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SUPERIOR COURT OF THE STATE OF CALIFORNIA
COUNTY OF SACRAMENTO

SAN FRANCISCO BAYKEEPER, SHINGLE SPRINGS BAND OF MIWOK INDIANS, CALIFORNIA INDIAN ENVIRONMENTAL ALLIANCE, RESTORE THE DELTA, GOLDEN STATE SALMON ASSOCIATION, and THE BAY INSTITUTE,

Petitioners,

vs.

CALIFORNIA DEPARTMENT OF WATER RESOURCES,

Respondent.

Case No.: 24WM000017

REQUEST FOR JUDICIAL NOTICE IN SUPPORT OF PETITIONERS' MOTION FOR PRELIMINARY INJUNCTIVE RELIEF

Date: 5/31/2024
Time: 2:30 p.m.
Judge: Hon. Stephen P. Acquisto
Dept: 36

Pursuant to California Evidence Code § 452, Petitioners in the above entitled action request that the Court take judicial notice of the exhibits identified below in support of Petitioners' Motion for Preliminary Injunctive Relief.

Judicial notice may be taken of a public entity's regulations, legislative enactments, resolutions, reports, and other official acts. (*Trinity Park L.P. v. City of Sunnyvale* (2011) 193 Cal.App.4th 1014, 1017, *citing* Evidence Code §§ 452(b), (c); *Smiley v. Citibank* (1995) 11 Cal.4th 138, 145, fn. 2. Here, the following two documents, each of which is attached hereto, are "official acts" within the context of Evidence Code section 452.

Exhibit A: California Department of Water Resources, Final Environmental Impact Report for the Delta Conveyance Project (December 8, 2023), an official act of the California Department of Water Resources for which judicial notice is proper pursuant to Evidence Code § 452(c). Due to the length of this document, Petitioners are seeking judicial notice only of the Executive Summary and third chapter of the Final Environmental Impact Report.

Exhibit B: California Department of Water Resources, Notice of Determination for the Delta Conveyance Project (December 21, 20243), an official act of the California Department of Water Resources for which judicial notice is proper pursuant to Evidence Code § 452(c).

Respectfully submitted,

Dated: May 3, 2024

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EXHIBIT A

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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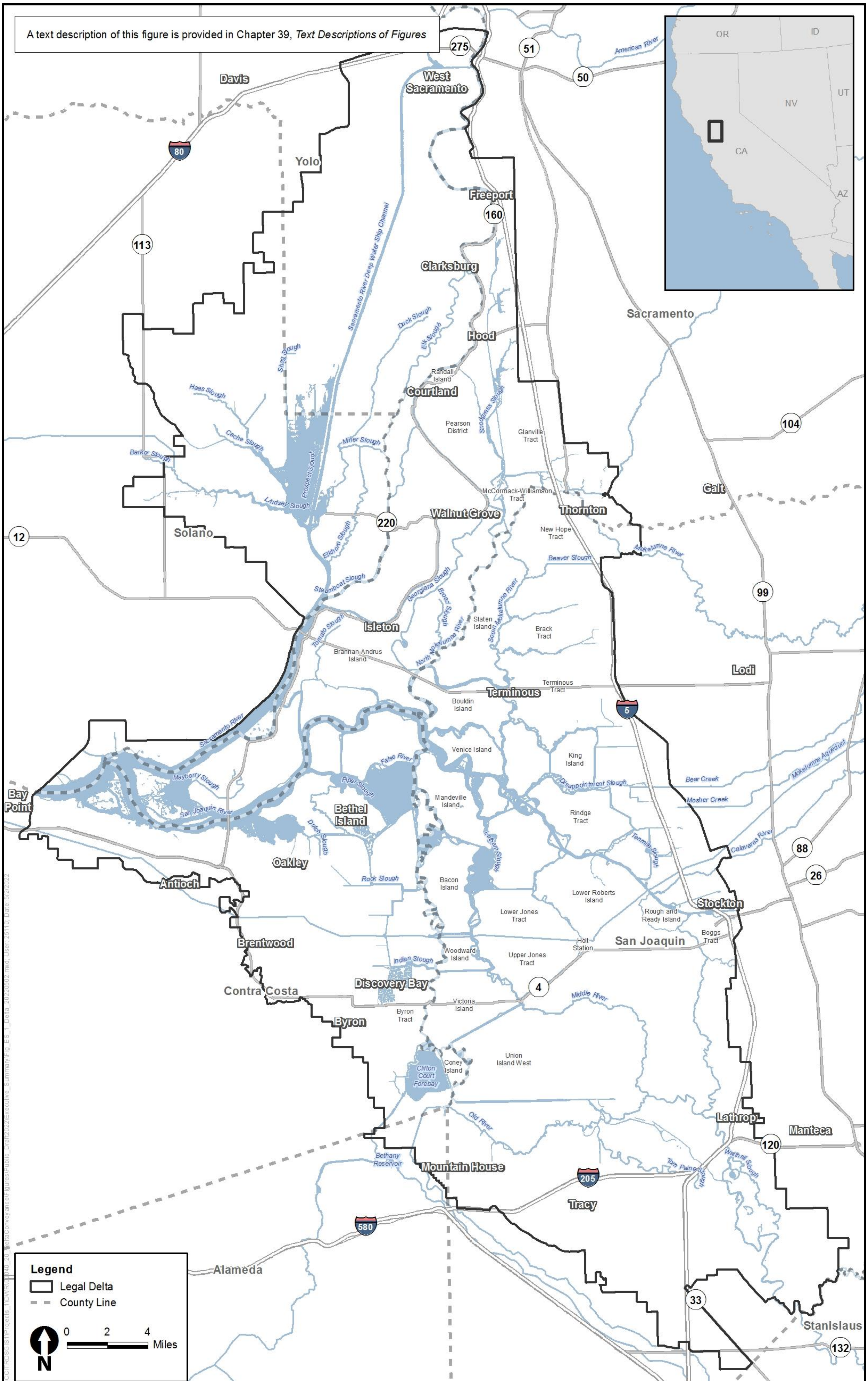

1

2 **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.

1 **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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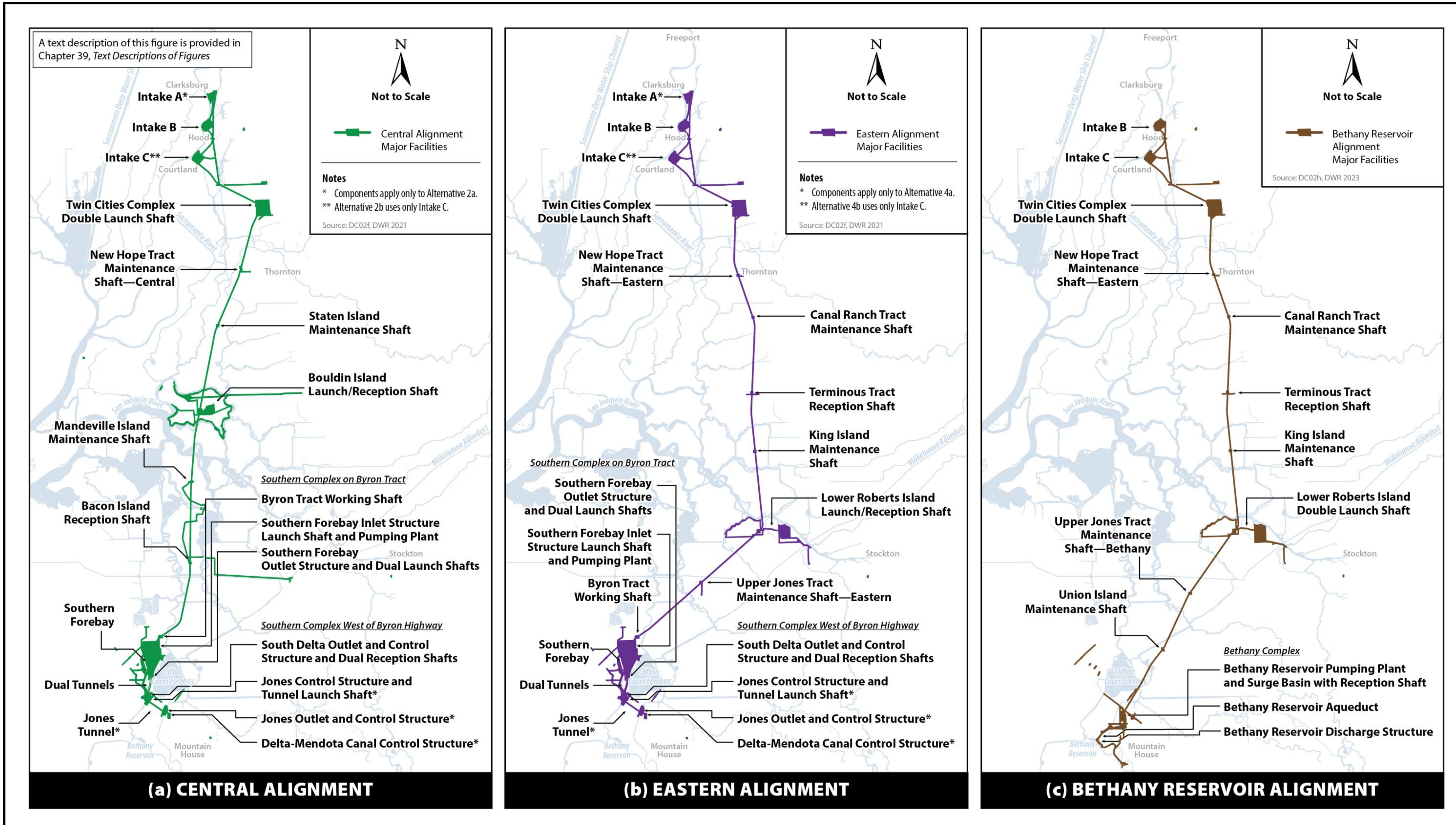

Figure ES-2. Delta Conveyance Alternative Alignments and Major Facilities

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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

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[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

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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.

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

	Project Alternative								
Chapter 7 – Flood Protection	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

	Project Alternative								
Chapter 7 – Flood Protection	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)	0.00018L TS	0.00032L TS	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

	Alternatives								
Chapter 9 – Water Quality	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.

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

	Alternative								
Chapter 10 – Geology and Seismicity	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

2 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.

1 **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

Chapter 11 – Soils	Alternative								
	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

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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1 **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%

	Alternative								
Chapter 12 – Fish and Aquatic Resources	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.

1 **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

Chapter 13 – Terrestrial Biological Resources	Alternative 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.

1 **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

2 [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
3 the Compensatory Mitigation Plan.

4 [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.

1 **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

2 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.

1 **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

2 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).

1 **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

2 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.

1 **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

2 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

Chapter 28 – Paleontological Resources	Alternative								
	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.

Chapter 3
Description of the Proposed Project and Alternatives

3.1 Introduction

As described in Chapter 1, *Introduction*, the California Department of Water Resources (DWR), at the direction of Governor Gavin Newsom in Executive Order N-10-19, has inventoried and assessed approaches to modernize water conveyance through the Sacramento–San Joaquin Delta (Delta) and proposed a new, single-tunnel project. DWR has developed the basic project purpose and objectives described in Chapter 2, *Purpose and Project Objectives*, consistent with the Governor's Executive Order.

The alternatives in this *Delta Conveyance Project Final Environmental Impact Report* (EIR), including the proposed project, meet the requirements of the California Environmental Quality Act (CEQA). This CEQA analysis is also intended to support compliance with other state and federal permit requirements where discussion of alternatives is relevant. As described in more detail in Section 3.2, *Alternatives Development Process*, and in Appendix 3A, *Identification of Water Conveyance Alternatives*, DWR considered all suggestions made during the scoping process as well as other information on the record to evaluate and screen potential alternatives to be analyzed in detail in this Final EIR.

For the Delta Conveyance Project (project), DWR is preparing a standalone EIR that will not be prepared jointly with a federal agency's National Environmental Policy Act (NEPA) compliance document. As explained in Chapter 1, a separate Environmental Impact Statement (EIS) will be prepared to meet the requirements of NEPA, with the U.S. Army Corps of Engineers (USACE) as the lead agency. Because of this, care has been taken in this Final EIR to describe alternatives at a level of detail normally required for an EIS to ensure as much consistency as possible for these two documents. The Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] § 1502.14) require all reasonable alternatives to be objectively evaluated in an EIS, so that each alternative is evaluated at an equal level of detail (40 CFR § 1502.14(b)).

The proposed project and alternatives evaluated in this Final EIR involve the construction and operation of new conveyance facilities for the movement of water entering the Delta from the Sacramento Valley watershed to the existing State Water Project (SWP) and, potentially, to Central Valley Project (CVP) facilities in the south Delta, which would result in a dual-conveyance system in the Delta. This Final EIR also analyzes related amendments to the long-term water supply contracts that may be needed.

CEQA Guidelines also direct that "the specific alternative of 'no project' shall also be evaluated along with its impact" (14 Cal. Code Regs. § 15126.6 [e][1]). The No Project Alternative analysis is required to discuss existing conditions at the time the Notice of Preparation (NOP) is published, as well as "what would be reasonably 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" (14 Cal. Code Regs. § 15126.6 [e][2]). In this chapter, Section 3.5, *No Project Alternative*, describes the types of actions that Delta Conveyance Project participants other than DWR might undertake to address local supply issues under a long-term scenario in which the Delta Conveyance

Project is not approved or implemented. Because the effects of climate change and sea level rise are reasonably foreseeable, they are included in the No Project Alternative. Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*, further details assumptions for the No Project Alternative.

This Final EIR provides the project-level analyses to disclose impacts required for approval of any of the alternatives and provides information to facilitate the proposed project permit decisions. This chapter describes the No Project Alternative and nine project alternatives (Table 3-2) that are evaluated in detail in this Final EIR. The project alternatives have been developed to best meet the project's basic purpose and objectives described in Chapter 2 and are the outcome of an extensive screening process summarized in Section 3.2. *Alternatives Development Process*, and Section 3.2.1, *Alternatives Screening Analysis*, and detailed in Appendix 3A, *Identification of Water Conveyance Alternatives*. Appendix 3A includes consideration of potential alternatives to the Delta Conveyance Project (project), alternatives identified during the public scoping process, and alternatives previously considered for the California WaterFix environmental review process.

Section 3.3, *Proposed Project and Alternatives Overview*, provides an overview of the proposed alignment and operational alternatives, and Section 3.4, *Common Features of the Alternatives*, describes the key facilities common to most of the alternatives and alignments. Sections 3.2, 3.3, and 3.4 of this chapter discuss conveyance facilities. Section 3.5, *No Project Alternative*, describes the No Project Alternative. Sections 3.6 through 3.14 describe the characteristics that differentiate the nine project alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, 4c, and 5). A discussion of maintenance is integrated into the sections describing major common features as relevant, and is not presented separately. Section 3.15, *Field Investigations*, describes past and future efforts to identify geotechnical, hydrogeologic, agronomic, and other field conditions that will guide appropriate construction methods and monitoring programs for final engineering design and construction. Additional actions not analyzed in this EIR associated with field investigations would comply with the necessary state environmental review requirements and may require additional CEQA review.

Section 3.16, *Intake Operations and Maintenance*, describes the conveyance facility operational criteria and assumptions. This Final EIR also considers the operation and maintenance of the SWP in relation to implementation of the project alternatives. Maintenance of these facilities is described and analyzed in cases where new types of maintenance would be required for new facilities. For the 7,500-cubic-feet-per-second (cfs) Alternatives 2a and 4a that would involve the CVP, those operations and any maintenance of those facilities are also analyzed.

Section 3.17, *Real-Time Operational Decision-Making Process*, describes the real-time operations decision-making process under current operations and how it would operate with the project alternatives. Section 3.18, *Adaptive Management and Monitoring Program*, briefly describes adaptive management and monitoring that would occur under the project.

The Community Benefits Program, proposed as part of the project, is introduced in Section 3.19 and described more fully in Appendix 3G, *Community Benefits Program Framework*. The Community Benefits Program could provide funding for actions that are described in broad general categories that could be funded but no action has yet been identified. Accordingly, the analysis of the potential impacts of those actions is at a commensurate general level and is provided in Chapter 34, *Community Benefits Program Analysis*, of this Final EIR. Because significance determinations regarding specific Community Benefits Program actions would be speculative, none are provided. As projects are funded, they will undergo project-level CEQA review, as appropriate, and any other required regulatory processes before they would be implemented.

Section 3.20, *Ombudsman,* describes how DWR will create a Delta Conveyance Project community support position, referred to as a project ombudsman, to increase effective communication and provide a single point of contact for members of the public and other interested parties during construction of the proposed project. Section 3.21, *Potential Davis-Dolwig Act Actions*, describes how DWR will comply with this act requiring that "preservation of fish and wildlife be provided for in connection with the construction of state water projects." Section 3.22, *Contract Amendments*, discusses contractual arrangements between DWR and the public water agencies (PWAs) that receive and distribute water from the SWP.

The Compensatory Mitigation Plan (CMP) would compensate for the loss of natural communities, habitats for terrestrial and aquatic species, and aquatic resources by enhancing and creating channel margins and tidal wetland habitat for aquatic resources and special-status species on lands owned by DWR (Interstate [I-] 5 Ponds 6, 7, and 8) or partners (Bouldin Island). Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*, describes the CMP in detail. Strategies in the CMP also include obtaining mitigation bank credits or establishing site protection instruments (such as a conservation easement) for mitigation sites, and controlling invasive species through long-term and site-specific management and maintenance plans along with monitoring and adaptive management. The CMP is mitigation for impacts identified in the Final EIR and not part of the project description, but is mentioned here because it is referenced in multiple chapters. Chapter 4, Section 4.1.1.5, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* provides a high-level summary of the approach to evaluating compensatory mitigation in resource chapters. Each resource chapter considers the potential impacts of implementing the CMP along with the impacts of other mitigation measures.

3.2 Alternatives Development Process

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. The CEQA analysis must also include an analysis of the No Project Alternative.

CEQA requires that the lead agency consider alternatives that would avoid or substantially lessen any of the significant impacts of the proposed project. Section 15126.6(a) of the CEQA Guidelines provides that:

> [a]n EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. An EIR is not required to consider alternatives which are infeasible. The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason. (CEQA Guidelines § 15126.6[a])

Under these principles, the 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 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)). DWR, as lead agency, will be the CEQA decision maker in determining the final form of a project if one is approved.

DWR began the alternatives development process by revisiting the scoping comments received on the Bay Delta Conservation Plan (BDCP) and California WaterFix, described in Chapter 1 of this Final EIR. During the 2009 BDCP EIR/EIS scoping process, 1,051 comments were received related to the development of alternatives. After publishing the Draft BDCP EIR/EIS, based on the Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP) approach in December 2013, and after reviewing critical public and fish and wildlife agency comments on that document, the lead agencies decided to consider additional alternatives. They substantially modified three of the HCP/NCCP alternatives, including the proposed BDCP (Alternative 4 in the Draft BDCP EIR/EIS) and introduced a new proposed action called the California WaterFix (Alternative 4A) in the Partially Recirculated Draft EIR/Supplemental Draft EIS (RDEIR/SDEIS) in July 2015.

While the BDCP and then California WaterFix had different project objectives, some of these alternative comments or suggestions were applicable to the Delta Conveyance Project. The 2020 Delta Conveyance Project NOP described a new proposed single-tunnel project and solicited additional suggestions about potential alternatives during the public scoping period. This involved input from a large group of interested parties, an extensive evaluation of various options, and analysis of the environmental impacts that goes beyond the normal scope of a CEQA review. These processes were helpful in informing the public and gathering input on a project that would affect a very complex estuary and a statewide water supply system.

Following the 2020 NOP and consideration of scoping comments, DWR screened a range of alternatives and began evaluating potential impacts from constructing, operating, and maintaining conveyance facility alternatives. Simultaneously, the engineering team continued to refine facility designs, construction approaches, and project operations to optimize the conveyance facility approach and evaluate options to further reduce environmental effects.

The alternatives screening process and results are presented in Appendix 3A, *Identification of Water Conveyance Alternatives.* The screening process involved considering a wide range of alternatives that were initially thought to meet project objectives and potentially reduce environmental effects. The alternatives that passed through two screening levels were included for further review in the Final EIR. These alternatives consisted of variations on the conveyance facility alignments, conveyance capacities, and arrangement of new north Delta intakes. Initially, two conveyance facility alignments, central and eastern, with varying diversion capacities were considered for further evaluation in this Final EIR. After early environmental results were considered and additional engineering studies and consideration of interested party and agency comments were completed, DWR decided to also evaluate the Bethany Reservoir alignment in this Final EIR.

The project alternatives evaluated in this Final EIR represent three water supply conveyance alignments combined with the proposed construction of new north Delta diversion and conveyance facilities capable of conveying a range of up to 3,000 cfs to 7,500 cfs in total. This range of alternatives was based on developing a design that could meet project objectives with a smaller maximum conveyance capacity than the 9,000 cfs proposed under BDCP/California WaterFix and incorporated scoping suggestions for a 3,000-cfs alternative with a range of intermediate options.

Section 3.2.1 describes, in a general way, the screening process and criteria used to develop the final range of alternatives to be considered for the conveyance facilities. This process is described in detail in Appendix 3A. A detailed description of the process and steps used in identifying and refining proposed locations and design of all proposed project facilities is described in two engineering project reports—one for the central and eastern alignments, and one for the Bethany Reservoir alignment (C-E EPR and Bethany EPR) (Delta Conveyance Design and Construction Authority 2022a, 2022b).

3.2.1 Alternatives Screening Analysis

The screening process for the Delta Conveyance Project EIR focused on identifying alternatives to the proposed project as defined in the NOP; it was not a *project objective development* exercise similar to previous efforts but considered the alternatives previously developed for BDCP and California WaterFix and additional alternatives. Therefore, the screening started with the purpose and objectives of the proposed project stated in the NOP and the alternatives were screened with these specific objectives in mind. The proposed project identified in the NOP and developed to specifically meet the stated project objectives, Dual Conveyance Central Tunnel Alignment or Dual Conveyance Eastern Tunnel Alignment, operating at 6,000 cfs, was the basis against which alternatives were screened. The screening criteria were developed based specifically on the proposed project and consistent with the legal requirements of CEQA and the project objectives included in the NOP published on January 15, 2020.

3.2.1.1 Alternatives Considered

Previous alternatives that were evaluated in the *Bay Delta Conservation Plan/California WaterFix EIR/EIS* and suggested during previous public scoping meetings, and that DWR determined may be capable of meeting most of the basic project objectives or could be modified to do so, were included in the alternatives screening process. Additional alternatives identified during the Delta Conveyance Project public scoping process were also screened.

The alternatives were grouped into four categories of dual conveyance, isolated conveyance, through-Delta conveyance with proposed diversion facility, and through-Delta conveyance with no new diversion facilities. A fifth "other" category encompassed alternatives proposing other technologies, including capping the California Aqueduct, use of an aboveground "tube" to convey water, and desalination on barges in Monterey Bay. A total of 21 alternatives were generated at this stage. In some cases, multiple similar proposals were combined and evaluated as one. Each of the screened alternatives is described in Appendix 3A.

The 21 potential alternatives to the proposed project were screened through a two-level filtering process. Filter 1 assessed whether a proposed alternative could **meet the project purpose and most of the objectives based on four related criteria**. Alternatives that met two or more of the following four Filter 1 criteria were carried forward for screening under Filter 2. Appendix 3A describes the following Filter 1 criteria in more detail.

- **Climate resiliency.** Addresses anticipated sea level rise and other reasonably foreseeable consequences of climate change and extreme weather events.

- **Seismic resiliency.** Minimizes health and safety risk to public from earthquake-caused reductions in water delivery quality and quantity from the SWP.
- **Water supply reliability.** Restores and protects ability of the SWP to deliver water in compliance with regulatory limits and SWP contractual agreements.
- **Operational resiliency.** Provides operational flexibility to improve aquatic conditions and manage future regulatory constraints**.**

Filter 2 examined whether the remaining alternatives would **avoid or lessen potential significant 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 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.

3.3 Proposed Project and Alternatives Overview

The 2020 NOP identified the proposed project as a 6,000 cfs diversion capacity alternative, 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. The EIR analyses and the application to USACE for authorization under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act were initiated with this concept of the proposed project, and with the knowledge that additional engineering refinements, preliminary findings about key environmental impacts, and input from the public and other interested parties may result in future changes. As the development of the EIR progressed, the evaluation provided additional information about the environmental impacts associated with the proposed project and alternatives. The preliminary impact assessment found that the Bethany Reservoir alignment had the potential to reduce environmental effects associated with the proposed project, particularly impacts on agricultural land, cultural resources, and wetlands and other waters of the United States within USACE's jurisdiction. As a result, DWR amended the permit application to USACE and now identifies the Bethany Reservoir alignment (Alternative 5) as the proposed project in the EIR. Identification of the Bethany Reservoir alignment as the proposed project for the EIR does not indicate that DWR has decided to move forward with the Delta Conveyance Project or that, if DWR does determine to move forward, the Bethany Reservoir alignment will be the project that DWR approves. DWR will not make a decision on the project until after addressing public comments on the Draft EIR, certifying the Final EIR, making all necessary findings and taking any other actions required to comply with CEQA.

The identified proposed project 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 water from two new north Delta intakes 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 and discharge it to the Bethany Reservoir for delivery to existing SWP export facilities (Figure 3-1 and Figure 3-2). This complex is called the Bethany Complex and is described in

Section 3.14, *Alternative 5—Bethany Reservoir Alignment, 6,000 cfs, Intakes B and C (Proposed Project)*.

Under the alternatives to the proposed project, Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, 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 (Figure 3-1 and Figure 3-2). The new Southern Forebay would be an additional, isolated south Delta water-balancing facility that would provide flexibility for operating both the new and existing facilities. The Southern Forebay and new appurtenant facilities in the south Delta are collectively called the Southern Complex, and would be sited adjacent to Clifton Court Forebay. These alternatives are described in this Final EIR in Sections 3.6 through 3.13.

Major facilities common to multiple alternatives are detailed in Section 3.4, *Common Features of the Alternatives*. Under all alternatives, operating the new conveyance facilities in conjunction with SWP's existing south Delta export facilities, and potentially the CVP's existing facilities, would create a *dual conveyance* system.

This chapter is a summary of project design and features of the nine project alternatives. DWR directed the preparation of the C-E EPR and the Bethany EPR and associated technical memoranda (Delta Conveyance Design and Construction Authority 2022a, 2022b). The EPRs and technical memoranda detail the engineering considerations that support project alternative design decisions. The EPR for the Bethany Reservoir alignment was developed, in part, to address potential impacts associated with the Southern Complex facilities proposed under the central and eastern alignment alternatives and detailed in the C-E EPR. The Bethany EPR contains a detailed description of Alternative 5 and the technical memoranda that informed the design of that alternative. These EPRs and technical memoranda are available for review and include construction and engineering details not provided in this chapter.

Some terminology used for alternatives and project facilities and major construction features in the EPRs and technical memoranda may differ from that used in this Final EIR. The crosswalk in Table 3-1 provides a guide to the major terminology differences that may appear.

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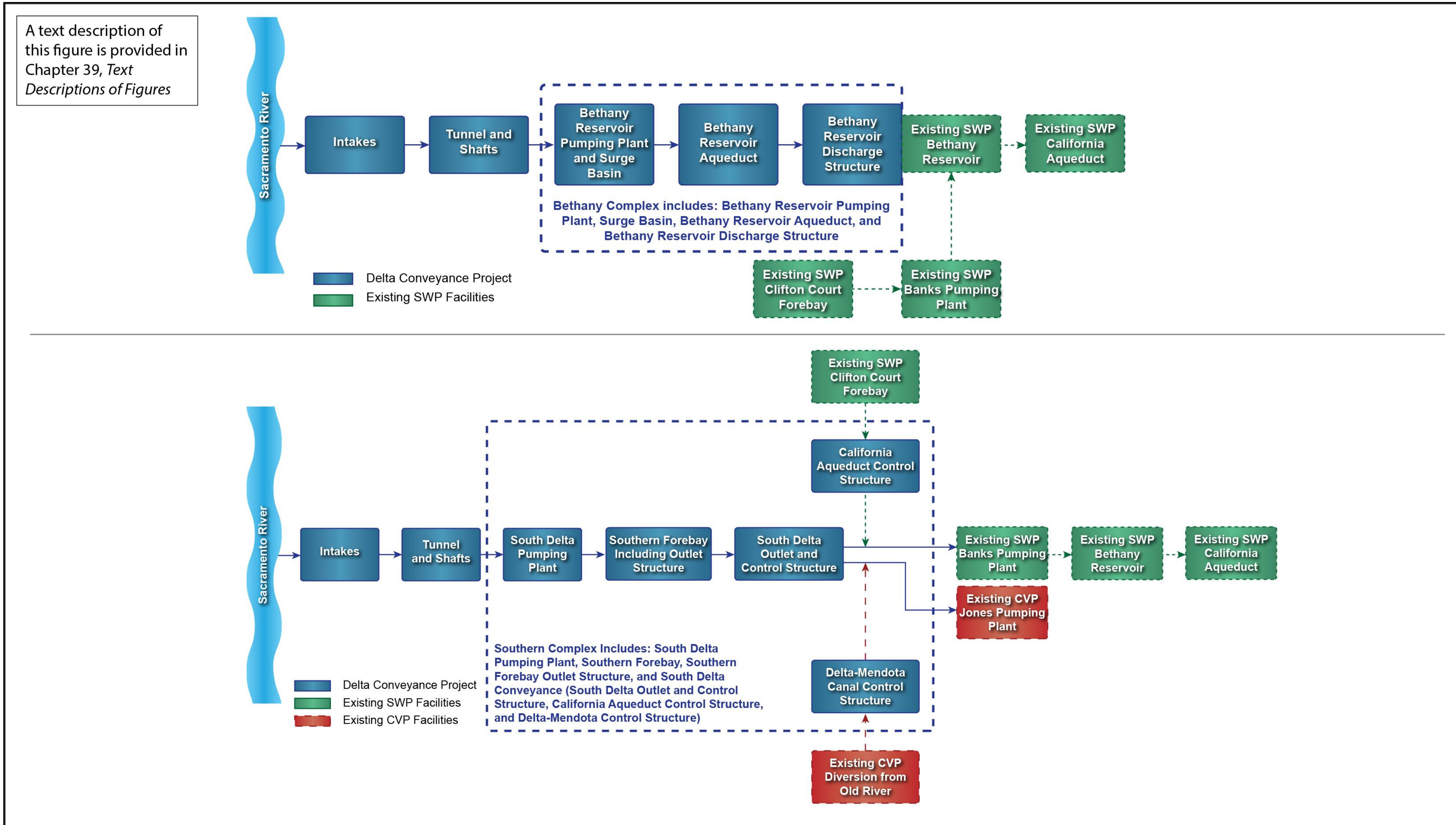

Note: CVP facilities would be used with central and eastern alignment Alternatives 2a and 4a only.

Figure 3-1. Schematic of Delta Conveyance Project Facilities for the Bethany Reservoir Alignment (top) and Central and Eastern Alignment Alternatives (bottom).

