is being built with consideration of climate change by designing to modeled conditions and thus is expected to have a low level of risk for direct climate change effects such as sea level rise. For example, the project design analysis considers the extreme risk aversion sea level rise scenario of 10.2 feet at 2100 to prevent seawater intrusion at the intakes. However, compounding effects of climate change, including increasing stress on supply to meet demand under warmer temperatures, or increasing need for water releases to maintain water quality requirements, may affect the long-term reliability of Delta exports (Delta Stewardship Council 2021:5-55–5-58). For information on climate models and scenarios used, see Chapter 30, Section 30.2.4, *Application of California Climate Projections to Alternatives Analysis,* and Appendix 5A.

This project supports statewide adaptation needs articulated in the *California Water Resiliency Portfolio* (California Natural Resources Agency et al. 2020) to diversify local supplies and prepare for hotter conditions and more intense floods and droughts by increasing the average annual SWP deliveries for the long-term average, dry, and critical water years (Chapter 6).

The project may make California's water system more resilient to changes in snowmelt and runoff patterns by helping to capture and move excess flows from locations in the state where runoff is projected to increase (e.g., some locations in the Sacramento and San Joaquin Valleys) to locations that may otherwise face reduced water availability and reduced carryover storage to supply water during dry months (California Department of Water Resources 2018:17–19; Appendix 5A). DWR considers capture and conveyance in the Delta as important potential adaptations to mitigate these system losses in its *Climate Action Plan Phase III: Climate Change Adaptation Plan* (California Department of Water Resources 2020c:29).

Project alternatives would increase resiliency in managing combined effects of sea level rise and changes in upstream hydrology, including changes to runoff patterns from earlier snowmelt and precipitation (Chapter 30, Section 30.2.3, *Climate Change Trends and Associated Impacts on the Study Area*). The alternatives provide an alternative diversion point in the north Delta for Delta exports, augmenting the ability to capture excess flows and improve operational flexibility to enable increased SWP deliveries during long-term average, dry, and critically dry water years (Chapter 6). This increased flexibility would allow managers in the SWP/CVP system more options for adaptively managing resources to optimize benefits across water uses and provide more reliable water supplies that would benefit areas receiving deliveries (Chapter 6).

Furthermore, the project alternatives are expected to provide the future benefit of allowing continued water deliveries and operational flexibility, should catastrophic failure from seismic activity or other disasters temporarily disrupt routing or quality of surface water supplies (Chapter 3).

This chapter does not include an impact summary table.

ES.5.1.27 Chapter 31, Growth Inducement

The project would increase the potential SWP annual delivery of water south of the Delta under all alternatives when compared to existing conditions, the total volume of additional water would not significantly induce population growth. Rather, increased water supply is likely to be used to provide improved supply reliability and restore amounts that agencies have previously received that have been reduced due to regulatory requirements. Further, increased delivery may simply restore average contract deliveries that have been affected because of regulatory rules and operational agreements or could be used to supplement or reduce groundwater use under the Sustainable Groundwater Management Act. Finally, there is not a strong discernable link between water deliveries and rate of population growth, and there are several factors outside of water delivery, such as housing and employment, that influence and drive population growth.

This chapter does not include an impact summary table.

ES.5.1.28 Chapter 32, Tribal Cultural Resources

Table ES-27 provides a summary comparison of impacts on Tribal cultural resources by alternative. Due to the sensitive and confidential nature of Tribal cultural resources, Chapter 32 discusses and compares the alternatives and their impacts in a qualitative sense and in most cases without specifying the precise nature of affected character-defining features' physical, ceremonial, or spiritual importance to affiliated California Native American Tribes (Tribes).

DWR's understanding of the types of physical features that define Tribal cultural resources (i.e., the character-defining features of a Tribal culture resource), how the project alternatives may affect character-defining features, and the cultural values they embody is informed by DWR's consultation with Tribes who are traditionally and culturally affiliated with the study area and chose to consult with DWR about the project. A list of the "consulting Tribes" is provided in Chapter 32, Section 32.1.2.1, *Consultation and Engagement with Tribes*. DWR acknowledges that a Tribe's participation in consultation does not imply the Tribe's approval or acceptance of the project. DWR recognizes, and has heard during consultation, that the Delta holds great significance to Tribes and that Tribes oppose the Delta Conveyance Project due to the potential unmitigable impacts on the Tribal cultural landscape and the many resources that make this place foundational to Tribes.

The construction and operation of the water conveyance facilities associated with the project alternatives has the potential to cause a substantial adverse change to the significance of one known Tribal cultural resource resulting from the material impairment of character-defining features of the Sacramento–San Joaquin Delta Tribal Cultural Landscape (Delta TCL). In addition, consulting Tribes may continue to provide DWR with a greater depth of understanding regarding the cultural significance of the Delta TCL character-defining features, or identify other sites, features, places, cultural landscapes, sacred places, and objects with cultural value to consulting Tribes that are not character-defining features of the Delta TCL. Therefore, the project also has the potential to result in impacts on individual Tribal cultural resources.

During Tribal consultation, Tribes repeatedly provided input on the relationship between natural and human-made features that, when taken together, constitute a geographically defined cultural landscape, and despite significant changes to the landscape from Euroamerican development, the landscape continues to retain culturally valuable physical, spiritual, and ceremonial features. According to CEQA, a cultural landscape that meets the appropriate criteria for a Tribal cultural resource "is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape" (Public [Pub.] Resources Code § 21074(b)). DWR concluded that a geographically defined cultural landscape, which meets the Public Resources Code criteria for a Tribal cultural resource, exists (the Delta TCL). The Delta TCL is a large, complex, multi-component Tribal cultural resource that comprises diverse natural and human-made character-defining features.