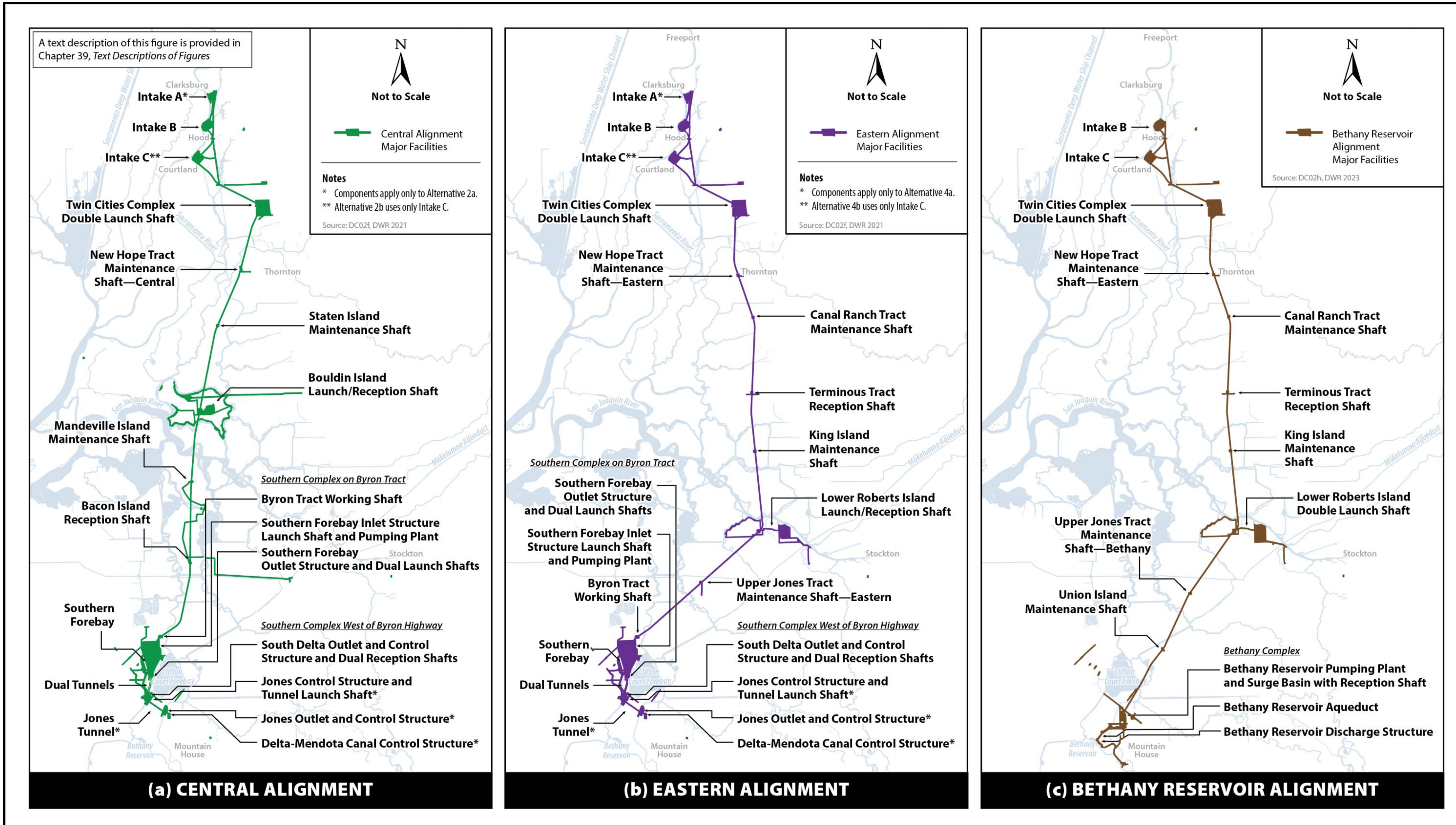

Figure 3-2. Alternative Alignments and Major Facilities

Table 3-1 Terminology Crosswalk

Engineering Project Report or Technical Memoranda	Environmental Impact Report
Central Corridor/Option	central alignment
Eastern Corridor/Option	eastern alignment
Bethany Reservoir Corridor Bethany Reservoir Alternative	Bethany Reservoir alignment; Bethany Reservoir alternative
Intake C-E-2, CE-2, 2, other variations	Intake A (1,500 cfs)
Intake C-E-3, CE-3, 3, other variations	Intake B (3,000 cfs)
Intake C-E 5, CE-5, 5, other variations	Intake C (1,500 or 3,000 cfs)
Option 1B	Alternative 1, Central Alignment, 6,000 cfs, Intakes B and C
Option 9B	Alternative 2a, Central Alignment, 7,500 cfs, Intakes A, B, C
Option 5B	Alternative 2b, Central Alignment, 3,000 cfs, Intake C
Option 7B	Alternative 2c, Central Alignment, 4,500 cfs, Intakes B and C
Option 2B	Alternative 3, Eastern Alignment, 6,000 cfs, Intakes B and C
Option 10B	Alternative 4a, Eastern Alignment, 7,500 cfs, Intakes A, B, C
Option 6B	Alternative 4b, Eastern Alignment, 3,000 cfs, Intake C
Option 8B	Alternative 4c, Eastern Alignment, 4,500 cfs, Intakes B and C
Option B2B	Alternative 5, Bethany Reservoir Alignment, 6,000 cfs, Intakes B and C
Retrieval shaft	Reception shaft

cfs = cubic feet per second.

3.3.1 Design for Climate Change and Sea Level Rise

Precipitation change, warmer temperatures, and wider variations in hydrologic conditions associated with climate change threaten the reliability of the current SWP water conveyance system. To best achieve water supply reliability and SWP climate resiliency in a cost-effective manner while meeting the needs of diverse users, conforming with operational requirements of the State Water Resources Control Board (State Water Board), and protecting species as discussed in Chapter 1, *Introduction*, the project design considers climate change and sea level rise. Historical data and projected outcomes based on changing factors, including temperature and precipitation, hydrologic conditions, sea level rise, water temperature and quality, and ecosystem health were used to model potential construction and operational conditions to inform project design and operations. Chapter 1 discusses how climate change interacts with these factors. Chapter 30, *Climate Change*, discusses global, national, and statewide climate change trends and their implications for the Delta Conveyance Project; Table 30-2 summarizes climate change projections for the study area.

Sea level rise projections used in modeling were acquired from the California Ocean Protection Council's (OPC) *State of California Sea-Level Rise Guidance Update 2018* (OPC Guidance). The OPC Guidance includes science-based methodology for state and local governments to analyze and assess the risks associated with sea level rise and to incorporate sea level rise into their planning, permitting, and investment decisions for infrastructure. The OPC Guidance provides a range of sea level rise projections and associated probabilities for future years based on accepted low and high greenhouse gas emissions scenarios. It also provides potential sea level rise estimates for a scenario in which the melting of Antarctic ice sheet accelerates sea level rise much higher and faster than rates experienced over the last century. This scenario, called H++, has no associated probability of occurring because model predictions of the impact of ice sheet collapse on sea level rise remain uncertain and predictions about the retreat of Antarctic ice vary considerably. H++ is considered the most conservative, risk-averse scenario and OPC recommends that it be considered for projects with a lifespan beyond 2050 with extreme risk aversion and for critical assets in the coastal zone and in potentially affected inland areas. Conservatively, DWR used the H++ values of 1.8 feet of sea level rise in 2040 and 10.2 feet in 2100 at the tide gage for San Francisco in its modeling for design. Year 2100 was selected as the horizon year because there is increased uncertainty around projections beyond 2100, and making use of projections beyond 2100 would be speculative.

DWR determined the 100-year and 200-year water surface elevations (WSEs) by hydraulic modeling, using the historical 100-year and 200-year flood flows recorded at the Martinez tide gage, plus extreme sea level rise for 2040 and 2100, scaled to account for how WSE decreases with distance inland from the tide gage. These elevations were determined using Delta Simulation Model II (DSM2) with scaled 1997 flood events to represent 100-year and 200-year flows. The incremental effect of sea level rise was found to be around 1.2 feet for most locations in the south Delta, and about 0.3 feet near the proposed intake locations. The incremental effect of sea level rise is based on DSM2 modeling for flows representing the 100-year event and 1.8 feet of sea level rise. Modeling used to support analyses for environmental resource Chapters 5 through 32 also considered inflows from the Yolo Bypass and the Sacramento, San Joaquin, Calaveras, Cosumnes, and Mokelumne Rivers (California Department of Water Resources 2020a). The memorandum titled *Preliminary Flood Water Surface Elevations (Not for Construction)* (California Department of Water Resources 2020a) prepared for the project provides modeling information used for overall project analysis.

Shaft pads at reception and maintenance shafts sites (described in Sections 3.4.2 and 3.4.3) would provide a working platform for construction of shaft diaphragm walls to minimize groundwater from entering the shaft construction site. Shaft pads would also serve as a refuge for workers during construction in the event of a levee breach that inundates the surrounding land up to a 100-year WSE plus sea level rise and climate change hydrology and 2 feet of freeboard*.* These elevations should be considered a minimum to provide flood protection during site construction. During the design phase, future calculations may necessitate higher elevations as additional information related to climate change and sea level rise becomes available. At the end of construction, shaft pads would remain in place and maintenance and reception shafts themselves would be raised above the top of the shaft pads to a height determined sufficient to protect the facilities from the 200-year flood plus sea level rise at 2100 and 3 feet of freeboard. Each shaft would have a cover that could be removed by a crane if access to the shaft or tunnel is needed in the future.

At the intakes, the Southern Forebay Inlet Shaft Structure, Southern Forebay Outlet Structure, South Delta Outlet and Control Structure (and under Alternatives 2a and 4a, the Jones Control Structure and Jones Outlet Structure), the earthen shaft pads would be removed, and the tops of shafts would be protected from sea level rise and hydrologic effects within the new concrete structures. Under Alternative 5, the top of the ultimate reception shaft in the surge basin would be flush with the floor of the surge basin, 35 feet below ground surface.

Launch shaft sites at Twin Cities Complex, Bouldin Island, and Lower Roberts Island would be at higher risk from sea level rise and hydrologic climate change effects because they are much larger and involve more personnel and equipment than maintenance and reception shaft construction sites. Accordingly, DWR proposes to build a ring levee (at Twin Cities) or improve existing levees (at Bouldin Island or Lower Roberts Island) to protect workers and facilities at those locations. After construction, the ring levee at Twin Cities Complex would be deconstructed except for a portion adjacent to the reusable tunnel material (RTM) storage area. Levee modifications at Bouldin Island or Lower Roberts Island that would bring the levees up to existing standards of flood protection would remain in place to address future flood risk. Shafts at Byron Tract would be protected by levees that have already been repaired, and the Bethany Complex would be at an elevation not subject to flooding. These facilities are described in Sections 3.4 through 3.14.

Chapter 30, *Climate Change*, discusses current climate change science and the risks to and resilience of the project in the context of climate change.

3.3.2 Alternatives Overview

The proposed project (Alternative 5) consists of a 6,000 cfs conveyance facility constructed on an eastern alignment in a corridor roughly parallel to and west of I-5 to a site south of Byron Highway and Clifton Court Forebay, adjacent to the Bethany Reservoir. Alternatives 1, 2a, 2b, and 2c consider a more central alignment. Alternatives 3, 4a, 4b, and 4c would follow an eastern alignment similar to proposed project as far as Lower Roberts Island, then turn west toward Byron Tract. The primary distinctions among the project alternatives are the tunnel alignment, size and conveyance capacities, and location of the facilities to convey the water to existing SWP facilities.

The proposed project and alternatives are as follows. Sections 3.6 through 3.14 summarize the major distinguishing features of each project alternative. Power, SCADA (supervisory control and data acquisition), road modifications, and other support facilities are discussed in Section 3.4.

- 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)

Different conveyance 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 would involve additional facilities in the south Delta to convey 1,500 cfs to the CVP C. W. "Bill" Jones Pumping Plant (Jones Pumping Plant). The 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 Bethany Complex near the Bethany Reservoir for release to the Bethany Reservoir and delivery to users.

Variations in conveyance capacity affect the size of the areas needed for construction and/or operation of the following facilities (Table 3-2).

- **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 RTM handling, and RTM storage.
- **Tunnel reception and maintenance shafts sites.** Shaft diameter and earth 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. This facility would not be 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. The Bethany Complex would include a pumping plant, surge basin with reception shaft, a buried pipeline aqueduct system, and a discharge structure to convey water to Bethany Reservoir.

3.4 Common Features of the Alternatives

Because the project alternatives have many features in common, this section describes the major facilities that are present in multiple alternatives. Not all project alternatives involve all the common features; see Table 3-2 for a comparison of key features of the alternatives and Table 3-3 for the overall temporary and permanent acres affected by each alternative. The distinctive characteristics and major features of each project alternative are described in Sections 3.6 through 3.14. Mapbooks illustrate the project route, facilities, and construction features of each alignment overlaid on aerial imagery. Mapbook 3-1 shows the central alignment, Mapbook 3-2 shows the eastern alignment, and Mapbook 3-3 shows the Bethany Reservoir alignment.

Under all alternatives, construction would generally take place Monday through Friday, sunrise to sunset, or approximately 10 hours a day, except for two processes: RTM handling, which is described in Section 3.4.4, *Reusable Tunnel Material*; and at the intakes, where construction would be continuous until the concrete pour for the tremie slab that forms the base of the cofferdam is completed, approximately 3 days per pour.

Table 3-2. 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 (cubic feet per second)	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 (cubic feet per second)	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.
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.

Items	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
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 for inspection or maintenance.	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
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	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

Items	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
	of 5.5 to 17.5 feet. Area: approximately 1,000 acres.								
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
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-foot diameter by 20-feet high one-way surge tanks connected to the BRPP'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-foot by 815-foot, 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 postconstruction. 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 postconstruction.
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.

Note: Tunnel diameter and length are from intakes to Southern Forebay, except for Alternative 5.
CVP = Central Valley Project; BRPP = Bethany Reservoir Pumping Plant.

Table 3-3. Temporary Construction and Permanent Acreage for Each Alternative

	Acres per Alternative								
Footprint	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 5
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	1,303.30	1,341.50	1,410.30	1,160.50	1,322.00	1,190.80

Note: Acreages include all major project features, railroad and road work, power, SCADA, and construction support facilities. Geotechnical investigation zones and fault study areas are not included.

3.4.1 North Delta Intakes

All alternatives would include new intakes on the Sacramento River in the north Delta. Intakes A, B, and C (alone or in combination, depending on the alternative) on the east bank of the Sacramento River would divert water and convey it through a single main tunnel. Intake A would be south of and on the other side of the Sacramento River from Clarksburg, Intake B would be just north of Hood, and Intake C would be between Hood and Courtland (Mapbook 3-1, Sheets 1, 2, and 4). Intake A under Alternatives 2a and 4a and Intake C under Alternatives 2c and 4c would be designed to divert up to 1,500 cfs of Sacramento River water. Intakes B and C would each divert up to 3,000 cfs under Alternatives 1, 2a, 2b, 3, 4a, 4b, and 5 (Alternatives 2b and 4b use Intake C only to divert 3,000 cfs). Operated in a coordinated manner with the existing facilities, the north Delta facilities would provide flexibility to alter the location, amount, timing, and duration of diversions. A summary of intake characteristics is provided in Appendix 3D, *Intakes, Roads, and Shafts Summary Tables,* Table 3D-1.

At each intake, water would flow through cylindrical tee fish screens mounted on the intake structure to a sedimentation basin before reaching the intake outlet (tunnel inlet) shaft at each site (Figure 3-3). The intake outlet shaft would serve as the tunnel boring machine (TBM) reception or maintenance shaft during construction and as the intake outlet shaft and maintenance access during operation. These shafts would have an inside diameter of 83 feet.

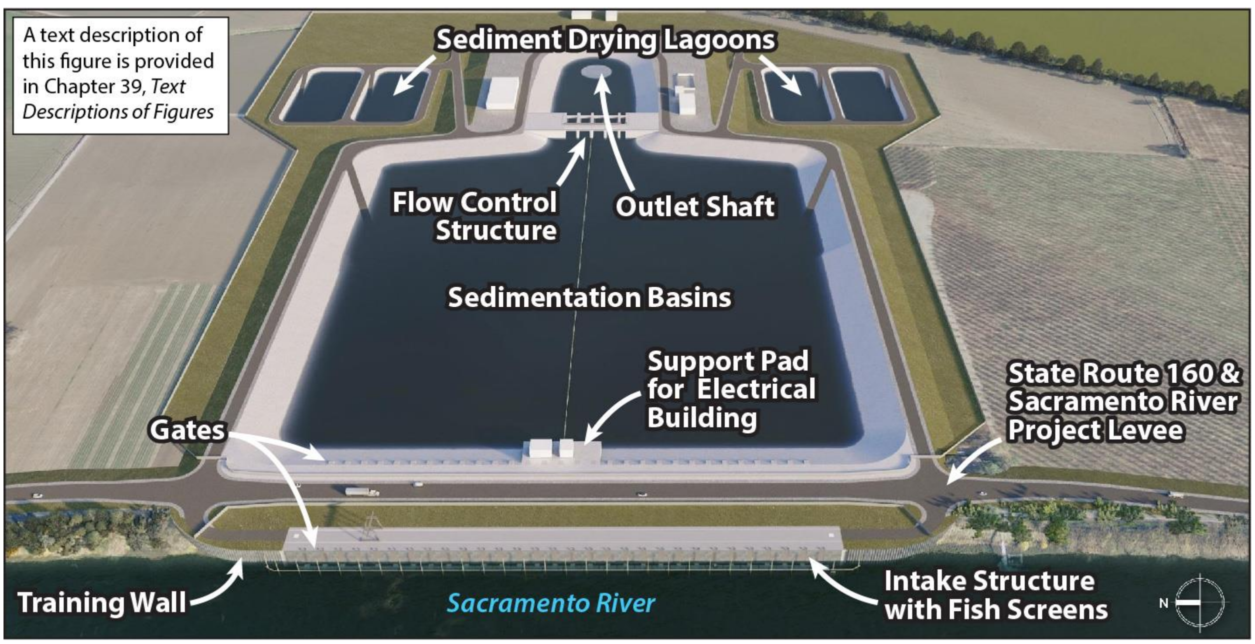

Figure 3-3. Typical Intake Configuration

From the intake outlet shaft, water would flow into a single-bore main tunnel that connects the intakes to the Twin Cities Complex, from which the tunnel route would extend south on a central, eastern, or Bethany Reservoir alignment (Figure 3-2 and Figure 3-4). The Twin Cities Complex is described in Section 3.4.3, *Tunnel Shafts*.

Intake features would include state-of-the-art cylindrical tee fish screens, intake structures, sedimentation basins, sediment drying lagoons, flow control structures, intake outlet channel and intake outlet shaft, embankments, and other appurtenant structures. Intakes would also include associated facilities to support construction and operations of the intakes. During construction, the intake footprints would contain areas for standby engine generators, staging and management of construction equipment and materials, and ground improvement and slurry cutoff wall material preparation areas. Standby engine generators would be permanently installed at the intakes. Construction access to the intake sites would be by means of new access/haul roads (Section 3.4.7, *Access Roads*). Permanent intake footprints when construction is complete would be smaller once certain construction-related features are removed.

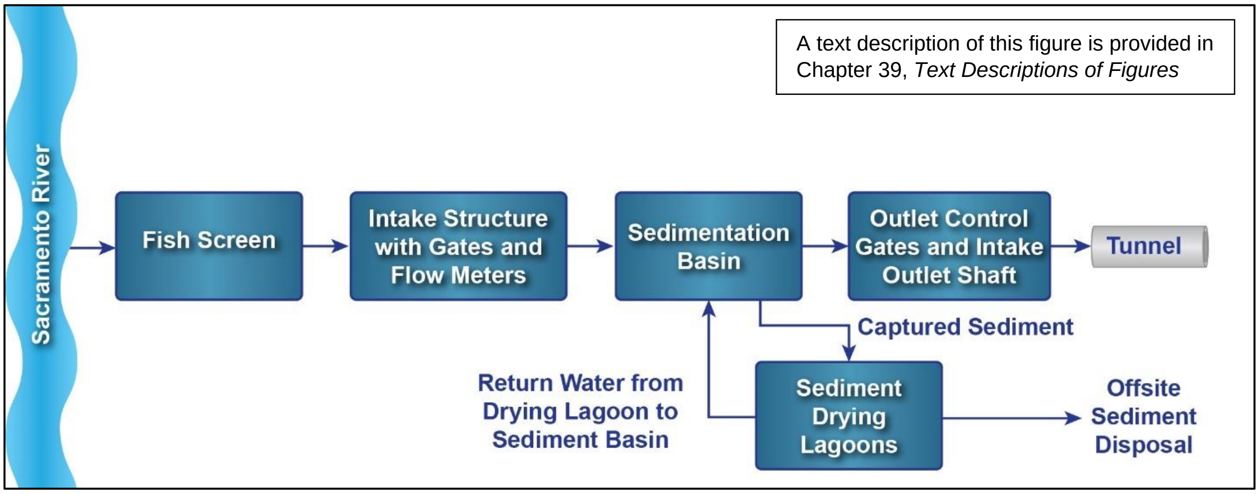

Figure 3-4. Schematic of Delta Conveyance Project Intake Facilities

Table 3D-1 in Appendix 3D summarizes the key features of the intakes for all alternatives.

3.4.1.1 Cylindrical Tee Fish Screens

Fish screens installed on intake structures minimize aquatic species from being carried into the intake facilities along with the diverted water. The intake screens are designed to draw in water at reduced velocities to reduce potential effects to the subset of fish exposed to the intake screens.

The intake fish screens are part of an overall intake system that includes the screen units and an integrated screen cleaning system, piping, and flow control features. The "tee-shaped" screen units would consist of two fish screen cylinders installed on either side of a center manifold that would be connected to the facility’s intake opening. Each intake fish screen would extend about 12 feet from the vertical face of the intake structure into the river. During diversion operations, water would flow from the Sacramento River through the fish screens and a 60-inch diameter pipe and discharge into the sedimentation basins. Control gates would regulate the flow through each screen unit to the sedimentation basin (Figure 3-5).

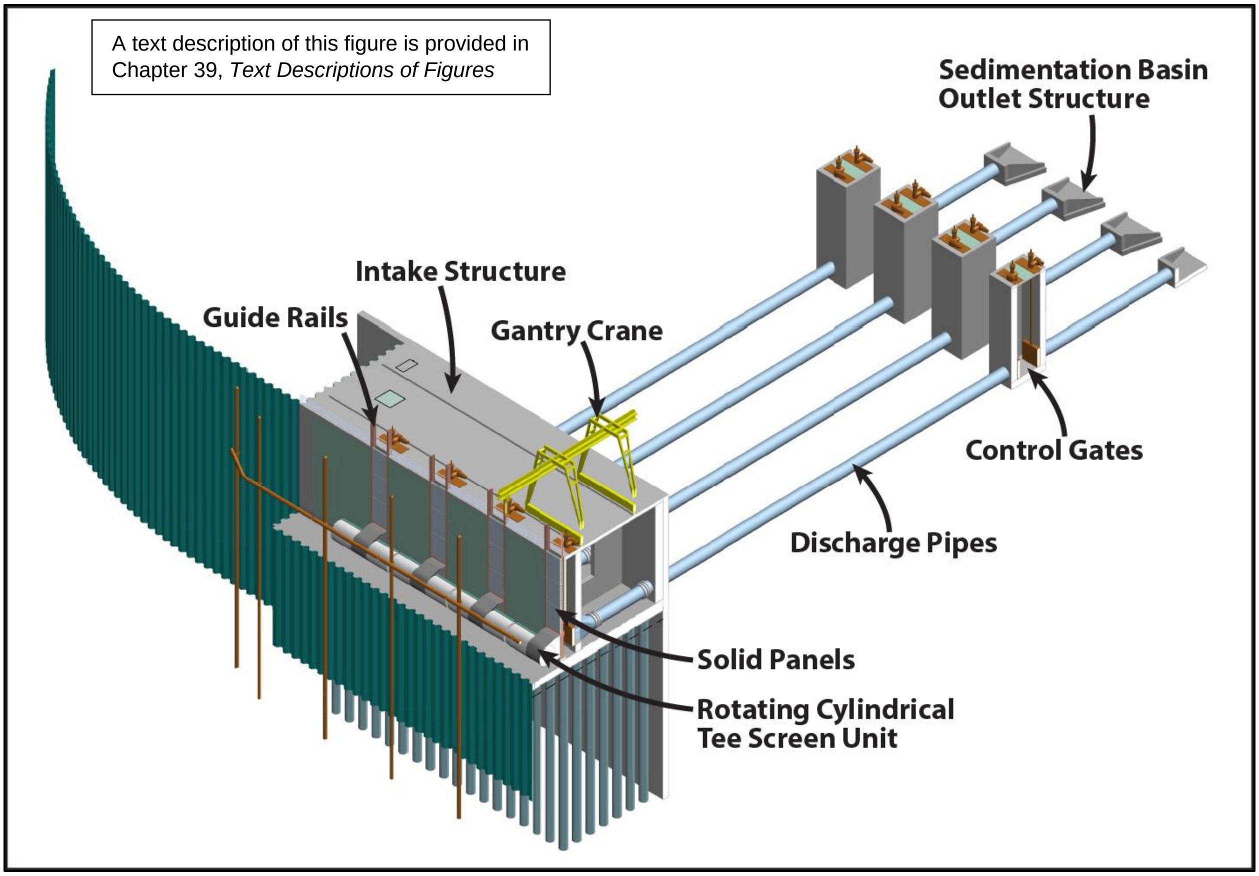

Figure 3-5. Cylindrical Tee Screen Facility

Installing the intake facility would require construction of a temporary cofferdam for in-river portions of intake construction to divert water and aquatic organisms around the work site and create a dry work area. Portions of the cofferdam would consist of interlocking steel sheet piles installed using a combination of vibratory and impact pile driving. Vibratory pile driving is a method by which the pile is vibrated into the soil beneath the site as opposed to being hammered in, as occurs in impact pile driving. Noise associated with vibratory pile driving is considerably lower than noise associated with impact hammer pile driving. To minimize noise and other disturbances from pile driving, vibratory pile driving would be used to the extent possible where supported by additional geotechnical information. All pile driving would be restricted between 7:00 a.m. and 7:00 p.m. and would not during this timeframe. It is estimated that the longest installation period (at Intake C) would be no more than 255 hours over a 5- or 6- week period, including time for handling and preliminary vibratory pile driving. Assuming 2 minutes of driving time for each sheet pile pair, impact drive time (as a subset of the total installation period) would range from a total of 9 hours at Intake A with 1,500-cfs capacity to 14 hours at Intake C with 3,000-cfs capacity, occurring over roughly 5 or 6 weeks. Each intake sheet pile construction period would be staggered by about 1 year (Delta Conveyance Design and Construction Authority 2022a).

3.4.1.2 Sedimentation Basins and Drying Lagoons

Diverted water would contain sediment suspended in the river water, a portion of which would be collected in a concrete-lined sedimentation basin. A deep soil-cement-bentonite perimeter wall (cutoff wall) would serve to isolate the sediment basins from the local groundwater and the Sacramento River. Each intake would have one sedimentation basin divided into two cells by a turbidity curtain (Figure 3-3). Water would flow from the intake through the sedimentation basin and through a flow control structure with radial gates into the outlet channel and shaft structure that would be connected to the tunnel system.

The screen and intake design would allow sufficient flow velocities in diversion pipes to sweep sediment into the sedimentation basin and prevent it from settling in the piping system. Once the diverted water enters the sedimentation basins, larger sand and silt sediment particles would settle while smaller silt and clay particles would be carried into the tunnel. A flow control structure with four large radial gates and one smaller gate would control the water level in the sedimentation basin and discharge flow into the intake outlet channel and outlet shaft. Tunnel and aqueduct velocity would be sufficient to transport these smaller particles to the Southern Forebay or Bethany Reservoir.

Each intake would have four concrete-lined sediment drying lagoons, each approximately 15 feet deep, containing an average of 10 to 12 feet of water within its embankments when in use. Once a year, during the summer months, the sedimentation basin would be dredged, one half at a time, and sediment slurry discharged to drying lagoons, dewatered, and allowed to dry naturally. The sediment is anticipated to be composed of large silt and sand particles with minimal organic material. During dredging operations, sediment is expected to accumulate to a depth of about 1 foot, distributed over the floor of the drying lagoons. Water drained from the sediment drying lagoon outlet structures and underdrains would be pumped back into the sedimentation basin. The sediment remaining would be dried for 2 to 6 days, which would reduce its moisture content to a point at which the sediment can be removed and transported without creating dust. If sediment is dried to a level that would create dust, the dust would be controlled by application of water from on-site supplies. The dried sediment would be removed by truck for disposal at a permitted disposal site or used for beneficial uses off-site. The fill and drain/dry sequence would take about 7 to 8 days, which would approximately match the dredged material filling rate so continuous operation would be possible. Each drying lagoon would be filled up to three times each year; however, generally this would happen only once per year for typical project conditions. The filling process would be part of the overall sediment removal and disposal process that would be conducted once per year. During the filling period, it would take about 2 days to move sediment from the sedimentation basin to each sediment drying lagoon, about 2 days to remove most of the water back to the sedimentation basin, and about 3 to 4 days to dry and remove sediment from the basin for a total duration of 7 to 8 days. Up to about 1,800 to 2,100 cubic yards of sediment would be removed from each lagoon each time this cycle occurs. The volume of sediment collected would depend upon the volume, suspended sediment concentration, and flow rate of water diverted at the intake. Intake maintenance activities are described in Section 3.16.5, *Intake Maintenance Activities*.

3.4.1.3 Temporary and Permanent Flood Control Levees and State Route 160

Constructing the intakes along the riverbank would require relocating the federal project levee (under USACE jurisdiction) and State Route (SR) 160 prior to building the intake structure and fish screens. The federal ("jurisdictional" or "project") levee was constructed as part of the Sacramento River Flood Control Project Levee program established by USACE to provide flood management for surrounding lands. Altering a jurisdictional levee requires approval by USACE and the Central Valley Flood Protection Board (CVFPB) prior to undertaking any modifications and requires that conformance with flood control criteria be maintained continuously during construction of any modifications. A temporary jurisdictional levee would be built at the intake sites east of the existing levee to reroute SR 160 and maintain continuous flood protection during construction of the new intake facilities (Figure 3-6).

SR 160 is a State and County Scenic Highway that runs on top of the existing jurisdictional levee. The California Department of Transportation (Caltrans) is responsible for the state highway. DWR would collaborate with Caltrans to ensure the temporary relocation and subsequent permanent realignment of SR 160 at the intakes conform to all Caltrans highway design, construction, and safety standards. Caltrans would assist DWR with the design of the temporary and permanent relocation of SR 160. Caltrans would also provide construction oversight for activities related to SR 160 relocation. Caltrans is a CEQA responsible agency for this EIR; accordingly, Caltrans would ensure this Final EIR meets its standards of environmental documentation.

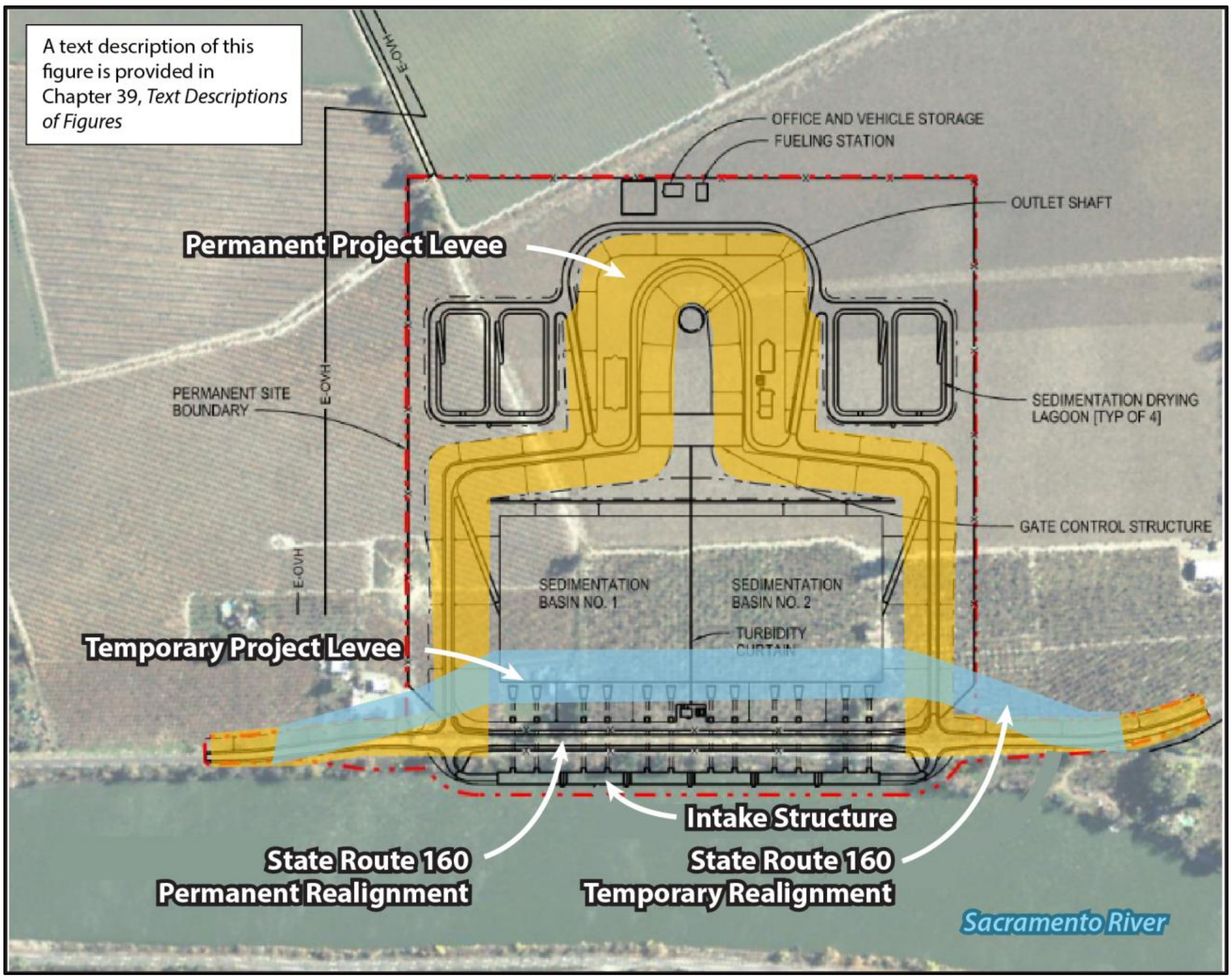

Figure 3-6. Schematic of Permanent and Temporary Levees

The temporary levee would also facilitate construction sequencing of the permanent jurisdictional levee around the perimeter of the intake shaft and sedimentation basin. The level of flood control afforded by the existing levee would be maintained during and after construction.

Between the temporary jurisdictional levee and the Sacramento River, a cofferdam would be constructed along the water side of the Sacramento riverbank adjacent to the existing SR 160 to provide a dry workspace for intake structure construction. Following construction of the intake structure and the permanent levee system on the land side of the temporary levee, the area to the east of the intake structure would be backfilled and SR 160 would be relocated on top of the backfill along the Sacramento River.

The intake structure and the temporary and permanent levees, including the sedimentation basin, radial gate structure, and intake outlet channel embankments would be designed to protect the site and surrounding area from the 200-year flood event with climate change. Modeling for design assumed the most extreme sea level rise of 10.2 feet at year 2100, scaled to how it would affect conditions in the Sacramento River, as described in Section 3.3.1, *Design for Climate Change and Sea Level Rise*, and defined in the *Preliminary Flood Water Surface Elevations* memorandum (California Department of Water Resources 2020a). This level of protection exceeds the requirements of both USACE and CVFPB. The final configuration of the levee embankment around the intake outlet channel and shaft would protect the channel and shaft opening from the 200-year peak flood elevations plus extreme sea level rise assumed for year 2100 and 3 feet of freeboard during operations (Table 3-4).

Table 3-4. Water Surface and Flood Protection Levee Elevations

Intake	River Mile	200-Year Max WSE + Climate Change + Sea Level Rise of 10.2 feet in 2100	Top of Levee (feet)
A	41.1	28.2	31.2
B	39.4	27.3	30.3
C	36.8	26.3	29.3

Source: Delta Conveyance Design and Construction Authority 2022d.
Max = maximum; WSE = water surface elevation.

3.4.1.4 On-Site Roads at the Intakes

Permanent paved roads and gravel-surfaced roads and work areas would be constructed at the intakes for use during construction and later operations (Figure 3-3).

For construction of Intake A, approximately 2 miles of roads would be constructed within the intake site. Most interior roads would be covered with gravel or gravel over geotextile material, or paved, depending upon the amount of vehicle use envisioned. Roads leading to the access road would be paved. Toward the end of construction, about 9,500 feet of 24-foot-wide paved permanent access roads would be installed. Access to the intake site would occur from SR 160 and from an access/haul road located to the west of the abandoned railroad embankment that would be installed during construction. Several internal access roads would be constructed around the base of the outlet shaft area, along the top of the embankments, and on ramps up the side of the embankments. Because these roads would receive substantial vehicle use, they would also be 24 feet wide and paved. Approximately 6,000 feet of 20-foot-wide gravel roads would be constructed around the sediment drying lagoons, along the length of the sedimentation basin parallel to SR 160, and to provide access along the sediment loading areas.

At Intake B, approximately 8,900 feet of 20-foot-wide paved permanent roads would be installed on the intake site toward the end of construction. Several 24-foot-wide paved internal roads would be constructed around the base of the intake outlet shaft area, along the top of the embankments, and on ramps up the side of the embankments. About 6,500 feet of 20-foot-wide gravel roads with chip seal would be constructed around the sediment drying lagoons, along the length of the sedimentation basin parallel to SR 160, and to provide access along the sediment loading areas. All construction access and the primary maintenance access to the intake site would be from the intake access road.

Intake C at 3,000 cfs diversion capacity would also have approximately 6,500 feet of 20-foot-wide gravel roads with chip seal around the same facilities as at Intake B. About 8,300 feet of paved permanent roads would be installed at Intake C near the end of construction, along with 24-foot paved internal access roads around the base of the intake outlet shaft area, along the top of the embankments, and on ramps up the side of the embankments. Intake C at 1,500-cfs capacity would have 8,000 feet of 24-foot wide paved roads and 6,000 feet of 20-foot wide gravel roads. All construction access and the primary maintenance access to the intake site would be from the intake access road.

Off-site access roads are described in Section 3.4.7.

3.4.2 Tunnels

Under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, the main tunnel would convey water from the intakes to the proposed new Southern Forebay Inlet Structure in the south Delta, to be distributed via the Southern Forebay and additional facilities composing the Southern Complex (Section 3.4.5, *Southern Complex on Byron Tract*). The bottom elevations of the main tunnel would range from -143 feet to -163 feet (North American Vertical Datum of 1988 [NAVD88]) with a top elevation near sea level. Under Alternative 5, the bottom elevations of the tunnel between the Twin Cities Complex and the Bethany Complex would range from -145 feet to -164 feet with a top elevation near sea-level. The inside diameter of the tunnel would range from 26 feet to 40 feet and the length of the main tunnel would range from 37 to 45 miles, depending on alternative, as shown in Table 3-2.

At the south end of the Southern Forebay, dual tunnels would connect the Southern Forebay to the SWP Harvey O. Banks (Banks) Pumping Plant approach channel, a distance of 1.7 miles. Two parallel tunnels are proposed to allow conveyance of the full design capacity of the Banks Pumping Plant, and secondarily so that one tunnel could be removed from service for inspection and cleaning while maintaining half-capacity service in the other tunnel (Section 3.4.6, *Southern Complex West of Byron Highway*). Alternatives 2a and 4a would require an additional single tunnel and facilities on the Southern Complex to convey water to the CVP. These are described in Section 3.7, *Alternative 2a—Central Alignment, 7,500 cfs, Intakes A, B, and C,* and Section 3.11, *Alternative 4a—Eastern Alignment, 7,500 cfs, Intakes A, B, and C.* Under Alternative 5, the main tunnel would go directly to the Bethany Reservoir Pumping Plant from Lower Roberts Island, without the Southern Complex dual tunnels, as described in Section 3.14.

3.4.2.1 Tunnel Maintenance

Tunnels would be designed to be low maintenance. An initial inspection could occur during the construction contract's warranty period, generally within about 1 year after the system is placed into operation. After the initial inspection, tunnel inspections could be completed once every 10 years for the first 50 years and every 5 years after 50 years from initial operation. The inspections could occur using autonomous underwater vehicles or remotely operated vehicles without the need to dewater the tunnel. Under the central and eastern alignment alternatives, if dewatering is required, two portable dewatering pumps would be installed within the Southern Forebay Inlet Structure launch shaft and water would be discharged directly into the Southern Forebay. Under the Bethany Reservoir alignment, two portable dewatering pumps would be installed in the Surge Basin reception shaft and discharge water directly into the Bethany Reservoir Pumping Plant discharge pipelines and ultimately to the Bethany Reservoir Discharge Structure.

3.4.3 Tunnel Shafts

Tunnel boring machines (TBMs) would be used to bore the tunnels. Tunnel shafts to launch, remove, and/or maintain the TBMs would be constructed at intakes, along the alignment, and at the Southern Complex or Bethany Complex. The TBM would be lowered into a launch shaft and would bore horizontally toward a reception shaft (Figure 3-7). Reception shafts would be used to remove the TBM from the tunnel at the end of each drive. Because the TBM cutterhead would need inspection and maintenance, maintenance shafts would be located approximately every 4 to 6 miles between launch and reception shafts to provide access for TBM maintenance, repair, access or evacuation, and logistic support in a free-air (not pressurized) environment. The northernmost intake shaft for each alternative would serve as the reception shaft during construction; shafts at downstream intakes would serve as maintenance shafts. During operations, shafts at intakes would serve as intake outlet shafts to convey water into the tunnel system as well as for maintenance access to the tunnel. All tunnel shafts would be maintained during operations to provide access, as needed.

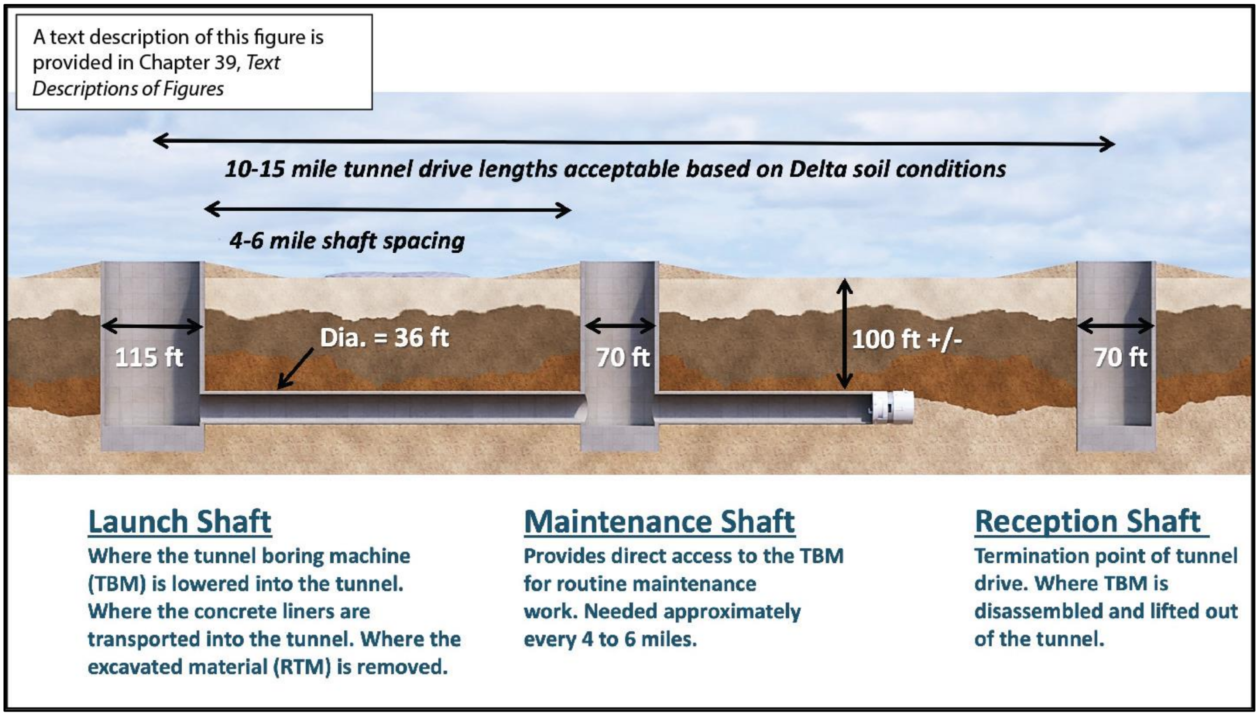

Figure 3-7. Key Components of a Tunnel Drive (6,000-cfs alternatives)

Most shafts would require construction of a shaft pad. Tunnel shaft pads would be constructed above the ground surface to an elevation approximately equal to the adjacent levee system on the island or tract. The height of the shaft pad would be sufficient to protect the tunnel and construction personnel from localized flooding but lower than the top of the shaft postconstruction to reduce the need for imported fill, which reduces related potential environmental effects. The final postconstruction shaft at the intakes would be raised above the shaft pad to an elevation above the maximum water surface in the tunnel for hydraulic surge events or the Sacramento River 200-year flood event with sea level rise and climate change hydrology for year 2100, whichever is higher, including freeboard criteria. Note that the Sacramento River flood event water level in some locations is higher than the local 200-year flood event with sea level rise and climate change hydrology for year 2100 (including wind fetch wave run-up) at all of the tunnel shaft sites, so the river flood level controls over the local flood level for setting the tops of structures. A concrete cover with air venting provisions would be placed over the top of the shaft. Cranes would be used to move the concrete cover and move any large equipment. A scaffold will be erected to allow personnel into and out of the tunnel during operations.

3.4.3.1 Tunnel Launch Shafts

Tunnel launch shafts would generally have a finished inside diameter ranging from 110 to 120 feet and 8-foot thick walls, depending on conveyance capacity. Tunnel launch shaft sites would include a shaft pad for the tunnel launch shaft with adjacent areas for equipment to excavate and support the shaft, cranes, and appurtenant items to move equipment into and out of the tunnel shaft, equipment holding areas, and areas to receive and manage the excavated RTM. Tunnel launch shaft sites would also include areas for tunnel liner segment storage, aggregate storage, slurry/grout mixing plants, electrical substation and electrical building, workshops and offices, water treatment tanks, access roads, and RTM handling, drying, and storage areas. Construction activities at the launch shafts would continue for 7 to 9 years. Tunnel shaft characteristics for each alignment are provided in Table 3-5 (Alternative 1), Table 3-9 (Alternative 3), and Table 3-13 (Alternative 5); shaft site dimensions would vary somewhat by alternative according to conveyance capacity and amount of RTM generated; construction and permanent acreages of shaft sites on each alignment are provided in Appendix 3D.

Double Launch Shaft at Twin Cities Complex

All alternatives would include the double launch shaft at the Twin Cities Complex. The double launch shaft would be constructed in a figure eight configuration with inside diameters of 110 to 120 feet (depending on conveyance capacity) to allow TBMs to excavate in both north and south directions (Figure 3-8). This double launch shaft would be part of a larger complex that houses other construction facilities to support tunnel excavation at this site.

The Twin Cities Complex would be off Twin Cities Road approximately 0.5 mile northeast of the interchange with I-5. Its northern boundary would fall between Dierssen and Lambert Roads, its eastern boundary along Franklin Boulevard, its western boundary offset from the I-5 embankment, and a majority of the southern boundary at Twin Cities Road. During construction, depending on alternative, the Twin Cities Complex would occupy from 322 to 586 acres. Permanent site size would range from 26 to 302 acres depending on alternative, as shown on summary tables for each alternative in Sections 3.6 through 3.14 of this chapter. The construction site would be surrounded by a ring levee, with height varying from about 3.5 feet to 11.5 feet, designed to protect the facilities from the 100-year flood event with the Delta-specific Public Law 84-99 equivalent standards (i.e., 1.5 feet of freeboard above the 100-year Federal Emergency Management Agency flood elevation with 2:1 [horizontal to vertical; H:V] exterior slopes and 3H:1V interior slopes).

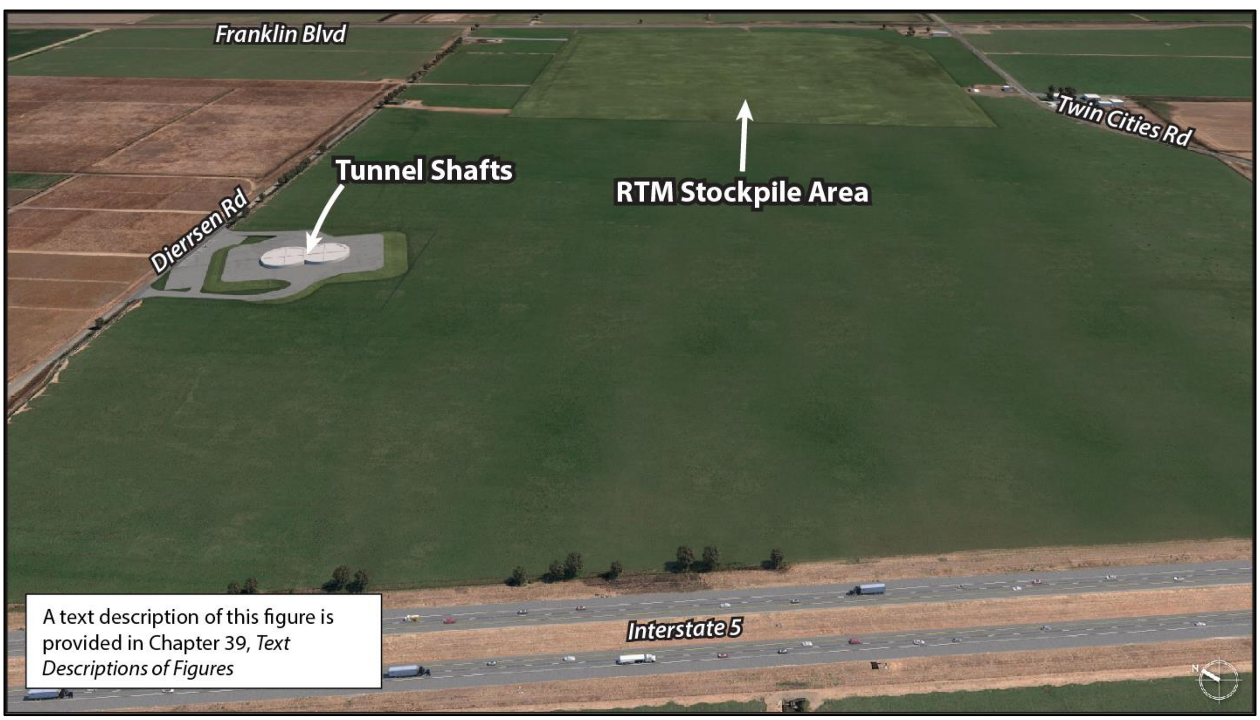

Figure 3-8. Twin Cities Double Launch Shaft Plan (permanent condition)

The Twin Cities Complex during construction would contain the double launch shaft, tunnel segment storage, a slurry/grout mixing plant, shops and offices for construction crews, parking, material laydown and erection areas, access roads, RTM conveyor and handling facilities (Section 3.4.4), a water treatment plant, emergency response facilities, and a helipad. Tunnel segments, TBM machinery, and other equipment would be delivered to the Twin Cities Complex by railroad at the rail-served materials depot in Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, and by road in Alternative 5. In Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, on-site rails would be used to move materials within the Twin Cities Complex and the railroad also would be used to transport RTM to the Southern Complex to construct portions of the Southern Forebay embankments for the central and eastern alignment alternatives. Approximately 1.3 to 1.8 million cubic yards of dry RTM would be moved to the Southern Complex for reuse.

Approximately 400,000 to 1 million cubic yards of RTM would be used to fill excavated areas at Twin Cities Complex site and provide fill to Mandeville and Bacon islands for the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c). The long-term RTM storage stockpile would be planted with erosion-control seed mix to stabilize the stockpile and avoid dust generation.

Excavated soil and RTM from the Twin Cities Complex would be used for constructing the on-site ring levee and tunnel shaft pad at the Twin Cities Complex and for constructing shaft pads on New Hope Tract, Staten Island, and Bouldin Island (central alignment), or shaft pads on New Hope Tract, Canal Ranch Tract, Terminous Tract, and King Island (eastern alignment). See Section 3.4.9, *Soil Balance*.

No ground improvement would be expected for construction at the Twin Cities Complex because underlying soils appear to have low compressibility and are not anticipated to be subject to liquefaction.

Reception and Maintenance Shafts

Reception and maintenance shafts (Figure 3-9) would have finished inside diameters ranging from 53 to 83 feet, depending on conveyance capacity. Tunnel reception and maintenance shaft sites would range in size depending on location and other facilities at the site (see summary tables of physical characteristics for each alternative). Tunnel reception and maintenance shaft sites would include areas for the tunnel shaft with adjacent areas for equipment to excavate the shaft, and cranes and appurtenant items to move equipment into and out of the tunnel shaft. Reception shaft sites would be larger than maintenance shaft sites because of the area needed to disassemble the TBM equipment prior to removal from the construction site. Construction activities at the maintenance and reception shaft sites would continue for approximately 2 years.

Because they would not be used to supply tunnel segments or remove RTM, reception and maintenance shaft sites would not require areas for storing tunnel liner segments or RTM handling. The reception shaft on Bacon Island, for central alignment alternatives, would include areas for aggregate storage and a concrete batch plant during shaft construction and equipment handling. Other shafts would have ready-mix hauled in. These shafts would be powered by new power lines extending from existing, local distribution networks and would not need an electrical substation.

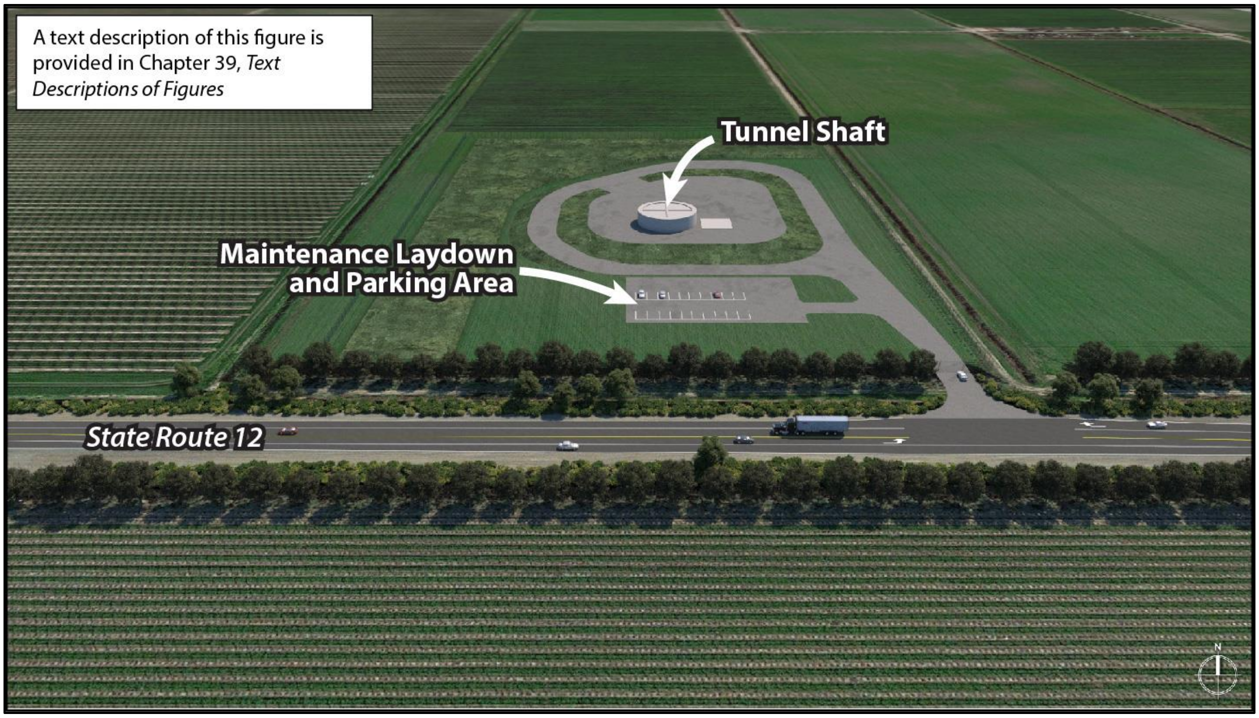

Figure 3-9. Typical Maintenance and Reception Shaft Site Postconstruction

Dual Shafts for Tunnels on the Southern Complex

In addition to the shafts required for the main tunnel, two launch shafts and two reception shafts would be required to bore dual tunnels that would convey water from the Southern Forebay Outlet Structure at the Southern Complex on Byron Tract to the South Delta Outlet and Control Structure at the Southern Complex west of Byron Highway. Those facilities, which would be present only in the central and eastern alignment alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and not in Alternative 5, are detailed further in Section 3.4.5, *Southern Complex on Byron Tract*, and Section 3.4.6, *Southern Complex West of Byron Highway*.

3.4.3.2 Tunnel Shaft Maintenance

Tunnel shafts would be used for tunnel access postconstruction so that periodic inspections, repair, and maintenance activities could be performed. Design features of the gravity tunnel system should preclude the need for planned maintenance; necessary maintenance activities would be the result of inspection findings. However, it is anticipated that at some point during the service life of the system, some maintenance would be required. The maintenance work could range from cleaning out the tunnel invert with a loader or possibly patching or repairing the tunnel lining. Areas to perform inspection and maintenance activities would be provided adjacent to and on top of the shaft pads at each shaft location. Inspection and maintenance activities would comply with the confined space regulations in accordance with Occupational Safety and Health Administration requirements.

There would be daily inspection and security checks at shaft sites. Depending on the activity, grounds maintenance (i.e., mowing, weed maintenance) would take place quarterly every 1 to 2 years, and repaving every 15 years.

3.4.4 Reusable Tunnel Material

RTM would be generated at launch shafts as the TBMs bore the tunnel. RTM is the soil removed by the TBM boring the tunnel, mixed with conditioners, and lifted to the ground surface through the launch shaft. "Wet excavated RTM" refers to the bulk material, including conditioners, resulting from tunnel excavation. After RTM is removed from the tunnel, it would be tested for hazardous materials, dried mechanically or allowed to dry naturally, then stockpiled and transported for reuse or permanently stored. Volumes of RTM generated and areas for permanent storage would vary depending on tunnel diameter and length and are provided in the summary table for each alternative.

RTM removed from the tunnel through the launch shafts would be transported by conveyor to handling and storage facilities near launch shaft sites. RTM excavation, testing, drying, and movement from the tunnel launch shaft sites during tunneling operations would occur year-round, 20 hours per day Monday through Friday and 10 hours on Saturdays, allowing time for equipment maintenance. RTM movement at the Southern Complex from temporary storage to dry stockpile areas would occur 5 days per week from sunrise to sunset. Under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, at the Twin Cities Complex and the Southern Complex, RTM could be moved by the railroad at any time of the day and on any day, depending upon the railroad schedules. Permanent RTM stockpiles would be elevated above the surrounding grades, covered with excavated topsoil, and planted with appropriate species primarily for erosion control, and potentially to create a natural habitat area when the stockpile is not being accessed for a soil material source. Recommended treatments for permanent RTM stockpiles would include spreading topsoil, cross disking, and planting native grasses. An access road would also be constructed from the existing paved road nearest to the stockpile.

3.4.4.1 Disposal of Reusable Tunnel Material

DWR would develop site-specific plans for the beneficial reuse of RTM to the greatest extent feasible for construction of the project. Excavated RTM would be placed in temporary stockpile areas and tested (generally once or twice a day) in accordance with the requirements of the Central Valley Regional Water Quality Control Board and the Department of Toxic Substances Control for the presence of hazardous materials at concentrations above their regulatory threshold criteria. The contractor(s) would conduct chemical characterization of RTM and associated decant liquid prior to reuse or discharge, respectively, to determine whether it will meet requirements of the National Pollutant Discharge Elimination System and the Central Valley Regional Water Quality Control Board. All decant liquid would be collected and treated for direct on-site reuse or on-site storage to reduce water supply needs. If the amount of treated water flows from RTM decant, dewatering flows, and site runoff exceeds the on-site water demands and on-site storage, the treated flows would be discharged to adjacent waterbodies in accordance with the stormwater pollution prevention plans, described in Appendix 3B, *Environmental Commitments and Best Management Practices*. While additives used to facilitate tunneling would be nontoxic and biodegradable, it is possible that some quantity of RTM would be deemed unsuitable for reuse and would be disposed of at a site approved for disposal of such material. This is expected to apply to approximately 1% to 5% of the total volume of excavated material.

It is anticipated that several stockpiles would be developed. Each temporary area would be generally sized to accommodate up to 1 week of RTM production to allow for testing of RTM for presence of contaminated or hazardous materials and suitability for reuse before stockpiling on-site or transporting off-site. Each stockpile area would be lined with impermeable lining material. Additional features of the long-term material storage areas would include berms and erosion protection measures to contain storm runoff as necessary and provisions to allow for truck traffic during construction.