Recognizing the Delta TCL as a cultural landscape respects the consulting Tribes' willingness to discuss Tribal history, ceremony, and sacred Tribal affiliations with the Delta that are typically only discussed within a Tribe, and their willingness to discuss sensitive Tribal perspectives about being displaced from ancestral lands and the loss of Tribal lands to non-Tribal people. The impact analysis presented in this chapter evaluates whether the project may materially impair character-defining features of the Delta TCL. The character-defining features may be located in discrete known locations or throughout all or parts of the study area, which is defined in Chapter 32, Section 32.1.1, *Study Area*.

The nature of how the project and each project alternative would materially impair character-defining features varies, as follows:

- *The Delta as a Tribal homeland and place of origin.* The scale of the project has the potential to materially impair the Delta as a Tribal homeland and place of origin character-defining feature.
- *The rivers and waterways within the Delta that are sacred*. The project would cause physical changes from the construction of new intake facilities and changes in hydrodynamics within the Delta TCL south of the intakes that have the potential to materially impair the river and waterways character-defining feature.
- *Terrestrial species habitats that are part of the Delta's ecosystem and Tribal heritage.* The effects of the project alternatives on terrestrial species and habitats (some of which are character-defining features of the Delta TCL) and the mitigation proposed for reducing such impacts to a less-than-significant level are addressed in Chapter 13. Even with consideration of the mitigation proposed in Chapter 13, the project alternatives have the potential to materially impair an affiliated Tribe's ability to physically, spiritually, or ceremonially experience these character-defining terrestrial species habitats.
- *Fish and aquatic species habitats that are part of the Delta's ecosystem and Tribal heritage.* The effects of the project alternatives on fish and aquatic species and habitats (some of which are character-defining features of the Delta TCL) and the mitigation proposed for reducing such impacts to a less-than-significant level are addressed in Chapter 12. The nominal effects of the project alternatives on character-defining fish and aquatic species habitats identified in Chapter 12 would be less than significant from a biological resources perspective, and the project would not materially impair an affiliated Tribe's ability to physically, spiritually, or ceremonially experience these character-defining features of the Delta TCL.
- *Ethnohistorical locations that are sacred places and historically important.* The project would cause physical impacts from the construction of conveyance facilities that may alter locations of

villages, ceremonies, paths and trails, or trade and subsistence activities that are character-defining features of the Delta TCL or introduce incongruent features that materially impair the physical, spiritual, or ceremonial qualities of these character defining features.

- *Archaeological sites that are sacred or important historical places.* The effects of the project alternatives on archaeological resources, some of which are character-defining features of the Delta TCL, are addressed in Chapter 19. The physical impacts on archaeological resources that are character-defining features of the Delta TCL may materially impair the physical, spiritual, or ceremonial aspects of these character-defining features.
- *Views and vistas of and from the Delta that are sacred and important to Tribal heritage.* The project may materially impair views and vistas that are character-defining features of the Delta TCL through the construction of conveyance facilities that are incongruent with the views and vistas and sense of place inherent to these character-defining features.

While no single project component, on its own, results in a significant impact on the Delta TCL, the project as a whole would materially impair character-defining features and result in a substantial adverse change to the significance of the Delta TCL. Some effects would be minimized as a result of mitigation measures proposed to address significant impacts identified in other chapters of this Final EIR. However, the mitigation measures included in other chapters are not focused on the Tribal or cultural significance of these resources, so the qualities that make these features character-defining features of the Delta TCL may not be mitigated to a less-than-significant level. Therefore, the project would result in a significant impact on the Delta TCL.

The precise nature of the impact on individual Tribal cultural resources is not currently known because DWR has not identified any individual Tribal cultural resources at this time; therefore, the features that may make an individual resource eligible for CRHR listing, its significance, attributes and location, and integrity have not been established. In general, DWR anticipates that if an individual resource is identified, the project has the potential to materially impair an affiliated Tribes' ability to physically, ceremonially, or spiritually experience the resource.

Mitigation measures have been identified to avoid and minimize impacts on Tribal cultural resources and to incorporate Tribal knowledge, including Tribal Ecological Knowledge, into the preparation and implementation of the CMP (Appendix 3F) and other measures for mitigating impacts on terrestrial biological resources, fish and aquatic resources, and cultural resources. Where avoidance or protection in place is not feasible, there is additional mitigation by way of resource-specific treatment in consultation with affiliated Tribes. Even with these measures, the project has the potential to materially impair affiliated Tribes' physical, spiritual, and ceremonial experience of character-defining features of the Delta TCL and therefore result in a significant and unavoidable impact on a Tribal cultural resource.

Table ES-27. Comparison of Impacts on Tribal Cultural Resources by Alternative

Chapter 32 – Tribal Cultural Resources	Alternative								
	1	2a	2b	2c	3	4a	4b	4c	5
Impact TCR-1: Impacts on the Delta Tribal Cultural Landscape Tribal Cultural Resource Resulting from Construction, Operations, and Maintenance of the Project Alternatives	SU	SU	SU	SU	SU	SU	SU	SU	SU
Impact TCR-2: Impacts on Individual Tribal Cultural Resources Resulting from Construction, Operations, and Maintenance of the Project Alternatives	SU	SU	SU	SU	SU	SU	SU	SU	SU

SU = significant and unavoidable.