RTM intended for reuse as structural fill for later project construction activities would require drying. Both natural drying (evaporation) and mechanical drying were considered for the tunnel launch shaft sites. Mechanical drying was considered for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, but not for Alternative 5 because RTM generated by the TBM is not proposed for reuse as part of Alternative 5 construction. At the Twin Cities Complex and Southern Complex, where the RTM would be reused for the project, mechanical dryers utilizing electric, natural gas, or propane heat sources would be considered. The mechanical dryers would minimize space requirements, provide for better moisture control, and avoid seasonal variation in evaporative drying rates as compared to natural drying process. The dried RTM would be piled and moved by bulldozers and motor scrapers, and then deposited in the dry stockpile areas near the tunnel launch shaft sites at the Twin Cities Complex and Southern Complex. As the RTM is required either on-site or at other locations, the RTM would be removed by wheel loaders and conveyors onto trucks or rail cars for transport to the designated points of use. RTM not removed for reuse would be graded and planted with erosion-control seed mix to avoid need for future handling and avoid dust generation.

At the Bouldin Island launch/reception shaft site (central alignment, Alternatives 1, 2a, 2b, and 2c), RTM would be naturally dried and stored on-site in permanent stockpiles. Due to the soil conditions, it is anticipated that the RTM stockpiles would consolidate and would decrease the long-term height. The long-term RTM storage stockpile would be planted with erosion-control seed mix to stabilize the stockpile and avoid dust generation.

At the Lower Roberts Island launch/reception shaft (eastern alignment, Alternatives 3, 4a, 4b, and 4c) or double launch shaft (Bethany Reservoir alignment, Alternative 5), RTM would also be naturally dried and stockpiled. A portion of the dried RTM would be used to refill the areas excavated at the launch site where soil was removed to construct tunnel shaft pads and levee modifications. Following tunnel construction, the RTM stockpile would be consolidated into a smaller area. Due to the soil conditions, it is anticipated that the RTM stockpiles would consolidate and the long-term height would decrease. The long-term RTM storage stockpile would be planted with erosion-control seed mix to stabilize the stockpile and avoid dust generation. Under Alternative 5, which would not include the Southern Forebay, RTM generated at the Twin Cities Complex and Lower Roberts Island would ultimately be moved to a single on-site long-term storage area at each launch shaft work area and planted with erosion-control seed mix to stabilize the stockpile and avoid dust generation.

RTM generated at the Southern Complex (central and eastern alignments) would be dried on-site using mechanical dryers and used for forebay embankment and forebay floor fill. A portion of the dried RTM would be used to refill the areas excavated at the Southern Forebay Inlet Structure launch shaft site where soil was removed to construct tunnel shaft pads and Southern Forebay embankments. The central alignment alternatives would not involve long-term stockpiles of RTM at the Southern Complex. For the eastern alignment alternatives, surplus dried RTM generated on-site at the Southern Complex would be stockpiled for long-term storage along with the surplus topsoil and peat stockpiles on an area north of the Southern Forebay. The long-term RTM storage stockpile would be planted with erosion-control seed mix to stabilize the stockpile and avoid dust generation.

At sites with mechanical drying, the RTM would be dried before being placed in a temporary stockpile. If the RTM generation rate is greater than the capacity of the mechanical drying equipment, the RTM would be transferred to a temporary wet stockpile area that can accommodate 1 week's worth of RTM above the average excavation rate. At sites with natural drying, RTM would be transferred to a temporary wet stockpile and tested prior to drying.

For the RTM not slated for reuse, wet RTM would be spread over a broad area in relatively thin lifts (e.g., 18 inches) and allowed to dry and drain naturally over a period of up to 1 year. Continuous spreading in thin lifts would allow RTM that is not mechanically dried to be dried naturally compacted in place without excessive earthmoving requirements.

If portions of the RTM were identified as hazardous, that material would be transported in trucks licensed to handle hazardous materials to a disposal location licensed to receive those constituents. If the RTM meets the criteria for reuse, the material would be moved by conveyor to a long-term on-site storage site or transported off-site for subsequent reuse.

Neither natural drying nor mechanical drying processes would be anticipated to create odors. It is recognized that odors typically occur in the presence of organic or sulfide constituents. Studies will be conducted during field investigations to evaluate materials for the presence of materials that could generate odors, such as organic materials. However, organic material would not be expected at tunnel depths based on preliminary understanding of regional depositional processes and available subsurface information. If sulfides were present, these constituents would probably be oxidized during the tunneling excavation and RTM soil-moving operations.

3.4.5 Southern Complex on Byron Tract

The Southern Complex would have facilities on Byron Tract east of Byron Highway and on a site west of Byron Highway. These facilities would be constructed for all alternatives except Alternative 5, the Bethany Reservoir alignment. See Section 3.14.1 for a description of Bethany Complex facilities.

The construction site for the Southern Complex on Byron Tract would vary somewhat by alternative; it would occupy approximately 1,500 acres during construction and about 1,200 acres permanently (see Figures 3-10 and 3-11, and Sections 3.6 through 3.13, for descriptions of individual alternatives). Facilities on Byron Tract east of Byron Highway would consist of the following.

- Byron Tract working shaft.
- Main tunnel terminus at the Southern Forebay Inlet Structure and tunnel launch shaft.
- South Delta Pumping Plant.
- Southern Forebay.
- Emergency spillway.
- Electrical switchyard.
- Maintenance and ancillary buildings.
- Southern Forebay Outlet Structure double launch shaft, upstream end of dual tunnels, and associated facilities to convey water in dual tunnels from the Southern Forebay to the South

Delta Outlet and Control Structure (the Southern Forebay Outlet Structure is part of the "South Delta Conveyance Facilities" on Byron Tract).

- Emergency response facilities.
- RTM handling facilities (e.g., RTM testing, drying, temporary storage areas) for RTM generated at the three launch shafts at the Southern Complex; temporary and permanent storage of excess dried RTM generated at the Twin Cities Complex.
- Concrete batch plant.
- Fencing for the Southern Complex.
- Access roads, including truck overpass over Byron Highway.
- Rail-served materials depot along the Union Pacific Railroad (UPRR) Lathrop-Byron rail line parallel to the Byron Highway to serve the Southern Complex tunnel launch shaft sites and to transport RTM from Twin Cities Complex to the Southern Complex and tunnel liner segments to the launch shaft site.
- Tunnel liner segment storage areas.

Portions of project land on Byron Tract would be reclaimed for habitat or agricultural use after construction. Land used during construction for topsoil storage, tunnel segment storage, retention ponds, railroad spurs, parking areas, access roads, and facilities/trailers for contractors and crew would be reclaimed. RTM treatment and storage areas within the permanent footprint of the Southern Forebay would not require reclamation.

Approximately 39 acres (for central alignment alternatives; 39 to about 42 acres for eastern alignment alternatives) of the site would be used for permanent topsoil stockpiles. Approximately 60 acres on the Southern Complex on Byron Tract would be used for peat storage (overtopped by topsoil) under central alignment alternatives, and 51 acres would be used for peat storage overtopped by topsoil under eastern alignment alternatives.

Conveying water from the Southern Forebay to the Banks Pumping Plant approach channel (part of the California Aqueduct) would require the following facilities.

- Southern Forebay Outlet Structure with double launch shaft to bore dual tunnels to the South Delta Outlet and Control Structure, and later to deliver water to those tunnels.
- Dual reception shafts at the South Delta Outlet and Control Structure along the Banks Pumping Plant approach channel.

Section 3.4.6, *Southern Complex West of Byron Highway,* describes the South Delta Conveyance Facilities that would provide the connection to the SWP Banks Pumping Plant.

3.4.5.1 Tunnel Shaft Sites at the Southern Forebay (Northern Embankment)

Two tunnel shaft sites would be located near the northern embankment of the Southern Forebay. Initially, a tunnel launch shaft would be located at the site of the Southern Forebay Inlet Structure and the South Delta Pumping Plant. The TBM would bore from the Southern Forebay Inlet Structure launch shaft to an intermediate working shaft site approximately 1 mile to the north. The TBM would bore through the working shaft and the tunneling support activities (segment supply, grouting, ventilation, RTM extraction, and construction access) would be relocated to the working shaft for continued boring toward the tunnel reception shaft on Bacon Island (central alignment alternatives) or Lower Roberts Island (eastern alignment alternatives). By relocating the tunneling support activities to the working shaft, the vacated Southern Forebay Inlet Structure launch shaft would allow concurrent construction of the South Delta Pumping Plant and avoid lengthening the project schedule. As the name suggests, after construction, the Southern Forebay Inlet launch shaft would serve as the inlet to the South Delta Pumping Plant and as the gravity flow control and overflow structure for the tunnel system. Both shafts would be considered part of the Southern Complex. Figure 3-10 shows the major characteristics of the Southern Forebay Inlet Structure launch shaft and Byron Tract working shaft sites.

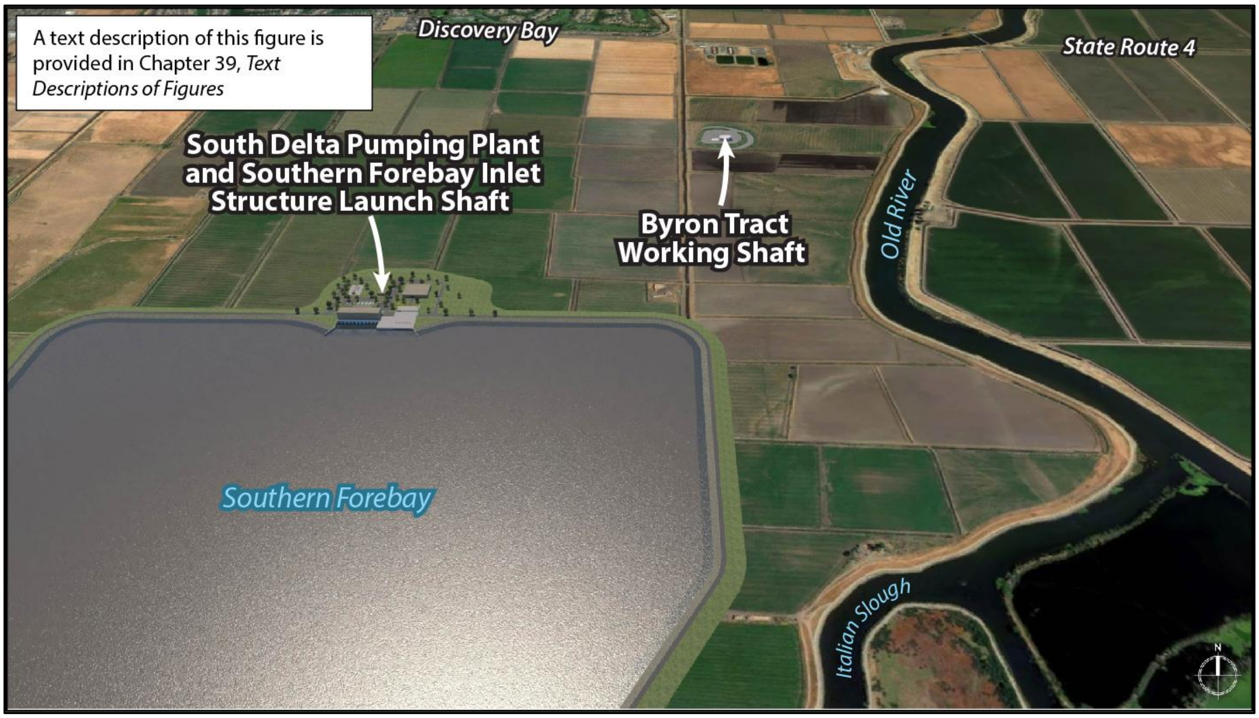

Figure 3-10. Southern Forebay Inlet Structure Launch Shaft and Byron Tract Working Shaft Site

3.4.5.2 South Delta Pumping Plant

The South Delta Pumping Plant would be situated along the northern embankment of the Southern Forebay adjacent to the Southern Forebay Inlet Structure launch shaft on Byron Tract. The Southern Forebay Inlet Structure launch shaft would become the main tunnel terminus, the pumping plant inlet, and overflow structure (Figure 3-11). The pumping plant would be the primary feature for conveying water from the tunnel system into the Southern Forebay.

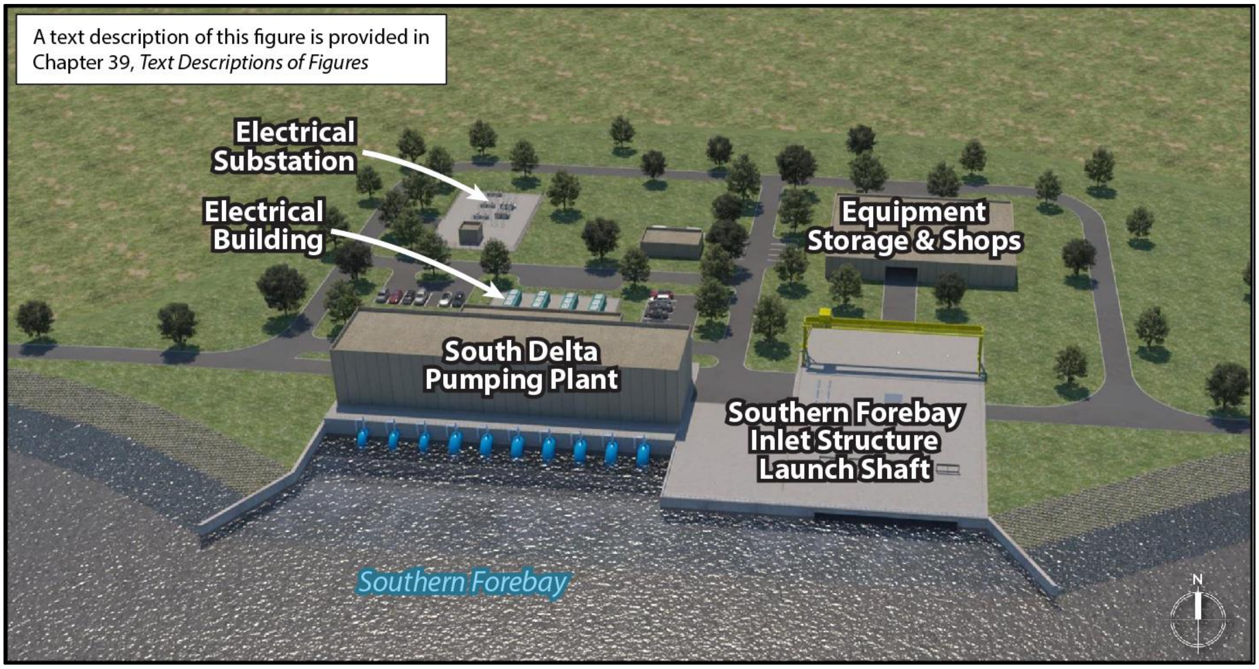

Figure 3-11. South Delta Pumping Plant Facilities

The pumping plant building would house a bank of 960 cfs primary pumps and 600 cfs secondary pumps, each with standby pumps; the number of pumps would vary by the alternatives' conveyance capacity. Two portable pumps would be available to dewater the tunnel when necessary for maintenance and inspection after the first year of operation and at 10-year intervals for the first 50 years and 5-year intervals after 50 years of operation. The primary pumps would use adjustable frequency drives to operate within a wide range of flows and surface water elevations at the intakes and the Southern Forebay.

Other pumping plant facilities would be the electrical building, electrical switchyard and substation, standby engine generator building, offices, storage, shops, and other appurtenant facilities. Gantry cranes with rail systems and other cranes would be outside of the buildings to move equipment during maintenance procedures. The site would be surrounded by security fences with three vehicle access gates.

Most South Delta Pumping Plant facilities would be placed aboveground on a raised site pad along the Southern Forebay embankment to protect the facilities from the 200-year flood event with climate change–induced hydrology, sea level rise for year 2100, freeboard criteria, and wind fetch wave run-up as modeled by DWR. The top of the pumping plant pad would be at an elevation of 28 to 29 feet.

During some operational conditions, water from the tunnel would flow into the Southern Forebay by gravity through the Pumping Plant Inlet and Overflow Structure adjacent to the South Delta Pumping Plant. The gravity operations would generally occur during periods of high river levels at the intakes concurrent with low surface water elevations in the Southern Forebay. The frequency of gravity flow would be determined during the design phase and based upon the operations of the intakes and existing SWP pumping plants. Depending on the frequency of gravity flow required, additional environmental review may be required.

3.4.5.3 Southern Forebay

The Southern Forebay would be on Byron Tract at the southern end of the main tunnel, northwest of Clifton Court Forebay and separated from it by Italian Slough. The forebay would serve as a water balancing facility to equalize the difference between Delta Conveyance Project supply, existing Clifton Court Forebay south Delta supply, and SWP Banks demand capacity. The Southern Forebay is one of the cornerstone facilities of the concept of "dual conveyance" for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, by allowing both supply systems to be used to the maximum benefit of the new and existing projects.

Water in the forebay would flow south into a Southern Forebay Outlet Structure and be conveyed in two tunnels to the South Delta Outlet and Control Structure west of Byron Highway for release to the SWP Banks Pumping Plant approach channel. The South Delta Conveyance Facilities west of Byron Highway are discussed in Section 3.4.6, *Southern Complex West of Byron Highway*.

The Southern Forebay would have a perimeter length of approximately 4.7 miles and a footprint of approximately 1,000 acres including embankments and exterior-circumference access roads. The normal operating capacity of the Southern Forebay would be 9,000 acre-feet with a maximum surface area of approximately 750 acres. Because it would provide only temporary storage to balance flows, its size and capacity would be the same for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c. The Southern Forebay would have an average water surface elevation of 11.5 feet, which would be approximately the midpoint within the normal operating range of elevations of 5.5 feet to 17.5 feet. The forebay floor would range from an elevation of 0 feet to -7 feet, so the average water depth would range from 11.5 feet to 18.5 feet at the average water surface elevation of 11.5 feet. A minimum water surface elevation of 5.5 feet would be required to provide gravity flow of up to 10,321 cfs to the Banks Pumping Plant. The Southern Forebay could be operated lower than elevation 5.5 feet (down to about an elevation of 0 feet), but the conveyance flow rate from the forebay would need to be reduced below the design capacity of 10,321 cfs to ensure that the water surface elevation at the Banks Pumping Plant would be maintained within the preferred operating range of the existing pumping plant.

Hydraulic surge conditions could occur in the main tunnel if there was a simultaneous shutdown of the pumps at the South Delta Pumping Plant. The tunnel shafts would provide some volume to store water during surges. The South Delta Pumping Plant and the Pumping Plant Inlet and Overflow Structure would include emergency overflow weir-type openings to convey water into the Southern Forebay if transient surge conditions should occur in the tunnel.

The Southern Forebay would be designed in accordance with the DWR Division of Safety of Dams 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. The hydraulic design of the emergency spillway would be based on the controlling event. Potential controlling events could include mis-operation of the system (e.g., pumps on, downstream gates closed) and uncontrolled flood flow through the conveyance system (e.g., system intake gates open accompanied by power outage during high river stage leading to uncontrolled gravity flow into the Southern Forebay).

The Southern Forebay embankments would be constructed above the existing ground surface using materials from on-site excavations and dried RTM, to the maximum extent possible, and on-site soils from the Southern Complex to balance earthwork to the extent possible (Section 3.4.9, *Earthwork Balance*). Forebay design considerations would include flood management, soil stability and seismic considerations, embankment and foundation stability, and seepage cutoff wall placement. Embankment foundation improvements would be implemented where needed (i.e., cutoff walls for seepage, or ground improvement for embankment stability) because of potentially poorly consolidated or weak foundations and seismic conditions. Seepage collectors and drainage layers would be installed within the outboard toe of the embankment. A 15-foot-wide access road and groundwater monitoring network would be installed along the perimeter of the outboard toe of the embankment (exterior slope).

Ground improvement would be implemented under portions of the embankment to minimize risk of ground subsidence, seepage-related issues, and seismic deformation. The ground improvement would include various combinations of removal of peat soils, installation of vertical wick drains, pre-loading of soils to promote ground settlement prior to construction of the embankment, *in situ* soil treatments for improving foundation strength, and installation of seepage cutoff walls.

Ground improvement would include excavation and replacement of 6 feet of the upper embankment foundation for the entire perimeter, and deeper where needed. The excavation and replacement would create a consistent embankment foundation and remove shallow foundation discontinuities. Deeper excavation and replacement could be performed, if practical, to remove unsuitable foundation materials, such as peat, highly organic soils, or loose sands. Shallow groundwater, however, may limit the depth of excavation in some areas unless dewatering is also incorporated.

3.4.5.4 Southern Forebay Outlet Structure

The Southern Forebay Outlet Structure would be in the embankment at the southern end of the Southern Forebay. Two launch shafts would be used to lower a TBM to bore each of two tunnels through which water would be conveyed 1.7 miles south to the South Delta Outlet and Control Structure at the Banks Pumping Plant approach channel (a.k.a. the California Aqueduct). These 115-foot-inside-diameter shafts would remain to feed water from the Southern Forebay into the tunnels via gravity flow during operation. Each tunnel would have an inside diameter of 38 feet under Alternatives 1, 2b, 2c, 3, 4b, and 4c. The two tunnels together would be capable of delivering the full capacity of Banks Pumping Plant when water does not flow from Clifton Court Forebay. Under 7,500-cfs Alternatives 2a and 4a, the dual tunnels would have an inside diameter of 40 feet to accommodate the additional capacity required to serve the CVP Jones Pumping Plant. Having two tunnels would also allow isolation and dewatering of one tunnel for maintenance and repair while allowing uninterrupted flow of about half of the design capacity through the other tunnel.

In accordance with DWR Division of Safety of Dams criteria, the Southern Forebay Outlet Structure would also function as the emergency outlet works capable of lowering the maximum storage depth by 10% within 7 to 10 days and fully draining the Southern Forebay within 90 or 120 days. As designed, the drawdown rate would exceed that required by DSOD.

3.4.5.5 Maintenance

South Delta Pumping Plant would have access for tractor trailer vehicles to drive through the building to transport materials and equipment. An overhead bridge crane capable of traveling the length of the building would be used to lift and place materials and equipment and for maintenance. Ultrasonic flow meters on each pump discharge piping system would be accessed through floor hatches for periodic inspection, calibration, maintenance, and replacement. A gravity flow outlet structure would be positioned on top of the Southern Forebay Inlet Structure (the repurposed launch shaft) for use when Sacramento River levels are high enough and the water level in the Southern Forebay is low enough to achieve gravity flow through the main tunnel between the intakes and the Southern Forebay. Bulkhead panels would be used to isolate the pumping plant wet well from the main tunnel and Southern Forebay during emergencies for life safety. An overhead rail-mounted gantry crane would move the panels and lower and raise materials, personnel, and equipment in the vertical shaft when needed, for example, to install temporary submersible pumps for tunnel dewatering or to permit inspection and maintenance access to the shaft and tunnel. An equipment storage and operations maintenance building would be adjacent to the pumping plant, staffed and outfitted with a welding shop, machine shop, and ample storage for materials, pump accessories, and spare equipment.

The Southern Forebay embankment, outlet works, emergency spillway, and their appurtenances would be designed to have a useful service life of at least 100 years without requiring major repairs other than maintenance and refurbishment of the operable gates at the inlet and outlet structures once every 25 to 30 years. Riprap over filter material would be placed along the inside embankment slopes to protect against erosion and would also discourage vegetation establishment. Native grasses would be placed along the outside embankment slopes for erosion protection. During periods when diversions do not occur at the north Delta intakes, the Southern Forebay could either remain full or mostly empty; maintaining higher water elevations would reduce weed growth on the bottom of the forebay. Periodically reducing the surface water elevations could reduce vegetation on the inside slopes. Vegetation removal on the interior and exterior embankments of the Southern Forebay would be conducted quarterly and done mechanically. Landscaping and ground cover around the forebay and within the project boundary will be maintained so as to minimize attractants to wildlife.

The Southern Forebay Outlet Structure would have a trashrack to capture debris that would collect on the open surface of the Southern Forebay before it enters the conveyance system. The trashrack would be cleared using a backhoe or excavator-mounted device and/or hand-held rakes for periodic cleaning. Vegetation and other items removed from the trashrack would be stored in a bin prior to disposal.

For inspection and maintenance of the dual tunnels, a bridge crane with 50-ton hoist and trolley would operate isolation stop log gates. Stop logs would be stored in place within guide frames in the open position. A mobile safety crane would be available for installation of life safety items (ventilation and lighting) and for lowering personnel in a cage for inspection, along with a two-way radio.

Drought-tolerant plants would be used as required in landscaping and no irrigation system would be installed. Landscape maintenance is assumed to consist of weed control only.

3.4.6 Southern Complex West of Byron Highway

West of Byron Highway, the Southern Complex would consist of the South Delta Conveyance Facilities that would connect the Southern Forebay to the SWP Banks Pumping Plant approach channel downstream of the John E. Skinner Delta Fish Protective Facility (Skinner Fish Facility) and potentially to the CVP Jones Pumping Plant (central and eastern alignments only). The upstream facilities—Southern Forebay Outlet Structure and upstream portions of the dual tunnels, plus associated facilities—would be on Byron Tract, as described in Section 3.4.5, *Southern Complex on Byron Tract*. The dual tunnels from the Southern Forebay Outlet Structure would pass under Italian Slough and Byron Highway to the downstream South Delta Conveyance Facilities west of Byron Highway. These would consist of the South Delta Outlet and Control Structure and the California Aqueduct Control Structure (Figure 3-12). Under Alternatives 1, 2b, 2c, 3, 4b, and 4c, the portion of the Southern Complex west of Byron Highway would occupy 164 acres during construction, and 112 acres postconstruction. Under Alternatives 2a and 4a, with additional facilities needed to connect to the CVP Jones Pumping Plant, the Southern Complex west of Byron Highway would occupy 293 acres during construction and 210 acres postconstruction. These facilities, which would be the same for both Alternatives 2a and 4a, are described in Section 3.7 for Alternative 2a.

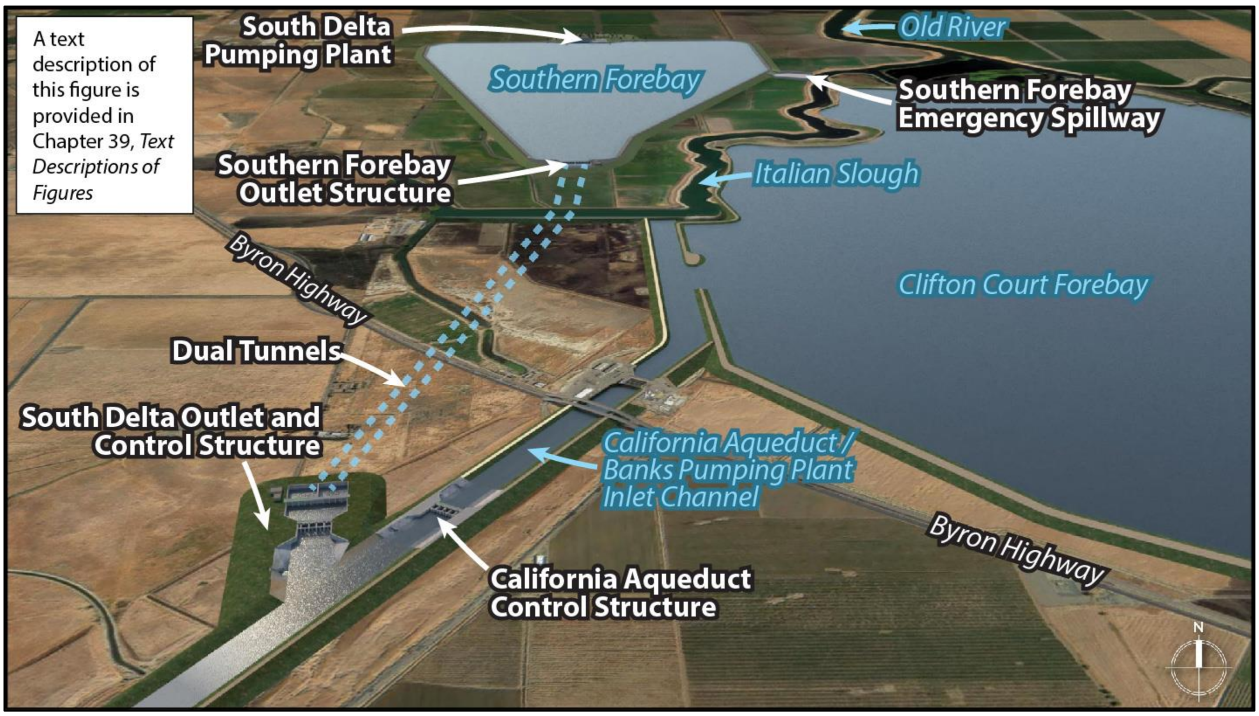

Figure 3-12. Southern Complex West of Byron Highway (Alternatives 1, 2b, 2c, 3, 4b, 4c)

The South Delta Conveyance Facilities include the California Aqueduct Control Structure, which would allow water to be delivered to the SWP Banks Pumping Plant from the new Delta Conveyance Project facilities only, from Clifton Court Forebay only, or from both systems.

Alternatives 2a and 4a would require additional facilities in the south Delta to serve the CVP with up to 1,500 cfs of conveyance, if the Bureau of Reclamation chooses to participate in the Delta Conveyance Project. These facilities are described in Section 3.7 for Alternative 2a.

3.4.6.1 South Delta Outlet and Control Structure

The South Delta Outlet and Control Structure would be alongside the Banks Pumping Plant approach channel approximately 1.4 miles upstream of the Banks Pumping Plant. The structure would be 400 feet wide by 1,250 feet long and 45 feet deep and contain the downstream end of the dual tunnels from the Southern Forebay Outlet Structure. The dual tunnels would end at two 90-foot-diameter TBM reception shafts within the South Delta Outlet and Control Structure. A series of radial gates would control the rate of flow released into the existing SWP system. This outlet and control structure would also convey emergency releases from the Southern Forebay Outlet Structure when acting as an emergency outlet, should the Southern Forebay require drawdown from maximum storage depth.

Other construction facilities at the South Delta Outlet and Control Structure include an electrical and control building, a bulkhead gate storage facility, a mobile crane, shops and offices for construction crews, parking, material laydown and erection areas, access roads, a water treatment plant for runoff and dewatering flows, a septic system, and storage for topsoil.

3.4.6.2 California Aqueduct Control Structure

The California Aqueduct Control Structure would be on the California Aqueduct, about 500 feet upstream of the confluence of the California Aqueduct and the South Delta Outlet and Control Structure. It would use a series of six large radial gates and one small gate to control flows from Clifton Court Forebay into the California Aqueduct or to balance them with flows from the Southern Forebay for conveyance into the SWP Banks Pumping Plant. The structure and surrounding grading heights would provide protection to downstream facilities from the highest anticipated 200-year flood event plus sea level rise for year 2100 in the Clifton Court Forebay area.

3.4.6.3 Maintenance

At the South Delta Outlet and Control Structure under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, each reception shaft would extend vertically into a collection basin from which the flow would enter an open channel system. This basin would have a separate tunnel transition compartment for each shaft to allow one tunnel to be isolated for dewatering and maintenance while the other tunnel remains in full operation. Two sets of bulkhead gates for isolation would be installed when needed to provide double isolation for worker safety during maintenance activities. Flow would proceed from the basin into a section of the facility containing radial gates. These gates would provide flow control for water being conveyed from the Southern Forebay into the California Aqueduct. Bulkhead gates installed in vertical slots in the piers between the radial gates, upstream and downstream, would allow isolation and dewatering of each gate bay as needed for gate maintenance and repair.

Under Alternatives 2a and 4a, the Jones Control Structure would have eight stop logs for isolation of all radial gates and dual isolation of Jones Tunnel. Two additional high stop logs would isolate the smaller radial gate and Jones Tunnel. Similarly, the California Aqueduct Control Structure and the Delta Mendota Control Structure would each use two sets of stop logs to isolate two sets of gate structures at each facility for inspection and maintenance. The Jones Outlet Structure would require double isolation for maintenance of the Jones Tunnel.

None of the Southern Complex structures would be present in Alternative 5, Bethany Reservoir alignment.

3.4.7 Access Roads

Constructing any of the alternatives would require substantial transportation facility improvements to serve the construction and material delivery processes and provide access to compensatory mitigation sites. Construction would require temporary relocation and realignment of SR 160 at the intakes (Figure 3-6), and new or improved access roads to intakes, tunnel shafts, the Southern

Complex, and the Bethany Complex (Figure 3-18, Figure 3-25, and 3-36). Details of road modifications under each alignment are provided in Appendix 3D, Tables 3D-2, 3D-3, and 3D-4.

Pavement conditions on existing county and local roads in the project area are predominantly classified as marginal to unacceptable.[1] State Routes are generally in good condition although pavement condition data were not available for all State Routes at the time of the needs assessment. DWR will conduct preconstruction pavement and roadway analyses of access roadway segments on local and county roads to determine whether the following access roads that are identified in the conceptual design of the project alternatives need improving: Lambert Road, Dierssen Road, Franklin Boulevard, Twin Cities Road, West Lauffer Road, SR 12, West Lower Jones Road, Bacon Island Road, Bacon and Mandeville Islands farm roads, Blossom Road, West Fyffe Street, West House Road, Lower Roberts Island Road, Western Farms Ranch Road, Clifton Court Road, Byron Highway, Lindemann Road, Mountain House Road, and Kelso Access Road (Delta Conveyance Design and Construction Authority 2022a, 2022b). Road improvement activities would include pavement remediation (e.g., fill potholes, asphalt cracking, and slurry seals), widening to a minimum of 12 feet, roadway design to serve construction traffic with new roads, and constructing new bridges or widening existing bridges. Where road and bridge improvements are undertaken, wider shoulders would be considered to meet bicycle lane standards; design standards for each state or local entity that operates roads and bridges would be followed for all proposed improvements on the existing respective roadways. Some project-area bridges rated as structurally deficient or functionally obsolete are scheduled to be replaced or rehabilitated by their respective jurisdictions. DWR would issue communications regarding roadway conditions and construction biweekly and post on the project information website in the multiple languages spoken in the Delta (see Section 3.20.1, *Point of Contact*, regarding project website and communications during construction). This would inform residents, business owners, and farmers of daily road construction and high-volume construction traffic events (e.g., during hours of materials deliveries).

Modifications to existing roadways during project construction would be completed in accordance with Caltrans or county criteria, depending upon the owner of the roadway. Future roadway projects under consideration by local or state agencies were reviewed to potentially coordinate road improvements. The preconstruction pavement and roadway analysis will be included as part of the Geometric Approval Drawings submittal for review, comment, and refinement, in consultation with the applicable transportation entities, including Caltrans for state highways and intersection facilities and local agencies for local roadway and intersection facilities. Improvements to State Routes would be designed and constructed in collaboration with Caltrans. Project roadway improvements to existing State Routes, local roadways, and bridges would remain after construction.

Roads used for material hauling, construction equipment access, and employee access would consist of existing State Routes and two-lane roadways in the Delta, new gravel (with chip seal except on Mandeville and Bacon Islands) or paved roadways constructed from existing roads to construction sites, and new roads within facility construction sites. Project logistics studies identified Lambert Road, portions of SR 4, SR 12, Byron Highway, and I-5 and I-205 as the core road access for trucks to haul equipment and materials to and from the project work sites. Current conditions of nonstandard

[1] Each county and the California Department of Transportation use different pavement management systems for classifying pavement conditions. For ease of interpretation, the separate condition categories were mapped into a single classification with two categories: acceptable and not acceptable (Delta Conveyance Design and Construction Authority 2022c:15).

shoulders and lane widths, combined with a lack of parallel streets and roads for detour, contribute to congestion on some of these routes. Truck routes were evaluated for existing and project truck volumes and would be improved where project truck traffic warrants improvement, based on the duration of work and expected commodities to be carried. Minimum requirements for truck routes are 12-foot-wide lanes and 4-foot-wide shoulders. SR 99, Twin Cities Road, and more than 30 local roads would also provide direct access to project work sites. Construction access roads would remain postconstruction for maintenance access to the facilities.

In all alternatives, SR 160 near the proposed north Delta intakes would be temporarily rerouted east of its existing alignment during the intake construction process and then relocated through the intake facility in the vicinity of the current SR 160 alignment (Figure 3-6), in collaboration with Caltrans for design and construction oversight, as described in Section 3.4.1.3, *Temporary and Permanent Flood Control Levees and State Route 160.*

Approximately 3.2 miles of Lambert Road from Franklin Boulevard to the new intake haul road and various portions of SR 12 near tunnel shaft sites would be widened under all alternatives. Tunnel crossings under I-5, SR 4, and SR 12 (applicable to all alternatives), and addition of turn lanes to SR 12 (applicable to eastern and Bethany Reservoir alignments) would be designed by DWR under Caltrans oversight and constructed through the Caltrans encroachment permit process with Caltrans oversight of construction activities.

A new 3.8-mile paved intake access/haul road would be constructed along the west side of the abandoned railroad embankment, to a new dedicated haul road east of the intakes to access Intakes B and C. Approximately 180 feet of the existing bridge over Snodgrass Slough at Hood-Franklin Road would be widened. The haul road would eliminate the need for construction traffic to travel through the main portion of the Town of Hood and on SR 160; it would not be a public road. All access for construction, plus most operations-phase access, would use the haul road to enter the intake sites (Figure 3-18 and Figure 3-25).

For alternatives involving Intakes B and/or A, the new intake haul/access road would be extended north by another 0.7 mile from Intake C past Hood-Franklin Road to a new 0.25-mile access road connecting to Intake B for all alternatives except 2b and 4b, and by an additional approximately 2.2 miles to Intake A. At Intake A, access would be provided by a 2.54-mile extension of the paved intake access road from Intake B. The paved road would be 32 feet wide with two 12-foot lanes and 4-foot shoulders. This access road also would include a 350-foot long by 32-foot wide bridge over a drainage channel.

For truck access to the Twin Cities Complex, approximately 1.4 miles of Twin Cities Road would be widened from Franklin Boulevard east of I-5 to I-5, and Dierssen Road would be widened for approximately 1 mile from Franklin Boulevard to I-5. Franklin Boulevard would be relocated and widened for approximately 0.6 mile between Twin Cities Road and just north of Dierssen Road for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c to accommodate the railroad connection to the Twin Cities Complex.

For central alignment Alternatives 1, 2a, 2b, and 2c, 0.8 miles of West Lauffer Road would be widened for access to the New Hope Tract maintenance shaft (central alignment location). For access to the Bouldin Island launch/reception shaft site, a new interchange and bridge would be constructed over SR 12 connecting to 2.1 miles of new access road constructed on Bouldin Island. Eight miles of SR 12 between I-5 and the new Bouldin Island interchange would be widened, including bridges over Farm Road and Little Potato Slough. The SR 12 widening would likely be designed with Caltrans assistance and Caltrans would oversee construction. To reach Bacon and Mandeville Islands shaft construction sites, a new bridge would be constructed at Holt over the East Bay Municipal Utility District (EBMUD) Mokelumne Aqueducts and BNSF railroad. To access these shafts, new or upgraded roads would be constructed for 15.5 miles along West Lower Jones Road, Bacon Island Road, and farm roads on Bacon and Mandeville islands, including a new bridge over Connection Slough (Mapbook 3-1).

For eastern alignment Alternatives 3, 4a, 4b, and 4c, a new 0.3-mile access road to the shaft site on New Hope Tract maintenance shaft (eastern alignment location) would be constructed from Blossom Road. To access the Terminous Tract maintenance shaft site, a new uncontrolled interchange with longer acceleration and deceleration lanes along SR 12 would be built and 2.3 miles of SR 12 from Interstate 5 to the tunnel shaft site would be improved. Access to the Lower Roberts Island launch/reception shaft would involve building a new 1.2-mile access road from West Fyffe Street to a new bridge; a new road and railroad bridges over Burns Cut from Port of Stockton; new 3.2-mile access road and rail lines along West House Road from the new bridge; and a new 1.6-mile access road on Lower Roberts Island.

Road improvements proposed under Alternative 5 would be the same as described above for intake access and for the eastern alignment maintenance shafts north of Lower Roberts Island. For Twin Cities Complex access under Alternative 5, 1 mile of Dierssen Road between Franklin Boulevard and I-5 would be widened, and 0.48 mile of Franklin Boulevard would be widened between locations 0.22 miles north of Dierssen Road and 0.25 miles south of Dierssen Road. Twin Cities Road would be widened for 1 mile from a location 0.83 miles west of Franklin Boulevard to a location 0.17 miles east of Franklin Boulevard. Access to the Lower Roberts Island double launch shaft site under Alternative 5 would involve 1.2 miles of new paved road on Rough and Ready Road on Port of Stockton, a new bridge over Burns Cut from Port of Stockton, 2 miles of new paved road to West House Road with widening 1.2 miles of West House Road, and 1.3 miles of new paved road from West House Road to North Holt Road with a new bridge over Black Slough.

In Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, Byron Highway near the Southern Complex would be realigned west of the current alignment to accommodate construction activities associated with the Southern Complex facilities. The modification would include a dedicated overpass over Byron Highway as a truck bypass. New 0.8 miles of road (extension of Discovery Bay Boulevard) would provide access from SR 4 to the Southern Complex on Byron Tract. For access to the Southern Complex west of Byron Highway, Clifton Court Road would be extended 0.1 mile and widened for 0.6 mile. North Bruns Way would be widened for 0.7 mile. Byron Highway would be relocated with a new roundabout to the east of existing Byron Highway, and two new bridges would cross the new alignment.

The modifications related to the Southern Complex would not be necessary under Alternative 5. For Alternative 5 downstream of Lower Roberts Island, road and bridge improvements would be needed for access to the Bethany Complex. These are described in more detail in Section 3.14.2 of this EIR.

Proposed transportation improvements are based on construction traffic analyses to reduce the daily effect of truck trips on local roadways. In addition to proposed new or improved roads for construction access, construction traffic management plans would include measures to reduce construction-related traffic congestion and enhance public safety on Delta roadways. This is discussed in more detail in Chapter 20, *Transportation*, Section 20.3.3.3, *Impacts of the Project Alternatives on Transportation*. Construction traffic would be restricted to I-80 in Yolo County and to

I-80 and SR 12 between I-80 and the Sacramento River in Solano County. Construction traffic would only be allowed on SR 160 between SR 12 and Cosumnes River Boulevard, where the highway would be realigned at the intake locations. Only employee shuttle buses and small pickup trucks would be allowed on Hood-Franklin Road, although construction traffic would cross Hood-Franklin Road west of the Snodgrass Slough bridge to access Intakes A and/or B. No trucks with three or more axles would be allowed on SR 4 across Victoria Island.

Hauling certain construction material by rail where rail is potentially available was also evaluated. Construction of rail spurs and rail-served materials depots would involve realigning or closing certain roads and railroad crossings. Construction traffic on these routes and local access roads would be minimized by construction sequencing of project facilities and incorporating construction material hauling by rail; limited use of barges at intakes only, restricted to daytime hours Monday through Friday; and park-and-ride facilities for employee trips into the construction traffic management plans.

Construction would start with clearing, grubbing, and moving utilities. Existing drainage facilities either within the construction site or adjacent to construction sites would be rerouted to not affect overland drainage flows or groundwater seepage flows prior to construction. After completion of construction at a project site, the condition of the pavement of access roads would be analyzed and remediation would be completed as necessary to return the facility to the condition that DWR constructed.

3.4.8 Rail-Served Materials Depots

Rail access to serve major construction sites would reduce truck use of local roads and highways. The UPRR and BNSF Railroad serve the Delta Conveyance Project area. Rail-served materials depots with rail sidings would be constructed and used to transport certain large volume construction materials, such as tunnel liner segments, to tunnel launch shaft sites and sometimes to convey RTM from the tunnel launch shaft sites to the Southern Complex to form the Southern Forebay embankments. The rail siding would be designed to allow the train to leave or pick up rail cars, hold the rail cars, and off-load or load the rail cars. The depot would include areas where trains would move off the main line to deposit the rail cars and areas to transfer the materials to trucks.

Central and eastern alignment alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) would have rail-served material depots serving the Twin Cities Complex and the Southern Complex.

- Along the UPRR Sacramento-Lathrop rail line near Franklin Boulevard and Twin Cities Road to serve the Twin Cities Complex double launch shaft site.
- Along the UPRR Lathrop-Byron rail line parallel to the Byron Highway to serve the Southern Complex tunnel launch shaft sites and to transport RTM from the Twin Cities Complex to the Southern Complex.

The eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and Bethany Reservoir alignment (Alternative 5) would have a rail-served materials depot at Lower Roberts Island. Under the eastern and Bethany Reservoir alignment alternatives (Alternatives 3, 4a, 4b, 4c, and 5), rail access to Lower Roberts Island would be provided from an extension of an existing short haul line at the Port of Stockton. Rail access would be extended over a new bridge over Burns Cut and continue to the launch shaft site and RTM storage area. This facility is described in Section 3.10, *Alternative 3—Eastern Alignment, 6,000 cfs, Intakes B and C*.

Construction of the rail-served materials depot at the Twin Cities Complex would require realignment of Franklin Boulevard and elimination of one private-road crossing of the UPRR because that land would become part of Twin Cities Complex. No other existing railroad/road crossings would be affected. Road modifications are described in Section 3.4.7, and detailed for the central and eastern alignments in Sections 3.6 and 3.10, respectively. Other road modifications for the Bethany Reservoir alignment are described in Section 3.14.2, *Access Roads*.

At the Southern Complex, 30 miles of UPRR track would be rehabilitated and 14.4 miles of new track would be installed. New track would be installed on existing pilings of existing railroad bridge over the California Aqueduct to the east of Byron Highway. Use of the UPRR Lathrop-Byron rail line for the Southern Complex would require reestablishing operation that has not been fully utilized between Tracy and Byron for over 20 years. This would not include changes of any existing at-grade railroad or road crossings between Tracy and Byron.

3.4.9 Soil Balance

Project construction would require large amounts of fill material at facility sites and would also generate extensive amounts of excavated soils and RTM. Roads and compensatory mitigation would require imported materials from commercial sources. Construction would occur over a period of years at most sites, but not simultaneously at all sites. For example, tunnel launch shaft sites would require soil fill material several months before tunneling operations would produce large volumes of RTM. Once tunneling is underway, RTM volume would be more than what is required to construct the launch shaft sites north of the Southern Forebay Inlet Structure. RTM from tunnel boring on the Southern Complex would be used in construction of the Southern Forebay. To optimize the movement of fill material and reduce the need for import, disposal, and stockpiling, an earthwork model was prepared to understand the total amount of soil fill required and produced at the various construction sites relative to the project schedule. The earthwork model analyzed soil fill material including structural and nonstructural fill, topsoil, peat, and imported specialty materials such as gravel and aggregate base. Model results provided estimates of the volume of fill material that could be produced on-site from excavation (including both RTM and surface soils), the volume needed on-site as structural fill, where import material would be sourced from if a deficit occurs, or where excess material would be stockpiled or disposed of if a surplus occurs.

It is expected that soils excavated on-site at intakes would balance on-site soil needs and no significant import or export of structural fill would be necessary. However, some imported fine-grained levee embankment core material may be required if on-site soils do not meet regulatory requirements for construction. RTM generated at launch shafts at the Twin Cities Complex and Lower Roberts Island would be used for backfilling borrow areas on-site. Soil excavated at the Twin Cities Complex would be used for the on-site ring levee and shaft pad at Twin Cities Complex; the shaft pads on New Hope Tract, Staten Island, and Bouldin Island; and levee repairs on Bouldin Island for central alignment alternatives (Alternatives 1, 2a, 2b, and 2c). (Soils on Bouldin Island are generally not suitable for tunnel shaft pad or levee construction, requiring import from the Twin Cities Complex.) For eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) and the Bethany Reservoir alignment (Alternative 5), soil excavated at the Twin Cities Complex would be used for shaft pads on New Hope Tract, Canal Ranch Tract, Terminous Tract, and King Island. Under the eastern alignment alternatives, soils excavated at the Lower Roberts Island launch shaft site would be used for the shaft pads on Lower Roberts Island and Upper Jones Tract and RTM generated on-site would be used to backfill borrow areas on Lower Roberts Island. Under the Bethany Reservoir alignment, soils from Lower Roberts Island would also be exported for use in shaft pads on Upper Jones Tract and Union Island. Earthwork balance at the Bethany Complex is explained under Alternative 5 (Section 3.14.1.3, *Bethany Reservoir Aqueduct*).

RTM from Twin Cities Complex would be used to backfill excavations on Twin Cities Complex to generally raise the soil to previous ground surface elevation. RTM material from Twin Cities Complex would also be used to develop the tunnel shaft pad at Mandeville and Bacon Islands (central alignment alternatives [Alternatives 1, 2a, 2b, and 2c]) and exported to use on the Southern Forebay embankments. RTM generated at launch shafts on the Southern Complex would also be used for Southern Forebay embankments. On-site soil excavations and RTM generated at the launch shaft sites on the Southern Complex would be used in the Southern Forebay embankments including construction of the pad for the South Delta Pumping Plant. Excavated soils and RTM from the Southern Complex on Byron Tract would be used for the South Delta Conveyance Facilities.

At the Southern Complex, excavated material generated on-site would be usable as structural fill to construct portions of the pumping plant pad, South Delta Conveyance Facilities, forebay embankments, and forebay floor grading. Additional on-site material would be expected to be usable as nonstructural fill to complete grading of the Southern Forebay floor. Peat soil unsuitable for use as fill would be placed in the permanent stockpile immediately north of the Southern Forebay.

Topsoil stripped from beneath the Southern Forebay embankments, inundation area, and other construction areas would be temporarily stockpiled in an area to the north of the Southern Forebay construction area. Approximately 41,000 cubic yards (compacted volume) of topsoil would be reused to cover the outboard slopes of the Southern Forebay embankments and emergency spillway channel embankments. Approximately 458,000 cubic yards (loose volume) of topsoil would be placed in a 5-foot-thick cover layer over the permanent peat stockpile. Remaining topsoil would be stockpiled with surplus RTM in an area to the north of the South Delta Pumping Plant. Approximately 74,000 cubic yards of clay material from on-site excavation of the initial 6 feet of soil would be used to construct the core of most of the Southern Forebay embankments. If fine-grained materials are not available, they would be imported from commercial sources.

3.4.10 Electrical Facilities

Power supplies would be needed at construction sites for the intakes, tunnel shaft sites, Southern Complex facilities including the South Delta Pumping Plant, Bethany Complex facilities, concrete batch plants, and park-and-ride lots. Power supplies would also be needed during operations of the intakes, Southern Complex control structures, South Delta Pumping Plant, Bethany Reservoir Pumping Plant and Bethany Reservoir Discharge Structure, and lights, security, and minor operations and maintenance (O&M) loads at all permanent locations.

Power demand during construction would include support for large equipment, such as cranes and ground improvement machines, tunnel boring machines and associated equipment including ventilation, conveyors and pumps, small tools, and construction-support facilities. Support facilities would include, but not be limited to, construction trailers, temporary lighting, and electric vehicle charging stations. Some of this equipment could be powered by on-site generators or internal combustion engines; however, electrical grid service to the sites, if available, would be more efficient, use less diesel fuels, and produce fewer emissions. In addition, Appendix 3B includes Environmental Commitment EC-7: *Off-Road Heavy-Duty Engines*, which states that DWR will consider use of electric or hybrid-electric off-road equipment (including generators) over diesel counterparts to the extent that they become commercially available, earn a track-record for reliability in real-world construction conditions, and become cost effective. Appendix 3B includes Environmental Commitment EC-13: *DWR Best Management Practices to Reduce GHG Emissions*. Best management practices under Environmental Commitment EC-13 include the following:

- **BMP 1.** Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether the specifications for the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project.
- **BMP 3.** Confirm that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane, or solar power, to power generators to the maximum extent feasible.
- **BMP 11.** Reduce electricity use in temporary construction offices by using high efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

Other strategies under Environmental Commitment EC-13 would achieve reductions in particulate matter and criteria pollutants. In addition, under Environmental Commitment EC-17, *Pursue Solar Electric Power Options at Conveyance Facility Sites*, DWR would pursue and evaluate options for solar power generation at shaft sites and pumping plant sites for operating the conveyance and appurtenant facilities.

Power for construction and operation of the conveyance facilities would use existing power lines to the extent possible, but the location or required load of some facilities would require either new aboveground power towers with lines or underground conduit to serve those specific areas (Figure 3-13). Some existing lines would require adding new towers to extend service to conveyance facilities. Some power would also be abandoned or relocated, and some overhead lines, such as those crossing the intake haul road, would be moved underground to address overhead height constraints. For any aboveground power lines that are new, non-specular materials would be used.

DWR is coordinating electric power transmission modifications with electricity providers: Sacramento Municipal Utility District (SMUD), Western Area Power Administration (WAPA), and Pacific Gas and Electric Company (PG&E). These companies own and maintain high-voltage transmission lines in the project area.

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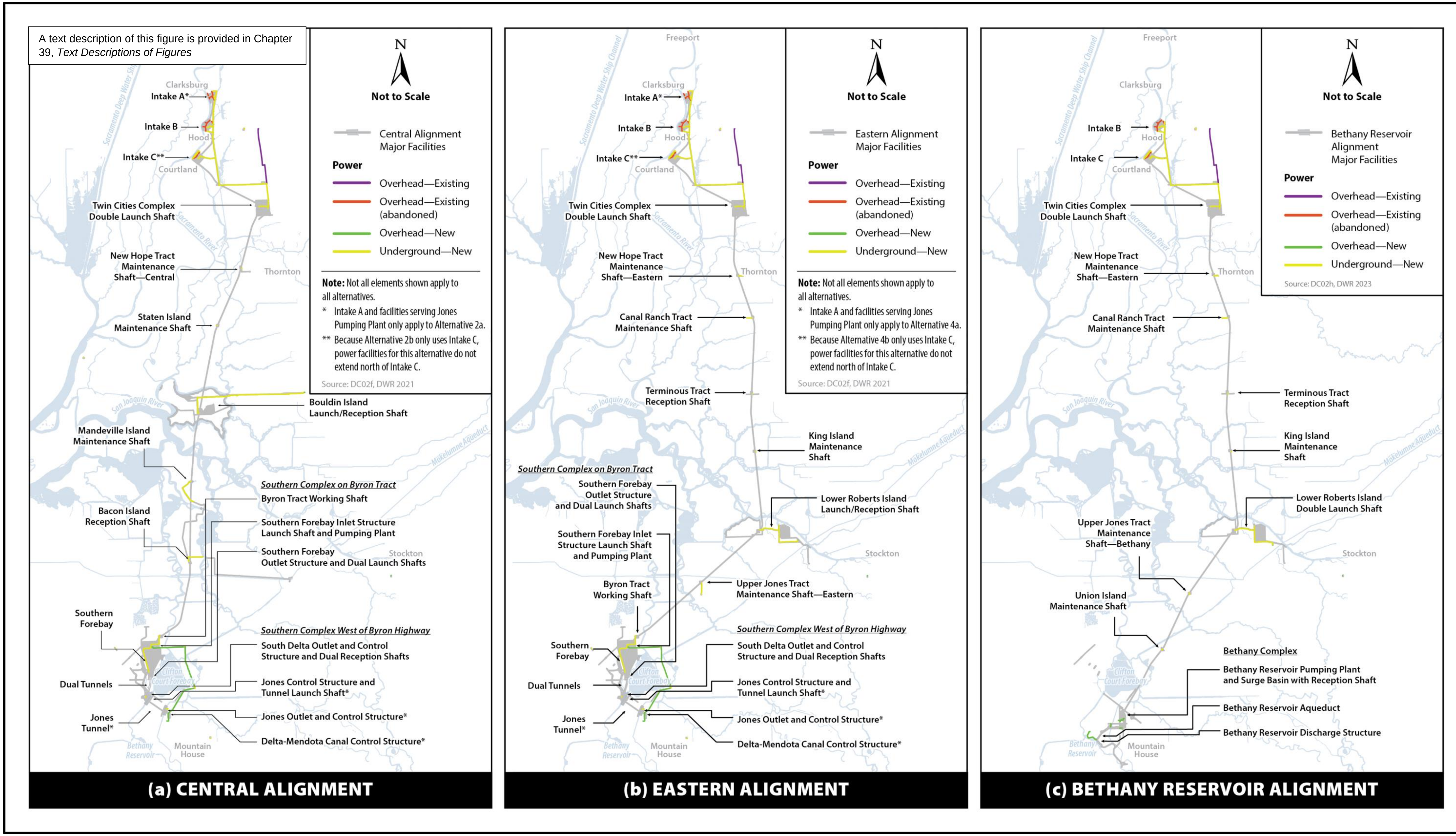

Figure 3-13. Power Lines

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3.4.11 SCADA Facilities

SCADA (supervisory control and data acquisition) systems and associated data communication systems are common features of water infrastructure that enable remote monitoring and control of the performance and operation of the system, including video security cameras. The new Delta Conveyance Project facilities would need to be integrated into SWP's existing SCADA system to allow for coordinated operations (Delta Conveyance Design and Construction Authority 2023a, 2023b). The communications network for the project would connect three major data centers, up to three intakes (depending on alternative) and up to three remote data sites for the central alignment and four remote data sites for the eastern alignment. It would connect three major data centers, two intakes, and four remote data sites for the Bethany Reservoir alignment. The major data centers would be at the existing DWR Project Control Center, DWR Operations and Maintenance Area Control Center at the Delta Field Division, and the new South Delta Pumping Plant or Bethany Reservoir Pumping Plant. During operation, SCADA would provide real-time performance data at intakes, tunnel launch shafts, and the Southern Complex or Bethany Complex facilities. A SCADA connection point would be included at the Terminous Tract maintenance shaft for the Eastern alignment alternatives and Bethany Reservoir alignment. No SCADA connection would be included at maintenance or reception shafts for the Central alignment alternatives. The communications aspects of the SCADA system would be used during construction to facilitate internet applications at the launch shaft sites, the intakes, and the Bethany Reservoir Pumping Plant.

The SCADA system would consist of SCADA equipment and communications links based upon fiber-optic cables that would be installed within and connecting to new structures. Whenever possible, the construction of fiber-optic based communications systems for the project would use existing telecommunications infrastructure, dedicated conduits within project road modifications, and termination panels installed inside or on the buildings or structures. Wherever possible, underground routes would be located along existing roads and project access routes (Figure 3-14). Overhead fiber installation would be limited to alignments with existing power pole corridors. The fiber cables would look similar to cable television cables.

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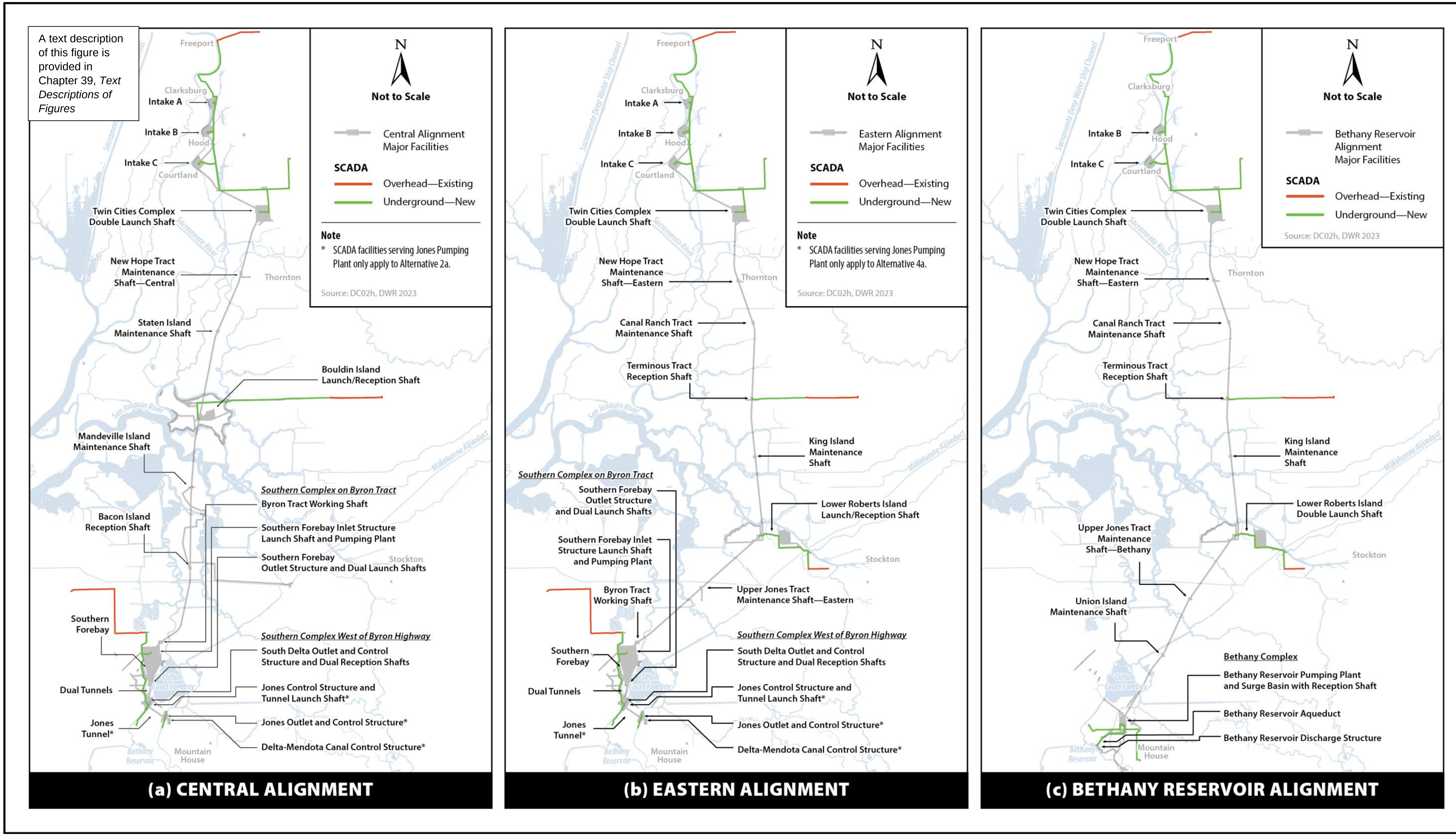

Figure 3-14. SCADA Fiber Routes

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3.4.12 Fencing and Lighting

Construction site security for major work sites would include security guards stationed at the main entry and exit gates for 24-hour site access management and surveillance. Security personnel would be on-site with regular inspection rounds. Cameras would also be used at key locations. Once construction is complete, permanent security fencing would be in place, and cameras would be installed with either local recording devices or transmission capabilities. These cameras would be located at sites where permanent power and SCADA facilities are proposed. Security personnel would monitor the site periodically.

During construction, park-and-ride lots would have downcast lighting. Permanent lighting at facility sites would be downcast, cut-off type fixtures with non-glare finishes and controlled by photocells and motion sensors, depending on the location. Construction and maintenance lighting would be similar except for a few necessary nighttime work activities that would require higher-illumination safety lighting of the work sites. Lights would provide good color with natural light qualities and minimum intensity with adequate strength for security, safety, and personnel access. The lights would comply with the Illuminating Engineering Society industry standards for light source and luminaire measurements and testing methods.

During construction, night lighting at park-and-ride lots would be controlled by motion detectors. During operations, the lights at the intakes, tunnel shafts, Southern Complex, and Bethany Complex would be motion activated to minimize light and glare to adjacent properties.

3.4.13 Park-and-Ride Lots

Park-and-ride lots would be established near major commute routes, where workers could park and ride shuttle buses or vans to construction sites. The employee shuttles would be electric-powered, and the park-and-ride lots would be equipped with electric vehicle charging stations. Trucks arriving late at night could also use these lots to park overnight to minimize nighttime deliveries to construction sites. Lots would be lighted with nighttime security lighting with motion detectors. Park-and-ride lots would be removed after construction unless local communities are interested in maintaining these lots in the future through the Community Benefits Program. Lots would be at the following sites.

- **Hood-Franklin Park-and-Ride Lot.** (Central, eastern, and Bethany Reservoir alignment alternatives.) Parking for employees at intakes. This lot would be located along the south side of Hood-Franklin Road immediately east of I-5. The total construction area would be 4.1 acres. The land is currently mostly agricultural land; a Caltrans construction yard occupies a small portion.
- **Charter Way Park-and-Ride Lot.** (Central, eastern, and Bethany Reservoir alignment alternatives.) Parking for employees at tunnel shafts on Lower Roberts, New Hope Tract, Staten Island, Bouldin Island, Mandeville Island, and Bacon Island on the central alignment, or New Hope Tract, Canal Ranch Tract, Terminous Tract, and King Island on the eastern and Bethany alignments. This lot would be located along the south side of Charter Way at the southwest corner of the I-5 overpass, on the south side of SR 4, just west of I-5. The total construction area would be 2.4 acres. The land is currently a private truck parking lot and would only require upgrade or replacement of pavement and lighting systems.
- **Rio Vista Park-and-Ride Lot.** (Central alignment alternatives.) Parking for employees at the Bouldin Island Tunnel Shaft. This lot would be located along the south side of SR 12 immediately

east of SR 160. The total construction area would be 3.0 acres. The land is currently agricultural land.

- **Byron Park-and-Ride Lot.** (Central and eastern alignment alternatives.) Parking for employees at the Southern Complex. This lot would be located near the northwest corner of Camino Diablo Road and Byron Highway. The total construction area would be 2.1 acres. The land is currently in an industrial area.
- **Bethany Park-and-Ride Lot.** (Central and eastern alignment alternatives.) Parking for employees at the Southern Complex. This lot would be located along the north side of Bethany Road to the east of the intersection of Henderson Road. The total construction area would be 2.6 acres. The land is currently agricultural land.

3.4.14 Land Reclamation

The alternatives would include some areas that would be temporarily disturbed but not needed for long-term operations of the proposed Delta Conveyance Project (e.g., construction staging areas). DWR would transfer this land to interested parties to be consistent with local land uses, including agricultural production or open space/natural habitat. To be able to use land for these purposes after construction, the alternatives include activities to reclaim this land.

Areas included in the construction boundary and not included in the postconstruction (permanent) project operations boundary at the intakes, tunnel launch shaft sites, and Southern Complex or Bethany Complex would undergo reclamation (Figure 3-15). Lands to be reclaimed would be those areas used during construction for material and equipment laydown and staging, material stockpiles, slurry/grout mixing plants, parking areas, and facilities/trailers (Figure 3-16). DWR would acquire the land for construction and would conduct agronomic testing to help determine whether the temporarily disturbed site could be reclaimed and final reclamation methods. The main goal of the land reclamation efforts would be to restore the soil health and condition, to the extent practical, in these temporary construction areas.

Construction activities, equipment, and material stockpiles could compact near-surface native soils or leave soils less suitable for agriculture or habitat. Initial reclamation tasks would include removal of all construction equipment and materials, demolition and removal of concrete slabs from temporary material storage areas, removal of temporary stockpiles/embankments, removal of temporary haul routes, and grading and leveling of the site to generally meet adjacent lands.

Initial soil treatments would depend on the actual disturbance, but for soils with more than minimal impact, the work would be expected to include ripping the soil and incorporating amendments (e.g., gypsum) to reduce compaction. This would be followed by spreading topsoil, cross disking, and fine grading/leveling to prepare the soil surface for future use. If the land transition would not occur in a relatively short period of time after construction, the areas would be drill seeded to provide erosion and dust control using a grass seed mix appropriate for the desired end use. Areas to be reclaimed to grassland would be seeded with a native grass and flowering forb mix, whereas areas to be reclaimed to agricultural use could be seeded with an erosion control seed mix.

Areas excavated to create borrow soil materials would be refilled to existing grade with soil or RTM from existing stockpiles at the end of construction. Treatments for reclamation using RTM base soil would be similar to those recommended for reclamation with native soils; however, additional treatments could be required to address soil conditions (for example, high or low pH). Lime and soil sulfur could be appropriate amendments for addressing soil pH; however, the actual amendments used would be based on soil tests performed at each of the sites postconstruction. Selection of amendments to address nutrient deficiencies would be made in consultation with the end user. Topsoil would be spread to a depth of 1 foot over the RTM base soil. For agricultural uses, the top 1 foot of soil is typically most important and is where fertilizer application would be focused to address the specific needs of the crop. Cultivated lands that are used for borrow and RTM sites that cannot be reclaimed following disturbance because of topographic alteration may be reclaimed as grasslands.

Permanent RTM stockpiles would be expected at some tunnel launch sites. These stockpiles would be elevated above the surrounding grades and would be planted with native grasses primarily for erosion control, for habitat enhancement, and to blend with the surrounding area when the stockpile is not being accessed for a soil material source. Recommended treatments for permanent RTM stockpiles would include spreading topsoil, cross disking, and planting native grasses.

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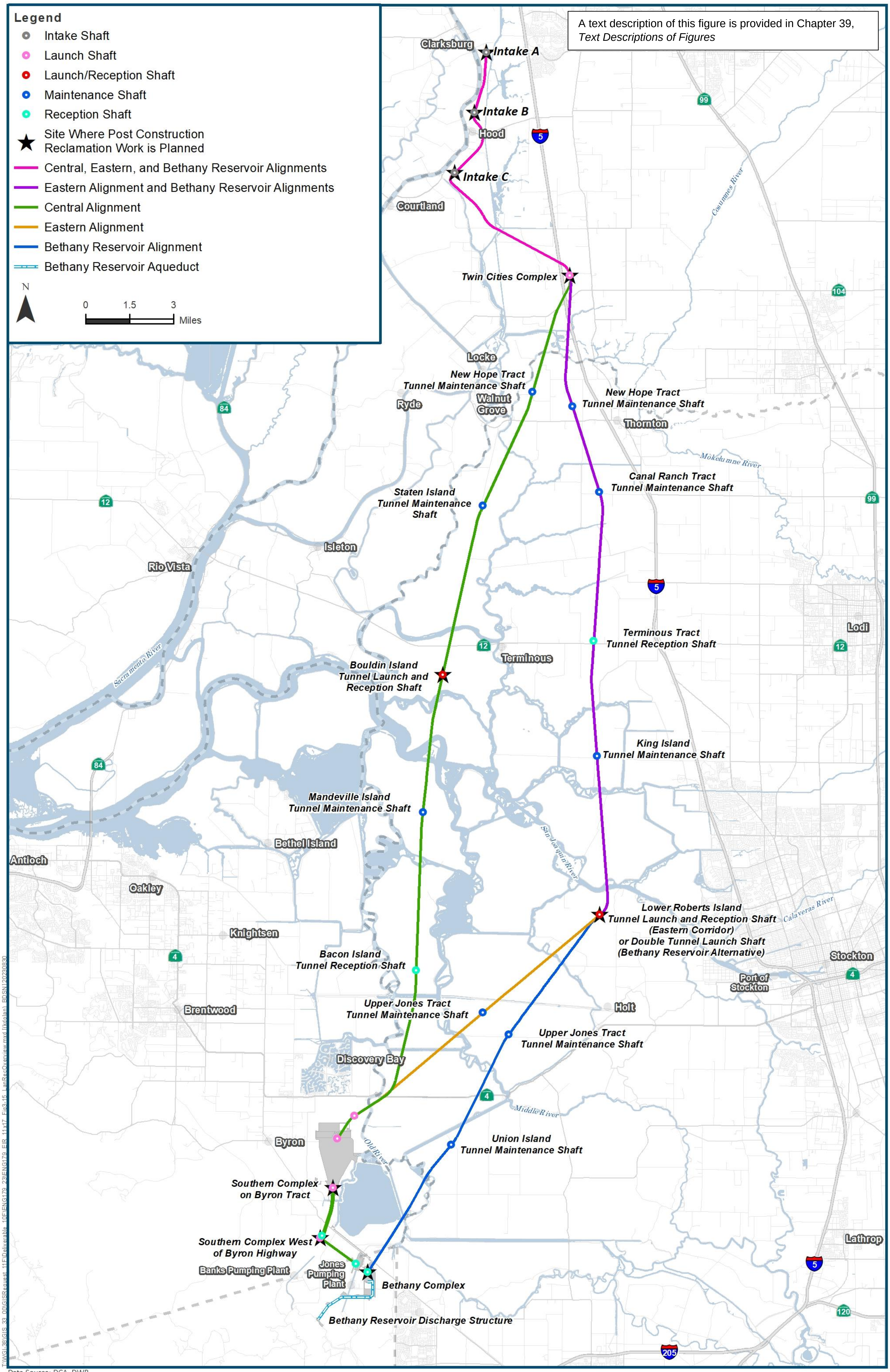

Data Source: DCA, DWR

Figure 3-15. Land Reclamation Areas Overview

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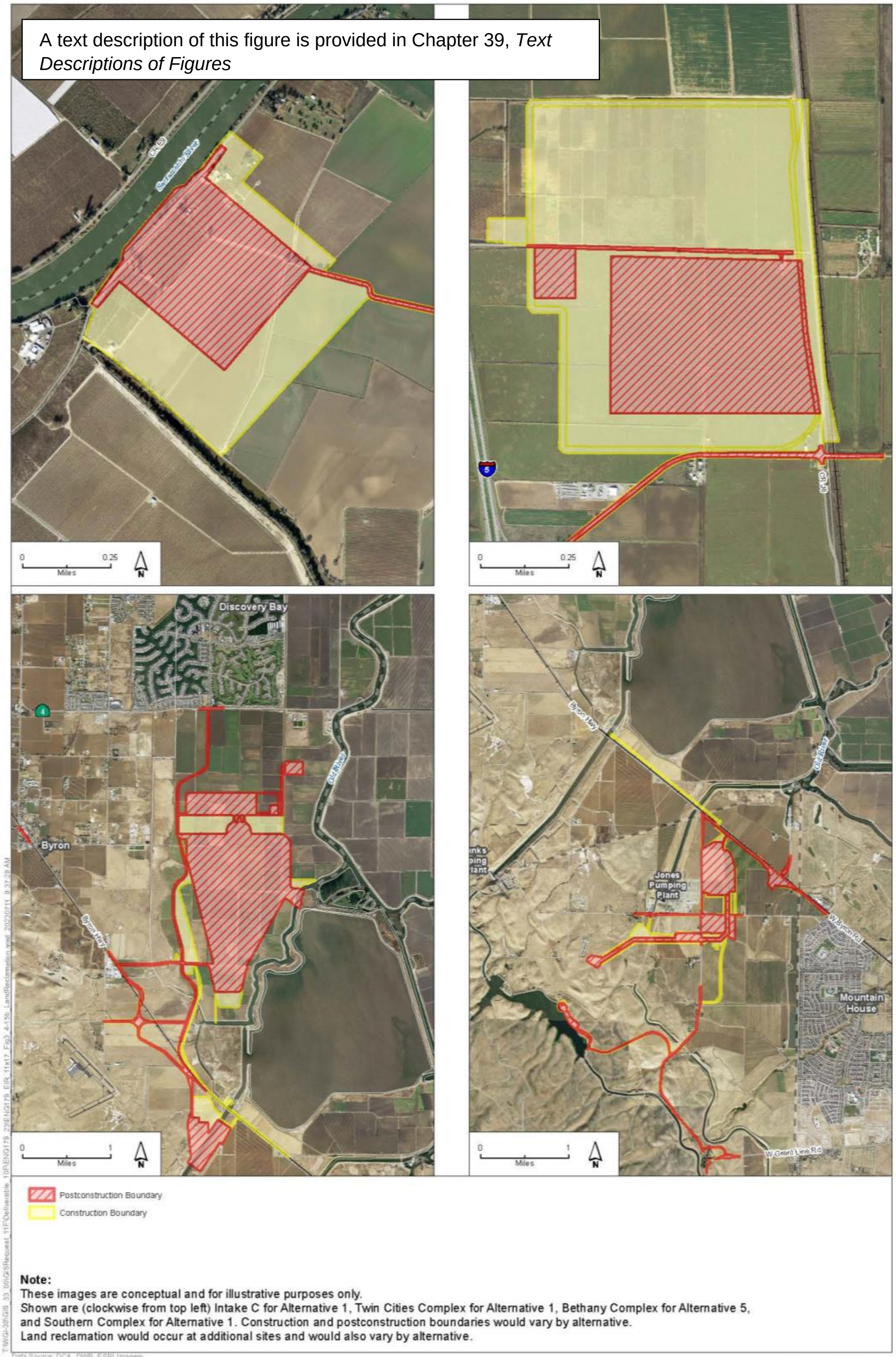

Figure 3-16. Potential Land Reclamation Areas

3.4.15 Other Construction Support Facilities

3.4.15.1 Concrete Batch Plants

Concrete batch plants would be located at Lambert Road at the intersection with Franklin Boulevard (all alternatives), Bacon Island (for central alignment alternatives only), and the Southern Complex near the South Delta Pumping Plant (all central and eastern alignment alternatives). The Lambert Road batch plant would be used for concrete delivery to the intakes, the Twin Cities Complex, and the other tunnel shafts north of SR 12. The Lower Roberts Island Launch/Reception shaft site would not require a dedicated concrete batch plant because it is close enough to a commercial plant to allow deliveries within an acceptable time after loading. The Lambert Road site would house two batch plants under all alternatives except Alternatives 2b and 4b (3,000-cfs capacity), which would require only one concrete batch plant at Lambert Road. Placing batch plants at Lambert Road would help minimize construction traffic and site sizes at intakes. The Southern Complex would have two dedicated batch plants located at northwest corner of Southern Complex site.

Alternative 5 would also utilize the two concrete batch plants at Lambert Road. Under Alternative 5, however, additional concrete batch plants would be at the Bethany Reservoir Pumping Plant and Surge Basin construction site instead of the Southern Complex, to provide concrete to all portions of the Bethany Complex. The two concrete batch plants would be north of Kelso Road and the new Bethany access road east of Mountain House Road. These batch plants were sited to allow a central delivery location for cement and aggregate and allow a centrally positioned site for distribution of the concrete around the Bethany Complex area.

A typical concrete batch plant site would be approximately 600 feet wide by 600 feet long with a 50- to 75-foot-tall batch plant with three bulk cement storage silos; a portable cement silo (trailer 10 feet tall by 60 feet long); a 500-square-foot batch trailer; four propane tanks; a 6,800-square-foot concrete block casting area; a 2,000- to 4,000-gallon diesel fuel tank; a 120,000-gallon water system consisting of six 20,000 gallons storage tanks and related collection facilities for stormwater and wash water; an admixing area that would include a pump house, admixture storage tanks, and secondary containment barriers; an aggregate storage area; a wash area for concrete mixing trucks and related returned concrete collection facilities; and parking for concrete trucks and employee vehicles. The concrete batch plant would include batcher, silo, and truck mixer dust collectors to minimize particulates in the surrounding air. Materials collected in the air filter bags would be hauled to licensed off-site disposal locations or added to the raw materials used to produce concrete. Concrete batch plant structures and equipment would be removed following construction.

3.4.15.2 Fuel Stations and Fuel Storage

Under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, three or four fuel stations with multiple tanks for diesel and gasoline would be constructed throughout the Southern Forebay site. Fuel stations would also be constructed at the intakes, the South Delta Pumping Plant site, and the South Delta Outlet and Control Structure site. Fuel would also be stored at all tunnel shaft sites and at the intakes in accordance with stormwater pollution prevention plan and hazardous waste management criteria, as described in Appendix 3B, Environmental Commitments EC-2: *Develop and Implement Hazardous Materials Management Plans*; EC-3: *Develop and Implement Spill Prevention, Containment, and Countermeasure Plans*; and EC-4b: *Develop and Implement Stormwater Pollution Prevention Plans.* The fuel tanks would be aboveground and would be surrounded by protective bollards to protect against collisions. Double-walled tanks with built-in secondary containment or external secondary containment beneath/around the tanks would protect surroundings from fuel leaks. A protective containment would be beneath each of the fuel tanks and a protective area would be constructed beneath the refueling area to help contain leaks that may occur during fueling. Spill containment kits would be placed at each of the fueling locations.

Under Alternative 5, fuel stations and fuel storage at intakes and tunnel shaft sites would be the same as under the eastern alignment alternatives. Two fuel stations with multiple tanks would also be constructed at the Bethany Reservoir Pumping Plant and Surge Basin. All fuel stations and storage would be removed following construction.

3.4.15.3 Emergency Response Facilities

In general, it is expected that primary emergency response services would be provided by the construction contractors. The contractor will be required to prepare a Project Emergency Response Plan with detailed information regarding emergency services, access to construction sites, and emergency response times to Delta communities. The Project Emergency Response Plan requires on-site emergency response facilities and services at primary work sites during construction. Evaluations and discussions with local agencies would be conducted to determine the most appropriate method to coordinate between project contractor-provided emergency response services at the construction sites and integration with local agencies. Additionally, DWR would enter into mutual aid agreements with emergency services agencies in the project area.

Under all alternatives using both Intakes B and C (including the 7,500-cfs alternatives that also use Intake A), emergency response facilities would be located at the Intake B construction site. Resources would include fire, rescue and medical equipment, personnel, and a helipad. Emergency personnel could include construction-phase staff that would be cross-trained. For alternatives with a single intake, temporary emergency response facilities would be established at the Intake C work site.

Intakes B and C, tunnel launch shaft sites, and the Southern Complex under central and eastern alignment alternatives or the Bethany Reservoir Pumping Plant and Surge Basin under Alternative 5 would each have a helipad for emergency evacuations. Intakes would also have a rescue boat. The Twin Cities Complex under all alternatives and the Lower Roberts Island double launch shaft site under Alternative 5 would have two ambulances during construction because there are two launch shafts.

Emergency response facilities at construction sites could be removed during construction demobilization depending on DWR's decision for need during operations.

3.4.15.4 Standby Engine Generators

Engine generators would be expected to be used during construction at the intakes. Standby engine generators would be used in the event of power outages. The Twin Cities Complex, Bouldin Island, and Lower Roberts Island launch shaft sites would each have a standby engine generator with fuel tanks during construction to provide essential services to the tunnel and TBM, including ventilation, lighting, lift, and sump pumps. Under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, the Byron Tract working shaft site, the Southern Forebay Inlet Structure tunnel launch shaft, and Southern Forebay Outlet Structure dual tunnel launch shafts would each have two standby engine generators during construction. The South Delta Outlet and Control Structure and the California Aqueduct Control Structure would share one portable standby engine generator.

Under Alternative 5, standby engine generators would be used during construction at the intakes, the Twin Cities Complex, Lower Roberts Island shaft site, each of the Bethany Reservoir Aqueduct tunnel portals, and the Bethany Reservoir Discharge Structure.

During operations, intakes would each have two permanent standby engine generators under all alternatives. The standby engine generators would be installed inside a fenced area on the top of site embankments, with the fuel tank. The fuel would be provided by a diesel tank with suitable containment or a propane tank set aboveground. The permanent standby engine generators would provide energy to operate the valves and gates, including the ability to stop diversions at the intake structure.

The Bethany Reservoir Pumping Plant and the Bethany Reservoir Discharge Structure sites would each have a permanent standby engine generator with an isolated and fully contained fuel tank, as described in Section 3.4.15.2.

3.4.15.5 Local Water Supply, Drainage, and Utilities

Delta Conveyance Project construction and operation would require services of power, water, telecommunications, and SCADA utilities. At several locations power distribution lines (Section 3.4.10, *Electrical Facilities*), irrigation, and drainage lines would be modified to maintain existing service and provide service to the project facilities. Gas wells and infrastructure are addressed in Chapter 27, *Minerals*. Levees are addressed in Chapter 7, *Flood Protection*. The following is a summary of project features as related to drainage and water supply utilities.

All Delta Conveyance Project features would be designed to not increase peak runoff flows into adjacent storm drains, drainage ditches, or rivers and sloughs. At the intakes, tunnel shafts, and Southern Complex, all water from dewatering activities and stormwater runoff on the construction site would be collected, treated, and stored on-site to reduce the need for off-site water sources. On-site reuse and storage would be maximized to reduce peak runoff rate from the site and the need to purchase potable water. If additional stored water is not needed, the treated stormwater runoff flows would be discharged to adjacent waterbodies in a manner that would not increase peak flow rates. Use of the treatment and storage facilities would avoid increased peak stormwater runoff flow rates from project construction sites.

Water supplies in the vicinity of the construction sites are provided by on-site groundwater, import from local sources, exchanges, existing riparian diversions, new temporary appropriations, or existing SWP appropriations. None of the potential construction sites are served by local or regional water agencies. Existing groundwater supplies occur at all of the project construction sites. Existing surface water right diversions occur on parcels at the intake sites, Lower Roberts Island tunnel shaft site (eastern and Bethany Reservoir alignments), and Byron Tract (central and eastern alignments).

Construction activities may require various amounts of water depending on the activity and location. The water supply needed for construction will be satisfied through a combination of the following: import from local sources, exchanges, use of existing riparian diversions, new temporary appropriations, or existing State Water Project appropriations. Any use of diversions will be screened, as appropriate, and additional authorizations addressed following development of detailed construction engineering. Self-contained trailers (size of freight trailers used for tractor-trailer rigs) would be used to contain the water treatment plant and for water storage. Approximately 20 to 50 containers would provide water treatment and storage at each construction site based upon the amount of water to be provided from site runoff, dewatering activities, and water hauled to the site. In some cases, temporary water tanks would be provided in lieu of multiple trailers. Water would be stored in specific facilities for firefighting at the intakes and tunnel launch shaft sites.

Most construction sites contain local irrigation and drainage facilities installed by existing or previous private landowners or reclamation districts. These systems may serve parcels that would be acquired for the project and adjacent parcels. Most of these existing facilities are buried and therefore not visible on aerial photographs. When the project can acquire access to specific parcels, irrigation and drainage facilities would be mapped for each site. If the facilities used by adjacent properties to move water from the existing diversion are located on a parcel to be used for a project feature, pipelines or canals would be installed to maintain service to the adjacent properties.

Wastewater service for structures near the project construction sites consist of individual septic systems with septic tanks and leach fields. Regional wastewater facilities are provided to the communities of Courtland and Walnut Grove by the Sacramento Area Sewer District. Interceptor pipelines extend between these communities and a regional pumping plant at the Rio Cosumnes Correctional Center (RCCC) (near the Franklin Field along Bruceville Road). The RCCC pumping plant lifts the wastewater into another interceptor that extends to the Sacramento Regional County Sanitation District wastewater treatment plant near the community of Elk Grove.

The project facilities would include widening of Lambert Road and installation of underground power cables along Lambert Road at a depth of about 5 feet. The New Hope Tract tunnel maintenance shaft along the central alignment would be located to the north of the interceptor alignment near West Lauffer Road. These facilities would be designed to not affect the wastewater interceptors. The main tunnel would be bored at a depth of almost 100 feet below the interceptors at Lambert Road and near West Lauffer Road.

Wastewater facilities for all of the project construction sites would be provided with portable restrooms. Septic systems would also be constructed at the intakes (all alternatives), Twin Cities Complex (all alternatives), Bouldin Island tunnel launch shaft (central alignment alternatives), Lower Roberts Island (eastern and Bethany Reservoir alignment alternatives), Southern Complex (central and eastern alignment alternatives), and at Bethany Reservoir Pumping Plant and Surge Basin site (Bethany Reservoir alignment). Because of high groundwater and/or low soil permeability at these sites, the leach fields would be sized larger than for locations with more favorable soil conditions, in accordance with the applicable county regulations.

3.5 No Project Alternative

Under CEQA, an EIR is required to analyze the No Project Alternative. As directed by the CEQA Guidelines, 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 Notice of Preparation "will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant" (CEQA Guidelines § 15125(a)).

CEQA Guidelines Section 15126.6 directs that an EIR shall evaluate a specific alternative of "no project" along with its impact. This Guideline section states that "the purpose of describing and analyzing a no project alternative is to allow decisionmakers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project…. [this analysis] shall discuss the existing conditions at the time the notice of preparation is published … as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved." For a "development project" such as the proposed Delta Conveyance Project, the no project alternative is the "circumstance under which the project does not proceed … if disapproval of the project under consideration would result in predictable actions by others, such as the proposal of some other project, this 'no project' consequence should be discussed ... [and] where failure to proceed with the project will not result in preservation of existing environmental conditions, the analysis should identify the practical result of the project's non-approval …" Section 15126.6 goes on to direct that, "after defining the no project alternative … the lead agency should proceed to analyze the impacts of the no project alternative by projecting what would reasonably be expected to occur in the foreseeable future if the project were not approved …."

CEQA Guidelines Section 15126.6, Subdivision (e)(2) indicates that No Project conditions may include some reasonably foreseeable changes in existing conditions and changes that would be reasonably 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. For purposes of this analysis, the No Project is considered at two timeframes. The first timeframe considered for the No Project Alternative is at 2020, which is the same timeframe as the project alternatives (in light of comparison to the 2020 environmental setting, which is the baseline for determining impacts under CEQA). Generally, the No Project Alternative at 2020 is identical to existing conditions found within the study areas and therefore is not separately discussed in the resource chapters.

The Final EIR analysis also considers a No Project Alternative under future conditions, when the Delta Conveyance Project is anticipated to be fully constructed and operational. This condition is represented by the year 2040 for resources that consider modeling to help characterize the alternatives. Under the No Project Alternative, DWR would continue to operate the existing SWP facilities to divert, store, and convey SWP water consistent with applicable laws, regulations, and permit conditions, and SWP contractual obligations for water deliveries. A description of the environmental conditions that may change under the No Project Alternative under future conditions is included in each resource assessment that is fully or partially dependent on the 2040 modeled condition. However, under the No Project Alternative, DWR would not make any changes to the SWP facilities in the Delta to address water supply reliability and related objectives identified in Chapter 2, *Purpose and Project Objectives*.

Under the No Project Alternative, DWR would remain subject to the current take limits for listed species and other current ESA and California Endangered Species Act (CESA) requirements. For this analysis, the No Project Alternative assumptions are limited to existing conditions, programs adopted during 2020 (i.e., what was known during the early stages of development of the Draft EIR), facilities that are permitted or under construction during the early stages of development of the Draft EIR, projects that are permitted or are assumed to be constructed by 2040, annual actions that vary each year, and changes resulting from climate change and assumed extreme sea level rise that would occur with or without the project (Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*). These assumptions represent continuation of existing plans, policies, and operations by governmental and nonprofit entities, and conditions that represent continuation of trends in nature.

Among the ongoing programs by governmental entities that are included in the No Project Alternative are actions required by the 2019 USFWS and NMFS Biological Opinions (BiOps) on Coordinated Long-Term Operations of the CVP and SWP and the California Department of Fish and Wildlife (CDFW) 2020 Incidental Take Permit (ITP) for Long-Term Operations of the SWP. The following summarizes which actions are reflected in the No Project Alternative.

- The anticipated effects of actions required by the 2019 BiOps and 2020 SWP ITP that have already occurred or are expected to be implemented prior to project approval are assumed in the No Project Alternative.
- The anticipated effects of actions required by the 2019 BiOps and 2020 SWP ITP that change water operations in the project area or upstream were assumed in the No Project Alternative if they were reasonably certain to occur and enough was known about the effects of the project in early 2020.[2]
- Examples of effects assumed in the No Project Alternative include the effects of operations of the Delta Cross Channel gates, those related to measures to reduce entrainment at the south Delta export facilities, and the Fremont Weir big notch (more formally known as the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project).

The detailed elements of the No Project Alternative are presented in Appendix 3C.

As noted above, the assumptions for the No Project Alternative as they relate to ongoing operation of the SWP are limited to what is reasonably foreseeable under existing and adopted programs in light of expected conditions reflecting ongoing climate change. The inherent challenge in envisioning long-term No Project conditions has required DWR, for purposes of defining the No Project Alternative in this Final EIR, to make some informed judgments about what might happen outside the immediate SWP context during such an extended time period. The analysis of the No Project Alternative in this Final EIR includes the possible actions of California water suppliers other than DWR under a long-term scenario in which the Delta Conveyance Project is not approved or implemented. In this scenario, SWP supply reliability would be expected to continue to degrade, and water agencies that receive SWP supplies would need to take additional actions to address local shortages that likely go beyond those actions that agencies are planning with or without the Delta Conveyance Project. These actions could include pursuing additional water conservation programs, water recycling projects, groundwater recovery projects, desalination of seawater or brackish

[2] For a detailed explanation about these modeling assumptions, see Appendix 5A, *Modeling Technical Appendix*.

groundwater, surface water storage, groundwater management, or water transfers and exchanges.[3] Constraints and regulations imposed by implementation of groundwater sustainability plans in response to the Sustainable Groundwater Management Act of 2014 could increase the need for reliable SWP surface water supplies over time.

More detail about which agencies would pursue which types of projects is provided in Appendix 3C, Section 3C.3.2.5, *No Project Alternative Assumptions for Water Agency Actions*.

As is explained throughout this Final EIR, such conditions would likely entail continuing uncertainty of SWP south Delta exports, increasing vulnerability in the south Delta to long-term reductions in water quality resulting from sea level rise, and continuing vulnerability to a major seismic event that could harm Delta facilities and potentially temporarily halt export operations. Further discussion of these risks and their potential consequences is incorporated in Chapter 30, *Climate Change*, and Appendix 5A, *Modeling Technical Appendix,* regarding climate change assumptions.

The No Project Alternative at 2040 includes ongoing and reasonably foreseeable projects and programs that are assumed to occur in the absence of the Delta Conveyance Project. The No Project Alternative includes the actions Delta Conveyance Project participants may take if the Delta Conveyance Project was not constructed and the resulting environmental effects of those actions. The other project and programs occurring within the Delta Conveyance Project study areas are included in the cumulative effects analyses in each resource chapter.

[3] It is acknowledged that water agencies are already exploring these types of actions as outlined in their water management plans. However, the No Project Alternative focuses on the added level of these actions that would be needed in order to replace any water reliability that would be gained through implementation of the Delta Conveyance Project.

3.6 Alternative 1—Central Alignment, 6,000 cfs, Intakes B and C

This section summarizes the distinctive characteristics of Alternative 1, which includes the major features described in Section 3.4 that are common to most central alignment alternatives (Alternatives 1, 2a, 2b, and 2c). Each central alignment alternative is then described relative to Alternative 1 in the respective sections that follow. As explained in Section 3.3, features vary among alternatives mainly in size (based on conveyance capacity), intakes utilized, and elements included at the South Delta Conveyance Facilities. Figure 3-2a, Mapbook 3-1, and Figure 3-17 show locations of project facilities and major construction features for the central alignment with 7,500 cfs conveyance capacity (Alternative 2a) in order to represent the potential maximum extent of the alignment. Alternatives with 6,000 cfs conveyance capacity would use only Intakes B and C; alternatives with 3,000 cfs conveyance capacity would use only Intake C.

Alternative 1 would follow a central alignment to convey 6,000 cfs of water diverted at Intakes B and C. Each intake would have a maximum diversion capacity of 3,000 cfs. To convey up to 6,000 cfs, the tunnel under Alternative 1 would have an inside diameter of 36 feet and an outside diameter of 39 feet and extend 39 miles from the intakes to the Southern Forebay. Figure 3-2a depicts the central alignment alternatives and major facilities.

Beyond the Twin Cities Complex double launch shaft, central alignment alternatives would also have shafts along the main tunnel route at the following locations, as shown on Figures 3-2a and 3-17.

- New Hope Tract maintenance shaft (central)
- Staten Island maintenance shaft
- Bouldin Island reception and launch shaft
- Mandeville Island maintenance shaft
- Bacon Island reception shaft
- Byron Tract working shaft (launch shaft)
- Southern Forebay Inlet Structure (launch shaft)
- Southern Forebay Outlet Structure and dual launch shafts (Section 3.4.5.4)
- Dual reception shafts at the South Delta Outlet and Control Structure along SWP Banks Pumping Plant approach channel (Section 3.4.6.1)

Alternatives 1, 2a, 2b, and 2c would have a reception and launch shaft on Bouldin Island between Twin Cities Complex and the Byron Tract working shaft. The tunnel launch shaft on Bouldin Island would launch the TBM south toward the tunnel reception shaft on Bacon Island. The same shaft would also be used to recover the TBM launched from Twin Cities Complex. This facility on Bouldin Island would also contain a gantry crane, RTM storage, tunnel liner segment storage, offices, emergency response facilities, water treatment facilities, and other appurtenant facilities and structures.

The Bouldin Island site is potentially vulnerable to flooding because portions of the existing perimeter levee have insufficient freeboard or slopes that do not comply with the Public Law 84-99 Delta-specific levee design standard. Targeted repairs would primarily involve levee widening and crown raises to provide 1.5 feet of freeboard above the 100-year flood elevation, minimum 16-foot crest width, exterior slopes of 2H:1V, and interior slopes ranging between 3H:1V and 5H:1V depending on levee height and peat thickness. All of the modifications would occur on the landside of the levees. Levee modifications would occur at several areas for about 51,000 feet of levees. The total size of the construction site and postconstruction site for the Bouldin Island levee modifications would be approximately 251 acres, with an additional 90 acres for temporary levee modification access roads. To account for ongoing work by levee maintenance agencies, the extent of levee repairs would be coordinated with the local levee maintenance agency.

After construction is completed, portions of shaft sites not included in the postconstruction boundaries would be reclaimed for potential uses such as natural habitat or agriculture to the extent practical. See Section 3.4.14, *Land Reclamation*.

Under all central alignment alternatives, the construction site for the Southern Complex on Byron Tract would occupy 1,457 acres and the permanent footprint would cover 1,189 acres.

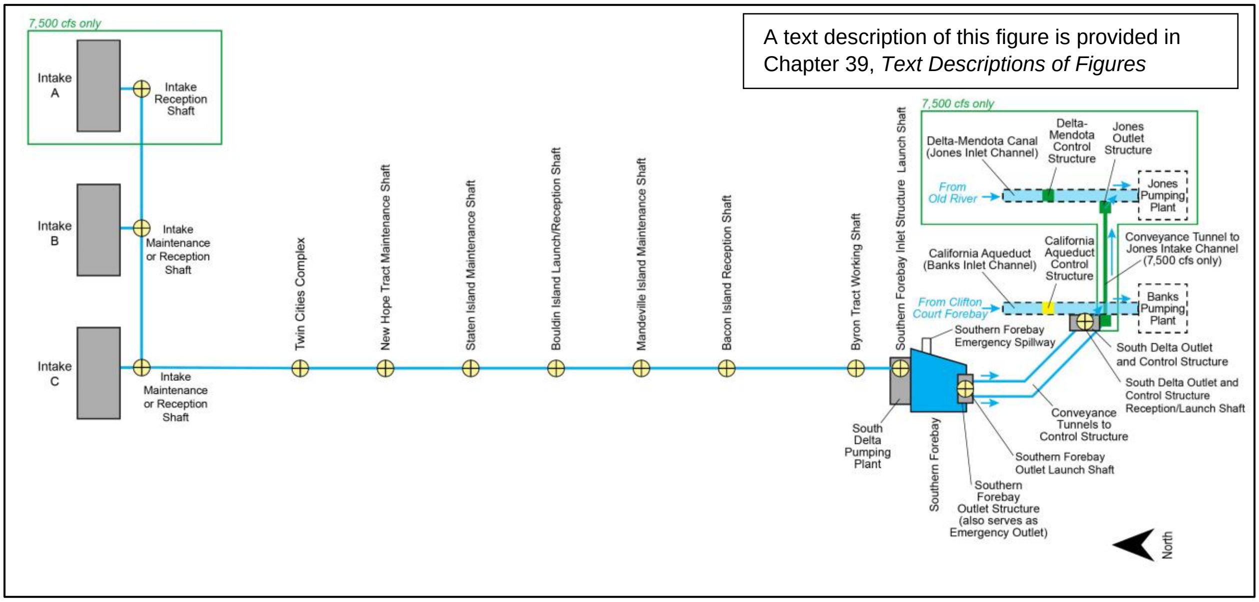

Figure 3-17. Project Schematic Central Alignment Alternatives

Table 3-5. Summary of Distinguishing Physical Characteristics of Alternative 1

Characteristic	Description [a]
Alignment	Central
Conveyance capacity	6,000 cubic feet per second
Number of Intakes	2; Intakes B and C at 3,000 cfs each
Tunnel from Intakes to Southern Forebay	
Diameter	36 feet inside, 39 feet outside
Length	39 miles
Number of tunnel shafts [b]	10
Launch shaft diameter (including each shaft at double launch shafts and combined launch/reception shafts)	115 feet inside
Reception and maintenance shafts diameter	70 feet inside

Characteristic	Description [a]
Twin Cities Complex	Construction acres: 479 Permanent acres: 141
Bouldin Island Launch/Reception Shaft	Construction acres: 615 Permanent acres: 507
Southern Complex	
Byron Tract working shaft diameter	115 feet inside
Southern Forebay Inlet Structure launch shaft diameter	115 feet inside
Pumping plant building	378 feet x 99 feet (approximately 0.86 acre)
Pumps	7 pumps at 960 cfs each, including 2 standby pumps 3 pumps at 600 cfs each, including 1 standby pump 2 portable pumps to dewater tunnel
Southern Forebay Outlet Structure Dual Launch Shafts diameter	115 feet inside, each
Dual tunnels to South Delta Outlet and Control Structure	38 feet inside diameter 41 feet outside diameter 1.7 miles long
Facilities on Byron Tract	Construction acres: 1,457 Permanent acres: 1,189
Facilities west of Byron Highway	Construction acres: 164 Permanent acres: 112
South Delta Outlet and Control Structure	400 feet wide x 1,250 feet long x 43 feet high
South Delta Outlet and Control Structure Dual Reception Shafts diameter	90 feet inside
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	130 acres x 15 feet high
Bouldin Island long-term RTM storage (approximate)	196 acres x 6 feet high
Southern Forebay long-term RTM storage	0
Total wet excavated RTM volume (for single main tunnel from intakes to Southern Forebay and dual South Delta Conveyance tunnels)	13.9 million cubic yards

cfs = cubic feet per second; RTM = reusable tunnel material. The long-term height of the RTM storage stockpiles would be lower as the RTM subsides into the ground.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

[b] Number of shafts for the main tunnel from intakes to Southern Forebay, counting the double shaft at Twin Cities Complex as one shaft.

Electrical facilities and SCADA facilities would be similar to those described in Section 3.4.10, *Electrical Facilities*, and Section 3.4.11, *SCADA Facilities*.

Boring the tunnel 39 miles from the intakes to the Southern Forebay and dual tunnels 1.7 miles from the Southern Forebay Outlet Structure to the South Delta Outlet and Control Structure is expected to generate approximately 13.9 million wet excavated[4] cubic yards of RTM. Drying and compaction would reduce the final volumes of RTM for reuse and storage.

RTM handling facilities would include RTM temporary wet storage; RTM mechanical dryers at Twin Cities Complex and Southern Complex; and RTM natural drying and long-term storage areas at Twin Cities Complex and Bouldin Island. Material would be tested for hazardous substances, stockpiled, and reused as much as possible. Excess suitable RTM remaining after project completion would be stockpiled at Twin Cities Complex. Stockpiles of RTM at Bouldin Island would only be used on-site, such as for restoring topography; it would not be transported for use at other construction sites. The Southern Complex would have two temporary RTM storage areas with a total maximum of 50 acres with stockpiles up to 10 feet high. It is not expected that there would be any permanent long-term RTM stockpiles at the Southern Complex under Alternative 1. Peat soils (51 acres) and topsoil and other soil materials (39 acres) would be stored in an area north of the Southern Forebay.

All central alignment alternatives would involve construction of the new South Holt Road Overpass over BNSF tracks. This construction would be coordinated with BNSF railroad to avoid traffic issues. There would be a minimum of 23 feet 4 inches of clearance between the top of the BNSF tracks and the bottom of the bridge deck, in accordance with BNSF requirements. Figure 3-18 shows roads specific to the central alignment alternatives.

[4] Excavated RTM would be in a less compact state than it is in the ground and with the addition of water and conditioners during the tunneling process, could be expected to occupy a greater volume. After drying and compaction, the RTM's volume would be approximately 99% of the pre-excavated volume.

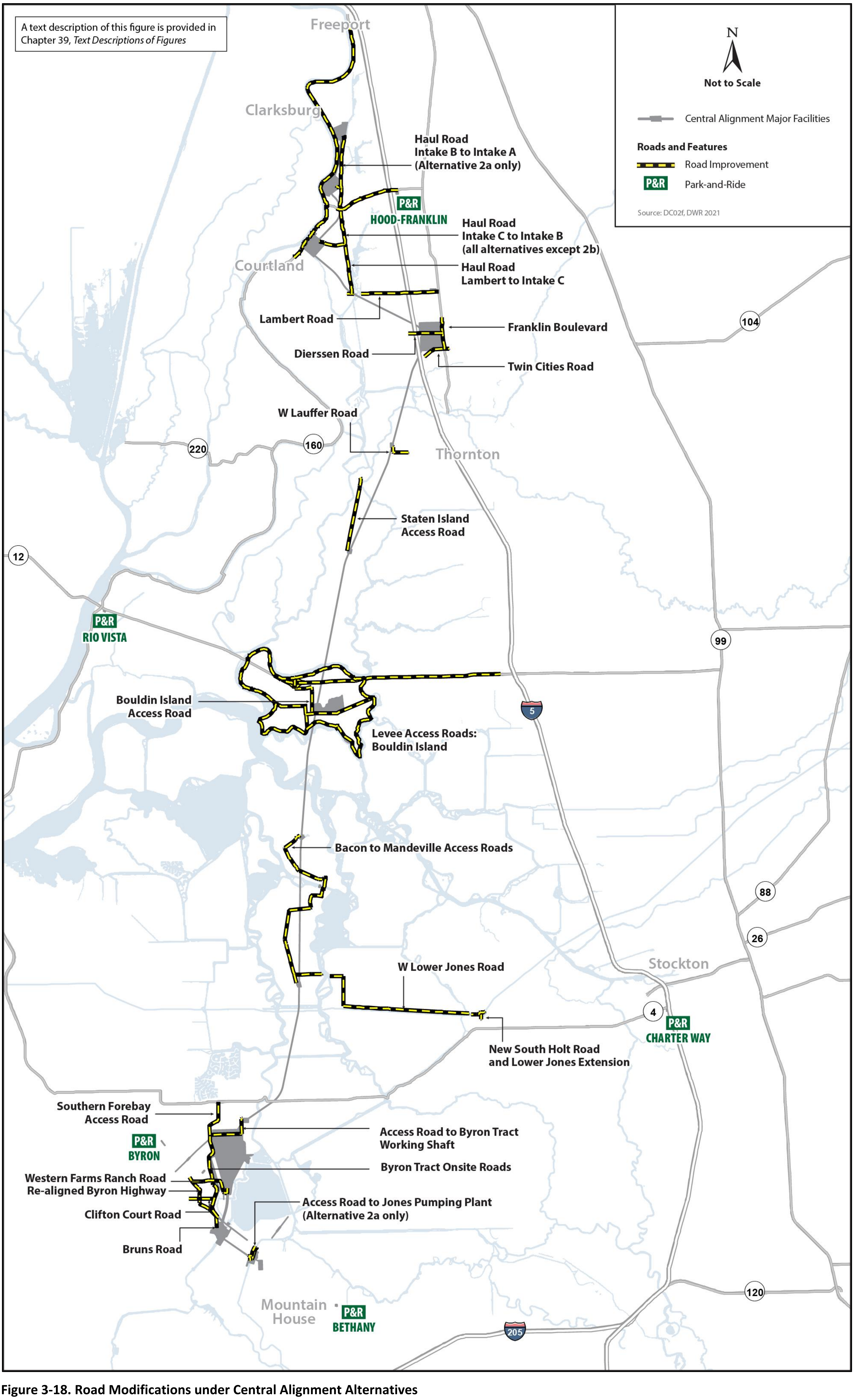

Figure 3-18. Road Modifications under Central Alignment Alternatives

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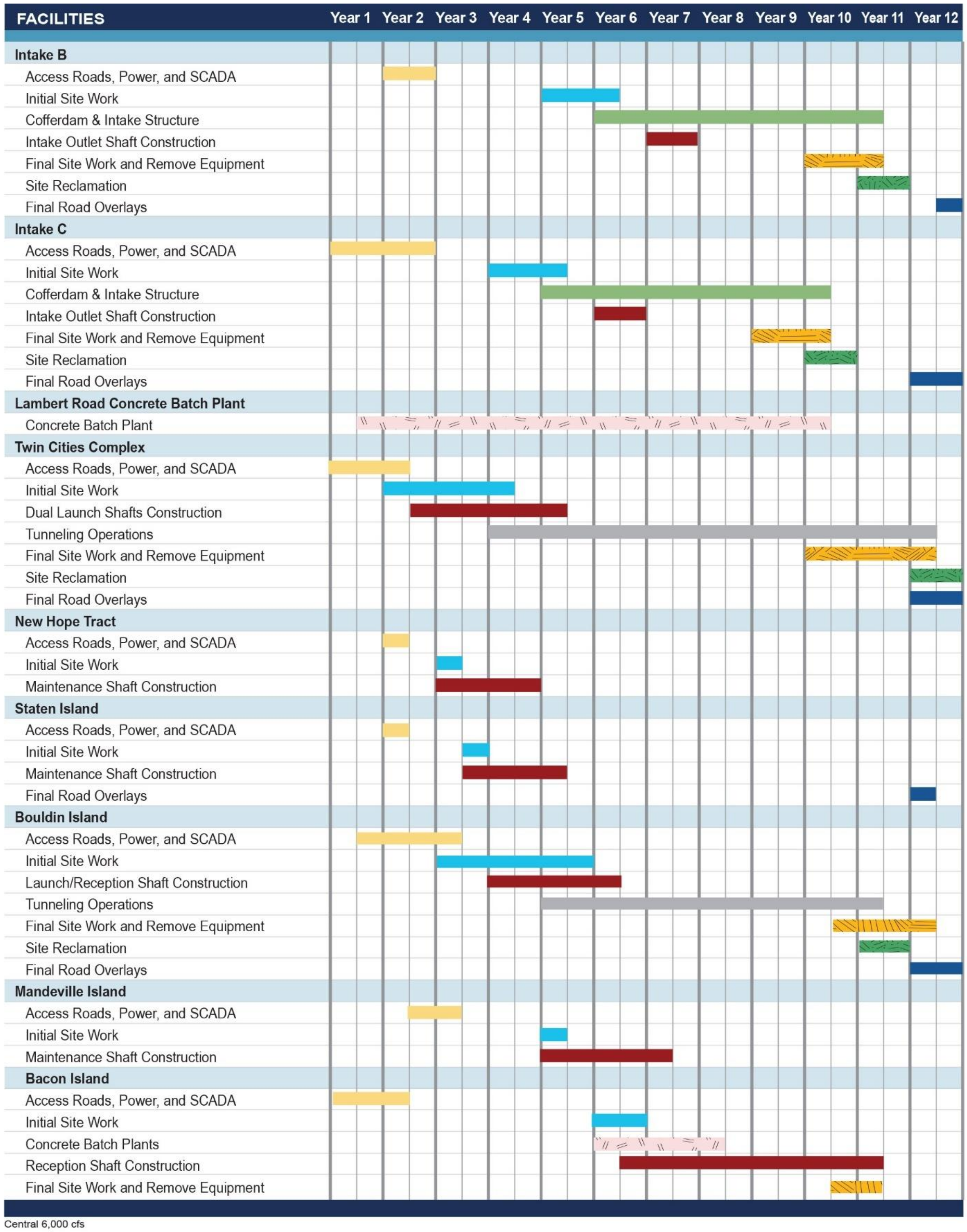
3.6.1 Construction Schedule

Construction of Alternative 1 would take approximately 12 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with site work at the intakes and Twin Cities Complex and power and SCADA at maintenance shafts. Most shafts would be completed in 2 to 3 years. Equipment decommissioning, site reclamation, and road overlays would occur in the final years, as shown in Figure 3-19.


FACILITIES
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
Year 7
Year 8
Year 9
Year 10
Year 11
Year 12
Intake B
Access Roads, Power, and SCADA
Initial Site Work
Cofferdam & Intake Structure
Intake Outlet Shaft Construction
Final Site Work and Remove Equipment
Site Reclamation
Final Road Overlays
Intake C
Access Roads, Power, and SCADA
Initial Site Work
Cofferdam & Intake Structure
Intake Outlet Shaft Construction
Final Site Work and Remove Equipment
Site Reclamation
Final Road Overlays
Lambert Road Concrete Batch Plant
Concrete Batch Plant
Twin Cities Complex
Access Roads, Power, and SCADA
Initial Site Work
Dual Launch Shafts Construction
Tunneling Operations
Final Site Work and Remove Equipment
Site Reclamation
Final Road Overlays
New Hope Tract
Access Roads, Power, and SCADA
Initial Site Work
Maintenance Shaft Construction
Staten Island
Access Roads, Power, and SCADA
Initial Site Work
Maintenance Shaft Construction
Final Road Overlays
Bouldin Island
Access Roads, Power, and SCADA
Initial Site Work
Launch/Reception Shaft Construction
Tunneling Operations
Final Site Work and Remove Equipment
Site Reclamation
Final Road Overlays
Mandeville Island
Access Roads, Power, and SCADA
Initial Site Work
Maintenance Shaft Construction
Bacon Island
Access Roads, Power, and SCADA
Initial Site Work
Concrete Batch Plants
Reception Shaft Construction
Final Site Work and Remove Equipment
Central 6,000 cfs

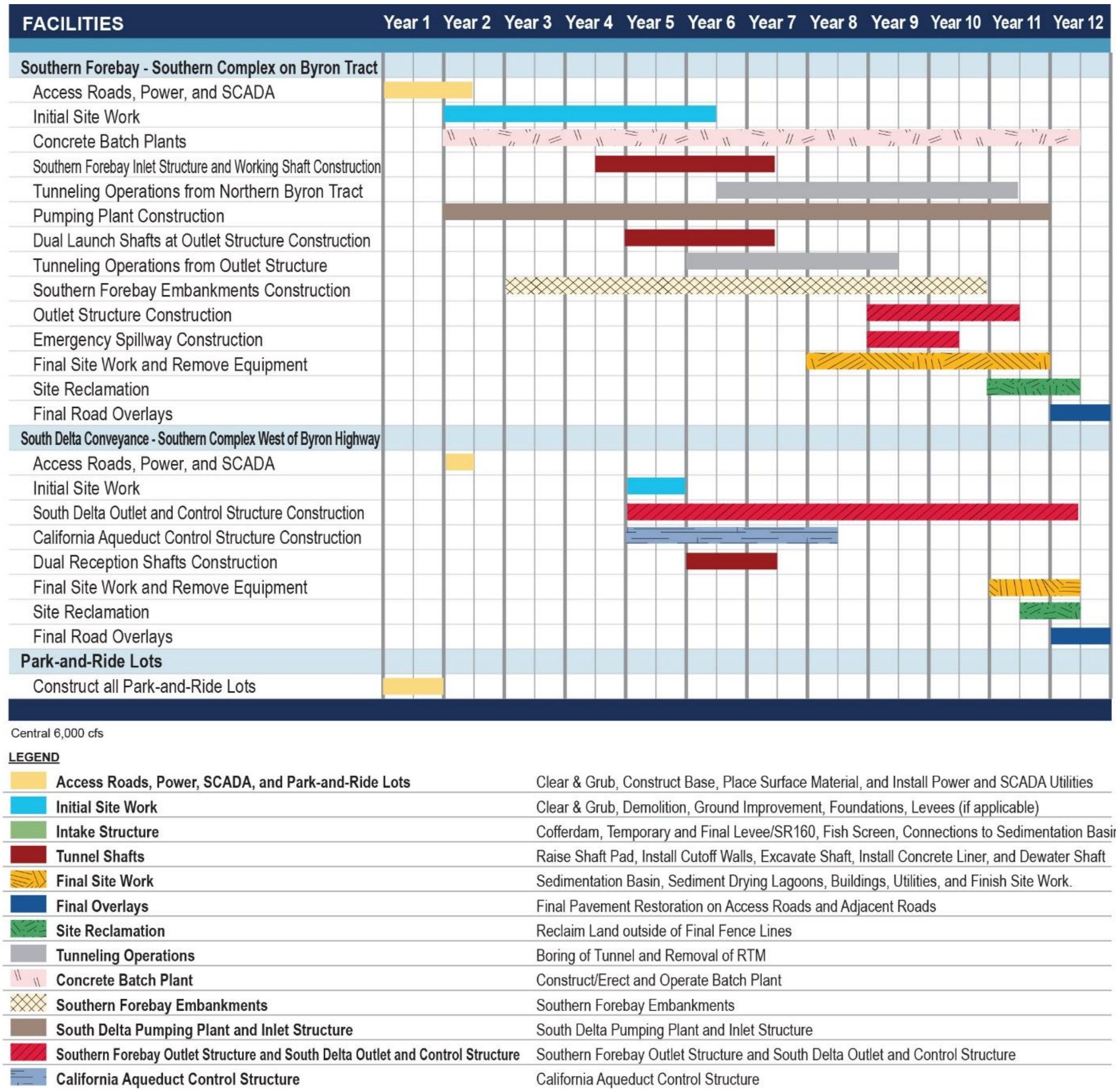


Figure 3-19. Alternative 1 Construction Schedule

3.7 Alternative 2a—Central Alignment, 7,500 cfs, Intakes A, B, and C

Alternative 2a would follow the same central alignment and involve the same facilities as Alternative 1, except that it would use three intakes and have additional facilities in the south Delta to connect to the CVP. Alternative 2a would have a design capacity of 7,500 cfs to provide 1,500 cfs of water delivery to the CVP Jones Pumping Plant in addition to 6,000 cfs of SWP deliveries. Accordingly, sizes of some facilities would be larger than under Alternative 1 to accommodate the larger conveyance capacity (Table 3-6). This alternative is considered to address the potential that the Delta Conveyance Project could be operated to provide water supply conveyance capacity for the CVP in coordination with the Bureau of Reclamation (Reclamation). Reclamation has not indicated an interest in participating in the Delta Conveyance Project, but this alternative is included to provide a comparison of potential impacts and benefits.

Figures 3-2 and 3-17 provide, respectively, a map and schematic diagram of the conveyance facilities associated with the central alignment including Alternative 2a. Mapbook 3-1 depicts the locations of project facilities and major construction features for all central alignment alternatives (Alternatives 1, 2a, 2b, and 2c).

The larger conveyance capacity would require the use of Intakes A, B, and C, described in Section 3.4.1, *North Delta Intakes*. While Intakes B and C would have a design capacity of 3,000 cfs, as they would under Alternative 1, Intake A would provide an additional 1,500 cfs of diversion capacity to achieve a total of 7,500 cfs. Intake A would have the same features and structures as Intakes B and C, but with a diversion capacity of 1,500 cfs it would have a smaller footprint. The Intake A site would cover approximately 166 acres during construction, and approximately 78 acres postconstruction. Under Alternative 2a, the Intakes B and C tunnel shafts would have an inside diameter of 83 feet and be used as TBM maintenance shafts; the northernmost tunnel reception shaft with an inside diameter of 83 feet would be at Intake A.

The cylindrical tee fish screen assembly would be the same as at Intakes B and C, except Intake A would require only 15 screen units at 100 cfs each.

The tunnel length from Intake A to the Southern Forebay would be 41.5 miles. To accommodate 7,500 cfs flow, the main tunnel and the dual tunnels from the Southern Forebay Outlet Structure to the South Delta Outlet and Control Structure would have an inside diameter of 40 feet (44-foot outside diameter), larger than that required under Alternative 1.

Tunnel shafts along the main tunnel alignment would be in the same locations as for Alternative 1, but larger. Launch shafts along the main tunnel alignment would have an inside diameter of 120 feet (including each shaft of the double launch shaft at Twin Cities Complex); maintenance and reception shafts would have inside diameters of 76 feet. The dual launch shafts at the Southern Forebay Outlet Structure would have a 115-foot inside diameter and the dual reception shafts at the South Delta Outlet and Control Structure would each have 90-foot inside diameters. Additionally, Alternative 2a would have a 90-foot inside diameter launch shaft to a single 20-foot-diameter tunnel originating in the Jones Control Structure adjacent to the South Delta Outlet and Control Structure. This tunnel would terminate at a reception shaft (55 feet inside diameter) at the Jones Outlet Structure at the CVP Jones Pumping Plant approach channel. Section 3.7.1, *Southern Complex West of Byron Highway,* explains these facilities further.

Launch shaft sites at Twin Cities Complex and Bouldin Island would be larger than under Alternative 1 because of the larger shafts required for the larger TBMs and the need to store additional RTM generated by larger tunnels (Table 3-6). Levee improvements at Bouldin Island would be the same as under Alternative 1. The Southern Complex would have two temporary RTM storage areas with a total maximum of 79 acres with stockpiles up to 10 feet high. It is not expected that there would be any permanent long-term RTM stockpiles at the Southern Complex for Alternative 2a. However, peat soils and excess topsoil and other soil materials would be stored at an area north of the Southern Forebay.

The Southern Forebay and the South Delta Conveyance Facilities would be the same as under Alternative 1, except that under Alternative 2a the pumping plant building would be 99 feet wide by 413 feet long and hold eight pumps at 960 cfs (including two standby pumps), three pumps at 600 cfs (including one standby), and two portable pumps for dewatering the tunnel.

Alternative 2a would also involve constructing the Jones Control Structure, the Jones Tunnel, the Jones Outlet Structure, and the Delta-Mendota Control Structure on the Southern Complex west of Byron Highway. These facilities are described in Section 3.7.1.

Alternative 2a would include the same access roads as shown on Figure 3-18 (Section 3.6, *Alternative 1—Central Alignment, 6,000 cfs, Intakes B and C*). In addition, this alternative would require an approximately 2.5-mile extension of the access road from Intake B to Intake A. This would be a 32-foot-wide paved road, with 12-foot lanes and 4-foot shoulders and include a 350-foot-long, 32-foot-wide bridge over a drainage channel. Toward the end of construction, about 9,500 feet of 24-foot-wide paved and 6,000 feet of 20-foot wide gravel permanent access roads would be installed at Intake A. Access to the Jones Outlet Structure and Delta-Mendota Control Structure would be provided along existing roads, including Herdlyn Road and an access road to the CVP Jones Pumping Plant. Alternative 2a would require additional electrical power supplies for Intake A, the Jones Control Structure, Jones Outlet Structure, and the Delta-Mendota Control Structure. Approximately 2.1 miles of new 69-kV electrical transmission lines would be installed underground adjacent to the Intake A site access route and intake haul road, traveling south to a double-circuit, low-profile switching station on the southwest quadrant of the intersection of the haul road and the site access road to Intake B. This new underground power serving the intake would be routed to a new on-site substation at the intake. Approximately 1.3 miles of existing overhead power lines at Intake A would be abandoned. To maintain power to the adjacent residences and agricultural facilities currently powered by these power lines, 0.6 mile of underground power would be installed adjacent to the existing access road, connecting to the existing overhead power line where the Intake A site access road enters the intake haul road.

To provide construction and operational power to the Delta-Mendota Control Structure, a connection to the existing PG&E line on Mountain House Road would be established. A new overhead line would be installed from an existing pole on the east side of the road to a 25-foot by 25-foot metering area on the west side of the roadway, and the new line would continue underground for approximately 650 feet to the new facility. Because of the critical control nature of this facility, a generator would be provided for backup power in case of a power outage. This alignment would temporarily affect approximately 0.6 acre and result in a permanent dedicated easement and metering area of roughly 0.4 acre. The relocation of non-project power would temporarily affect 2.9 acres and permanently affect 1.8 acres in a dedicated utility easement.

The SCADA facilities would be similar to those described in Section 3.4, with the addition of connections to Intake A and the new Jones Outlet Structure and Delta-Mendota Control Structure.

1 **Table 3-6. Summary of Distinguishing Physical Characteristics of Alternative 2a**

Characteristic	Description [a]
Alignment	Central
Conveyance capacity	7,500 cubic feet per second
Number of Intakes	3; Intake A at 1,500 cfs; Intakes B and C at 3,000 cfs each
Tunnel from Intakes to Southern Forebay	
Diameter	40 feet inside, 44 feet outside
Length	41.5 miles
Number of tunnel shafts [b]	11
Launch shaft diameter	120 feet inside
Reception and maintenance shafts diameter	76 feet inside
Twin Cities Complex	Construction acres: 546 Permanent acres: 285
Bouldin Island Launch/Reception Shaft	Construction acres: 657 Permanent acres: 544
Southern Complex	
Byron Tract working shaft diameter	120 feet inside
Southern Forebay Inlet Structure launch shaft diameter	120 feet inside
Pumping plant building	413 feet x 99 feet (approximately 0.94 acres)
Pumps	8 pumps at 960 cfs each, including two standby pumps 3 pumps at 600 cfs, each, including one standby pump 2 portable pumps to dewater tunnel
Southern Forebay Outlet Structure Dual Launch Shafts diameter	115 feet inside, each
Dual tunnels to South Delta Outlet and Control Structure	40 feet inside diameter 44 feet outside diameter 1.7 miles long
Facilities on Byron Tract	Construction acres: 1,457 Permanent acres: 1,189
Facilities west of Byron Highway	Construction acres: 293 Permanent acres: 210
South Delta Outlet and Control Structure	Includes Jones Control Structure
Dual tunnel reception shafts	2 shafts, each 90 feet inside diameter
Jones Tunnel Launch Shaft at the South Delta Outlet and Control Structure	90 feet inside diameter
Facilities to serve Jones Pumping Plant	
Jones Control Structure	222 feet wide x 370 feet long x 45 feet high
Single Jones Tunnel from Jones Control Structure to Jones Outlet Structure	20 feet inside diameter 22 feet outside diameter 7,900 feet (1.5 miles) long Maximum flow: 1,500 cfs
Jones Outlet Structure	Varies, 220 feet to 450 feet wide x 350 feet to 500 feet long x 32 feet high
Tunnel Reception Shaft at Jones Outlet Structure	55 feet inside diameter Top of shaft pad: at or near ground level Top of shaft pad elevation: 38 feet
Delta-Mendota Control Structure in Jones Pumping Plant approach channel	312 feet wide x 1,031 feet long

Characteristic	Description [a]
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	275 acres x 15 feet high
Bouldin Island long-term RTM storage (approximate)	225 acres x 7 feet high
Southern Forebay long-term RTM storage	0 acres
Total wet excavated RTM volume (for single main tunnel from intakes to Southern Forebay and dual South Delta Conveyance tunnels)	18.4 million cubic yards
Wet excavated RTM volume for Jones Tunnel between South Delta Outlet and Control Structure and Jones Outlet Structure	0.15 million cubic yards

cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

[b] Number of shafts for the main tunnel from intakes to Southern Forebay, counting the double shaft at Twin Cities Complex as one shaft.

3.7.1 Southern Complex West of Byron Highway

To deliver water to the CVP facilities, Alternative 2a would require additional facilities west of Byron Highway in addition to those described in Section 3.4.6, *Southern Complex West of Bryon Highway*. A new Delta-Mendota Control Structure would also be built under Alternative 2a; together these facilities would convey water to the Jones Pumping Plant approach channel (a.k.a. Delta-Mendota Canal).

3.7.1.1 Jones Control Structure and Jones Tunnel

The Jones Control Structure would be a reinforced concrete structure with radial control gates. It would be connected directly to the west side of the South Delta Outlet and Control Structure (Figure 3-12 and Figure 3-20). It would contain a 90-foot inside diameter TBM launch shaft that would become the inlet shaft to a single new 20-foot-diameter, 1.5-mile-long Jones Tunnel, connecting to a new Jones Outlet Structure adjacent to the Jones Pumping Plant approach channel. The Jones Control Structure would be used to control flow from the Southern Forebay into the Jones Tunnel and ultimately to the Delta-Mendota Canal.

3.7.1.2 Jones Outlet Structure

The Jones Outlet Structure would be located along the Delta-Mendota Canal approach channel. The Jones Outlet Structure would contain a 55-foot-diameter reception shaft from which to remove the TBM. At the reception shaft, the flows would transition from the tunnel to an open channel discharge into the Delta-Mendota Canal. The structure would be a flow-through facility with no operational control and would have no electrical or control systems (Figure 3-20).

3.7.1.3 Delta-Mendota Control Structure

The Delta-Mendota Control Structure would be located in the Jones Pumping Plant approach channel (Figure 3-20). The main feature of this structure would be motorized radial gates that control the flow in the Delta-Mendota Canal. One smaller gate would be provided to allow control of the flow rate to match what would be needed at the Jones Pumping Plant. The height of the structure and surrounding grading would protect the downstream side of the structure from the 200-year flood plus sea level rise for 2100 in the vicinity of the Clifton Court Forebay. The Jones Outlet Structure and Delta-Mendota Control Structure would be located on land owned by the federal government; excess excavated materials would be stockpiled on nonfederal land.

Figure 3-20 depicts these additional facilities.

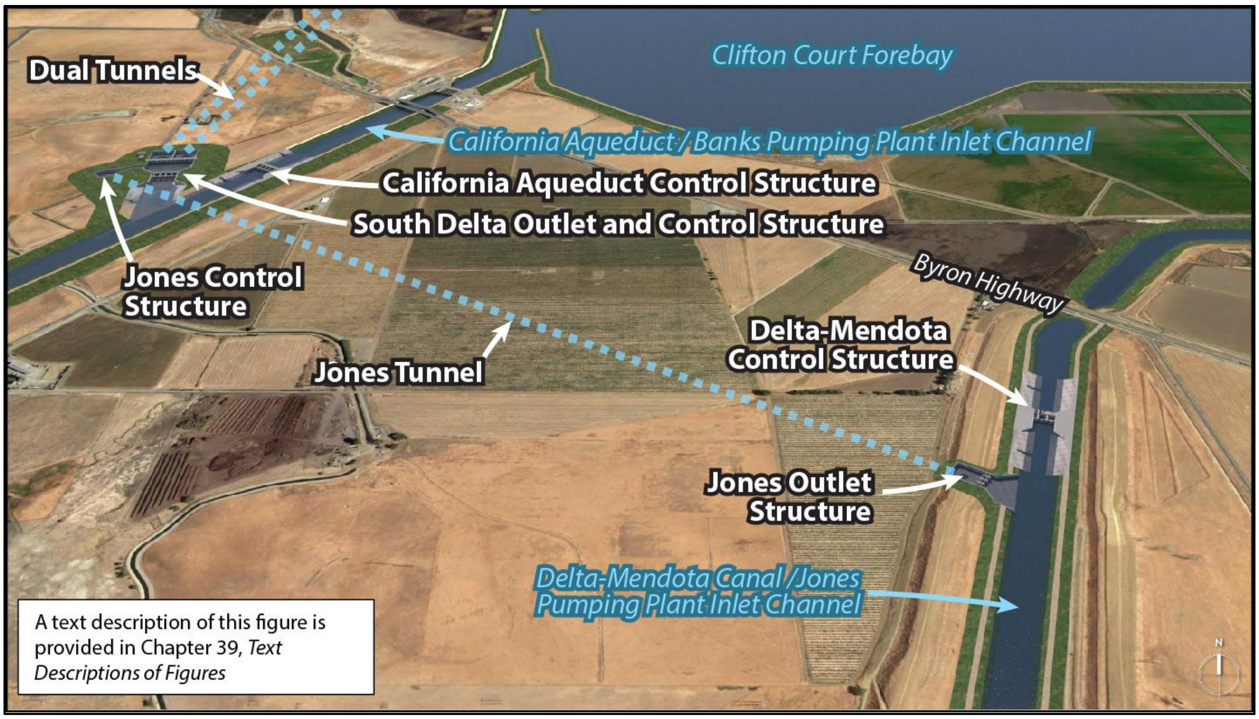
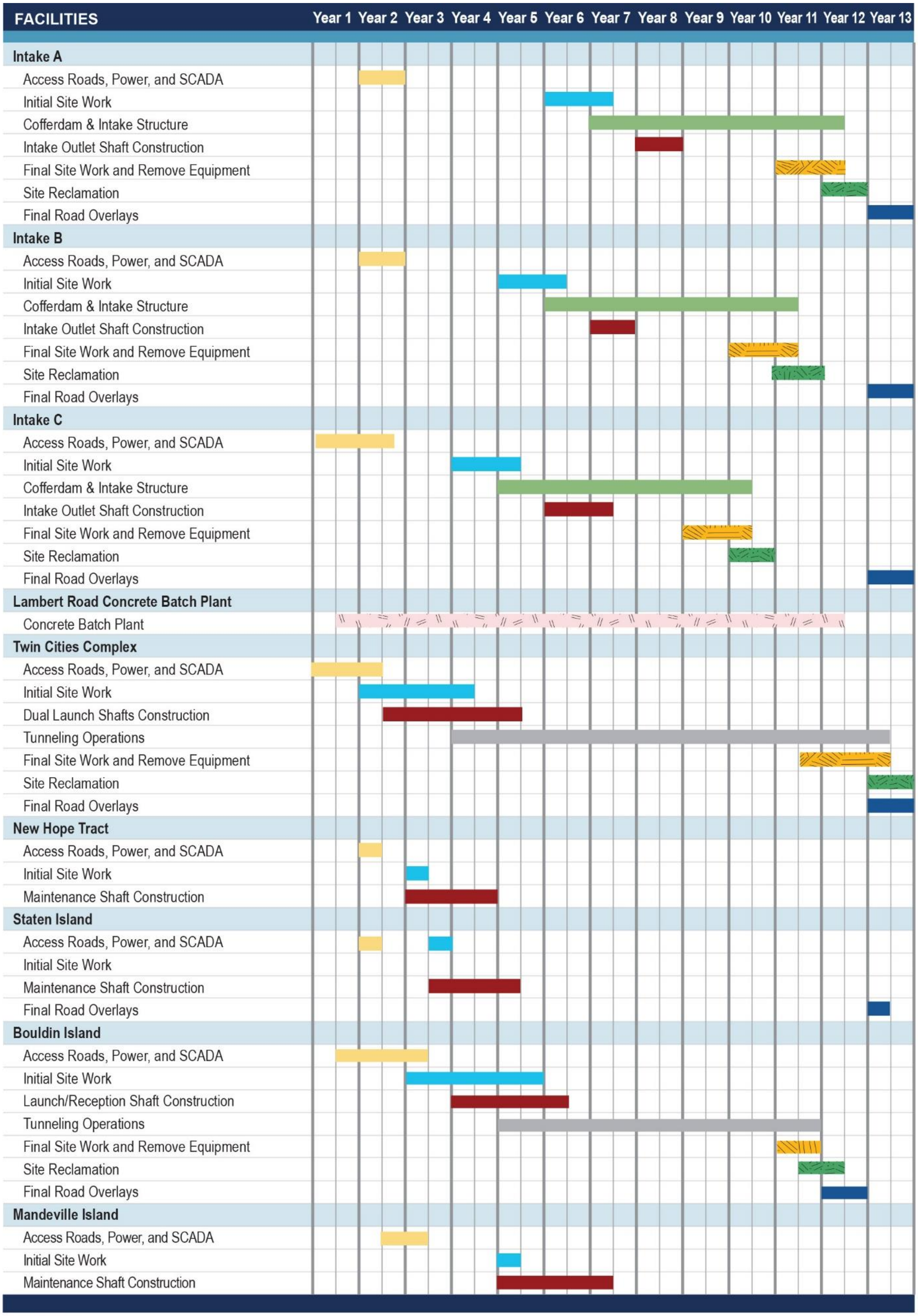


Figure 3-20. Facilities to Serve Jones Pumping Plant

3.7.2 Construction Schedule

Construction of Alternative 2a would take approximately 13 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with site work at the intakes and Twin Cities Complex and power and SCADA at maintenance shafts, and proceeding to equipment decommissioning, site reclamation, and road overlays in the final years, as shown in Figure 3-21.



Central 7,500 cfs

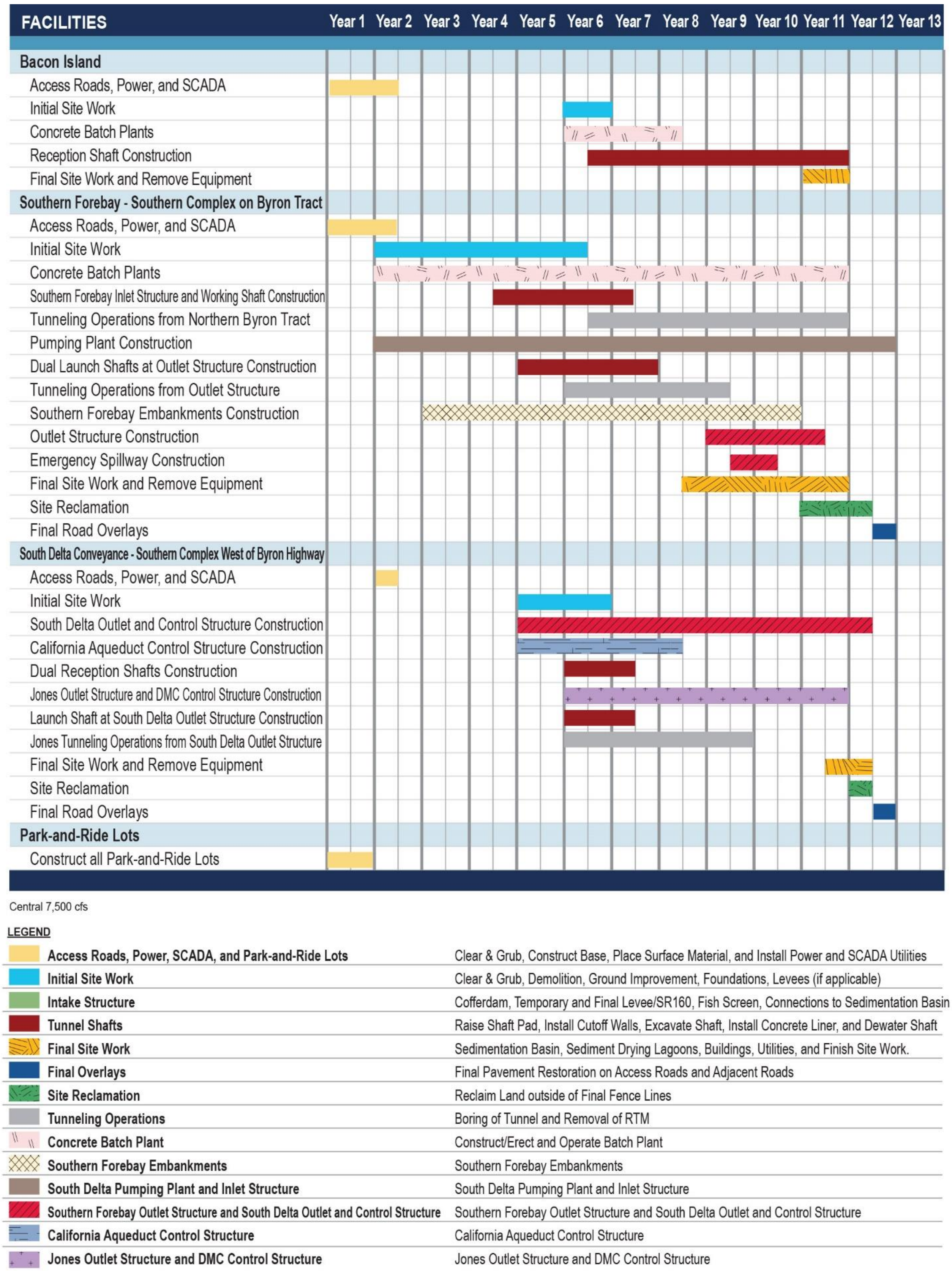


Figure 3-21. Alternative 2a Construction Schedule

3.8 Alternative 2b—Central Alignment, 3,000 cfs, Intake C

Under Alternative 2b, all conveyance facilities and operational features would be the same as described under Alternative 1 (Section 3.6), except that only Intake C would be constructed, and the maximum diversion capacity would be 3,000 cfs. With the smaller diversion capacity, the tunnel diameter would be 26 feet inside and about 28 feet outside, and its length from Intake C to the Southern Forebay would be 37 miles (Table 3-7).

The Intake C tunnel shaft would have an inside diameter of 83 feet and would also serve as the TBM reception shaft. Intake C would also include the emergency response facilities and the wastewater facilities that would instead be located at Intake B under Alternative 1.

Tunnel shaft locations would be the same as under Alternative 1. Launch shafts for the main tunnel would have inside diameters of 110 feet and reception and maintenance shafts would have an inside diameter of 53 feet. Launch shaft sites would be somewhat smaller than under Alternative 1 because the smaller tunnel and shorter length would generate less RTM. The Southern Complex would have two temporary RTM storage areas with a total maximum of 35 acres with stockpiles up to 10 feet high. It is not expected that Alternative 2b would require permanent stockpiles of surplus RTM at the Southern Complex. However, peat soils and topsoil and other soil materials would be stored at an area north of the Southern Forebay.

Table 3-7. Summary of Distinguishing Physical Characteristics of Alternative 2b

Characteristic	Description [a]
Alignment	Central
Conveyance capacity	3,000 cubic feet per second
Number of Intakes	1; Intake C at 3,000 cfs
Tunnel from Intakes to Southern Forebay	
Diameter	26 feet inside, 28 feet, 4 inches outside
Length	37 miles
Number of tunnel shafts*	9
Launch shafts diameter	110 feet inside
Reception and maintenance shafts diameter	53 feet inside
Twin Cities Complex	Construction acres: 322 Permanent acres: 26
Bouldin Island Launch/Reception Shaft	Construction acres: 540 Permanent acres: 436
Southern Complex	
Byron Tract working shaft diameter	110 feet inside
Southern Forebay Inlet Structure launch shaft diameter	110 feet inside
Pumping plant building	345 feet x 99 feet (approximately 0.78 acre)
Pumps	5 pumps at 960 cfs each, including 2 standby pumps 3 pumps at 600 cfs each, including 1 standby pump 2 portable pumps to dewater tunnel

Characteristic	Description[a]
Southern Forebay Outlet Structure Dual Launch Shafts diameter	115 feet inside, each
Facilities on Byron Tract	Construction acres: 1,457 Permanent acres: 1,189
Facilities west of Byron Highway	Same as Alternative 1
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	15 acres x 15 feet high
Bouldin Island long-term RTM storage (approximate)	129 acres x 5 feet high
Southern Forebay long-term RTM storage	0
Total wet excavated RTM volume (for single main tunnel from intakes to Southern Forebay and dual South Delta Conveyance tunnels)	7.5 million cubic yards

cfs = cubic feet per second; RTM = reusable tunnel material. The long-term height of the RTM storage stockpiles would be lower as the RTM subsides into the ground.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

All facilities at the Southern Complex would be the same as described in Sections 3.4.5 and 3.4.6, and under Alternative 1 (Section 3.6), except with a reduced diversion capacity, the South Delta Pumping Plant would have a maximum capacity of 3,000 cfs, fewer pumps, and the pumping plant building and electrical building would be smaller. The pumping plant building would be 99 feet wide by 345 feet long and hold five pumps at 960 cfs (including two standby pumps), three pumps at 600 cfs (including one standby), and two portable pumps for dewatering the tunnel.

Access roads would be the same as under Alternative 1, except that Alternative 2b would not require the access road between Intake C and Intake B.

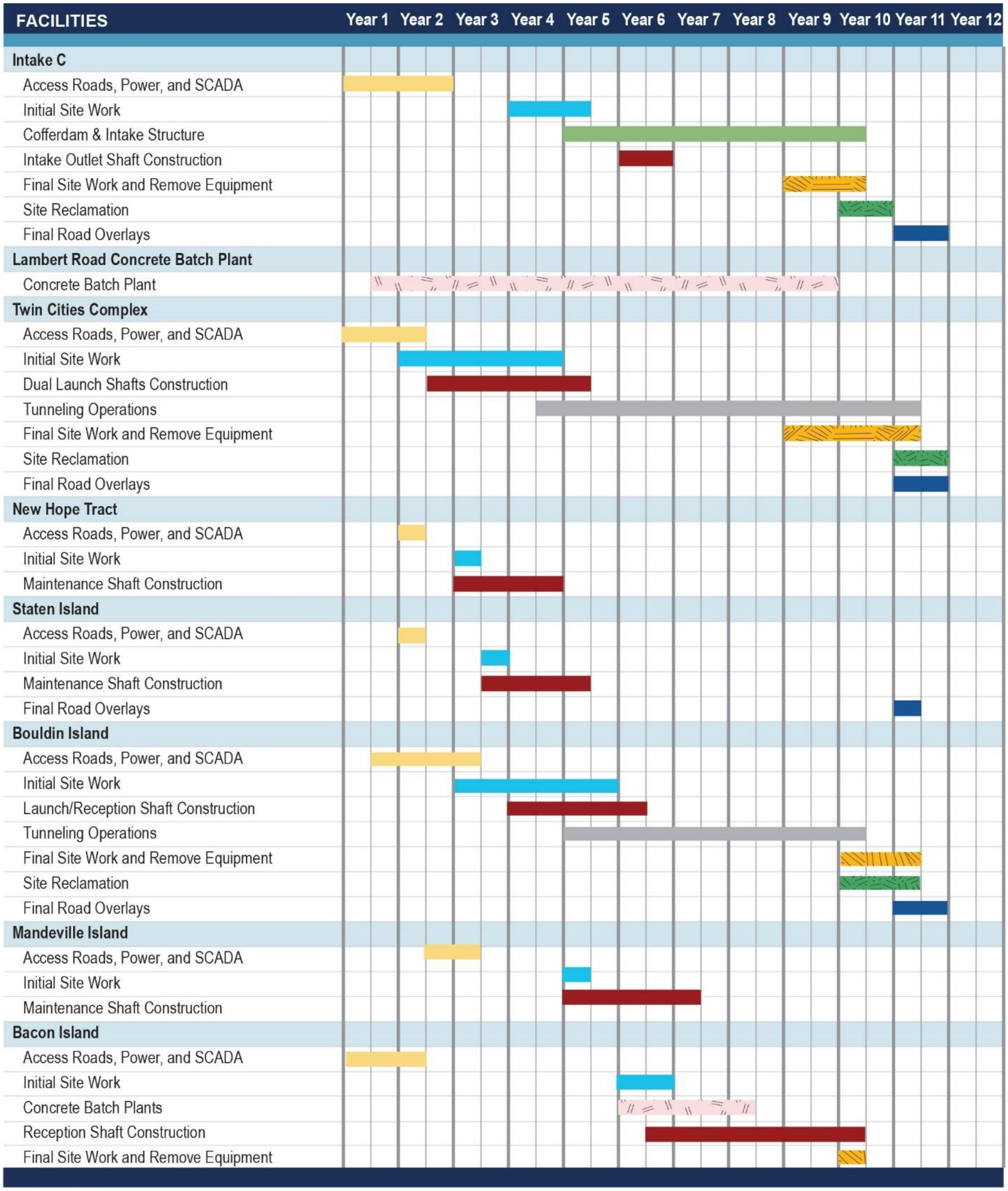
Locations of temporary and permanent electrical lines and substations would be the same as described in Section 3.4.10, *Electrical Facilities*, except that these facilities would not include power supplies to Intake B or a double-circuit, low-profile switching station at Intake C.

The SCADA facilities would be the same as under Alternative 1, except that this alternative would not include SCADA facilities to Intake B. The length of the underground SCADA lines would be the same as under Alternative 1 except without the 0.5 mile from Intake B to the intake haul road.

The goals and activities of land reclamation would be the same as described in Section 3.4.14, *Land Reclamation*.

3.8.1 Construction Schedule

Construction of Alternative 2b would take approximately 12 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with site work at the intake and Twin Cities Complex and power and SCADA at maintenance shafts, and proceeding to equipment decommissioning, site reclamation, and road overlays in the final years, as shown in Figure 3-22.



Central 3,000 cfs

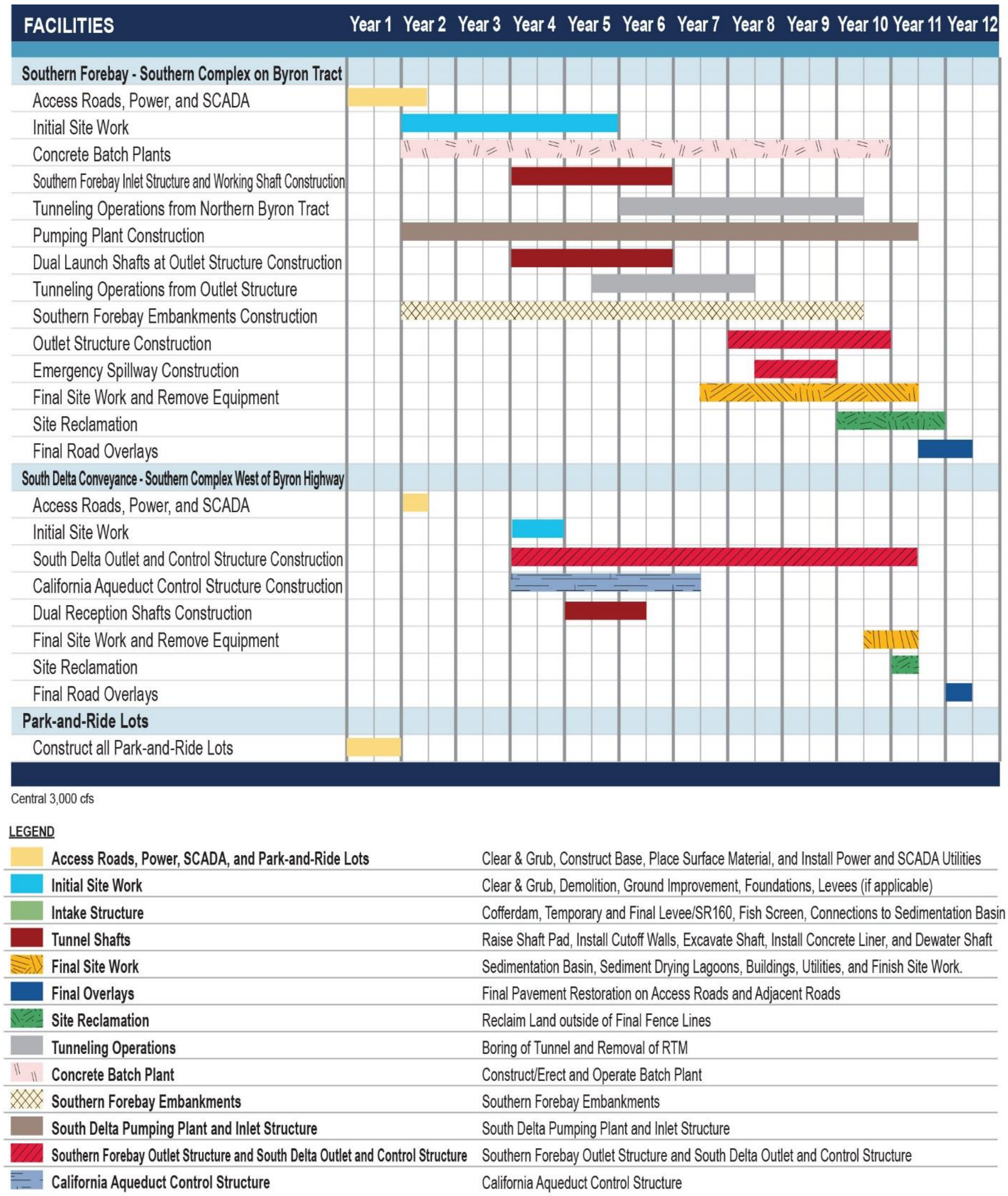


Figure 3-22. Alternative 2b Construction Schedule

3.9 Alternative 2c—Central Alignment, 4,500 cfs, Intakes B and C

Under Alternative 2c, all conveyance facilities and operational features would be the same as described under Alternative 1 (Section 3.6), but Intake C would be constructed with a maximum diversion capacity of 1,500 cfs instead of 3,000 cfs, for a total diversion capacity of 4,500 cfs. This would allow the permanent intake site to be smaller than under Alternative 1, with a slightly different layout. The main tunnel diameter would be 31 feet inside, 34 feet outside, and the tunnel length would be 39 miles from the intakes to the Southern Forebay.

Intake C with 1,500-cfs capacity would have a cylindrical tee fish screen with 15 units of 100-cfs capacity each instead of 30 units. Other key items would also have different dimensions than under Alternative 1, because of the smaller capacity of this alternative (Table 3-8).

Intake shafts would have an inside diameter of 83 feet. The Intake B tunnel shaft would also serve as the tunnel's TBM reception shaft. Shaft locations would be the same as under Alternative 1, but shaft diameters would be smaller. Launch shafts along the main tunnel alignment would have inside diameters of 110 feet; reception and maintenance shafts would have inside diameters of 63 feet. Alternative 2c would generate less soil material and RTM for on-site reuse, export, or storage. Launch shaft sites at Twin Cities Complex and Bouldin Island would be smaller than under Alternative 1 because the volume of RTM generated by boring the smaller tunnel would be less and would require smaller RTM storage areas at TBM launch shaft sites. The Southern Complex would have two temporary RTM storage areas with a total maximum of 39 acres with stockpiles up to 10 feet high. No surplus RTM would be permanently stockpiled at the Southern Complex.

The Southern Complex would be the same as described in Sections 3.4.5 and 3.4.6, and under Alternative 1 (Section 3.6), except the South Delta Pumping Plant building would be 99 feet wide by 345 feet long and hold six pumps at 960 cfs (including two standby pumps), three pumps at 600 cfs (including one standby), and two portable pumps for dewatering the tunnel. Facilities west of Byron Highway would be the same as under Alternative 1.

Temporary construction access, permanent facility access, and locations of temporary and permanent electrical transmission lines and substations would be the same under Alternative 2c as described under Alternative 1.

Table 3-8. Summary of Distinguishing Physical Characteristics of Alternative 2c

Characteristic	Description [a]
Alignment	Central
Conveyance capacity	4,500 cubic feet per second
Number of Intakes	2; Intake B at 3,000 cfs and Intake C at 1,500 cfs
Tunnel from Intakes to Southern Forebay	
Diameter	31 feet inside
Length	39 miles
Number of tunnel shafts [b]	10
Launch shaft diameter (including each shaft of double launch shafts)	110 feet inside
Reception and maintenance shafts diameter	63 feet inside

Characteristic	Description [a]
Twin Cities Complex	Construction acres: 392 Permanent acres: 63
Bouldin Island Launch/Reception Shaft	Construction acres: 585 Permanent acres: 479
Southern Complex	
Byron Tract working shaft diameter	110 feet inside
Southern Forebay Inlet Structure Launch Shaft diameter	110 feet inside
Pumping plant building	378 feet x 99 feet
Pumps	6 pumps at 960 cfs, each, including 2 standby pumps. 3 pumps at 600 cfs, each, including 1 standby pump. 2 portable pumps to dewater tunnel.
Southern Forebay Outlet Structure Dual Launch Shafts diameter	115 feet inside, each
Facilities on Byron Tract	Construction acres: 1,457 Permanent acres: 1,189
Facilities west of Byron Highway	Same as Alternative 1
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	52 acres x 15 feet high
Bouldin Island long-term RTM storage (approximate)	168 acres x 5.5 feet high
Southern Forebay long-term RTM storage	0
Total wet excavated RTM volume (for single main tunnel from intakes to Southern Forebay and dual South Delta Conveyance tunnels)	10.7 million cubic yards

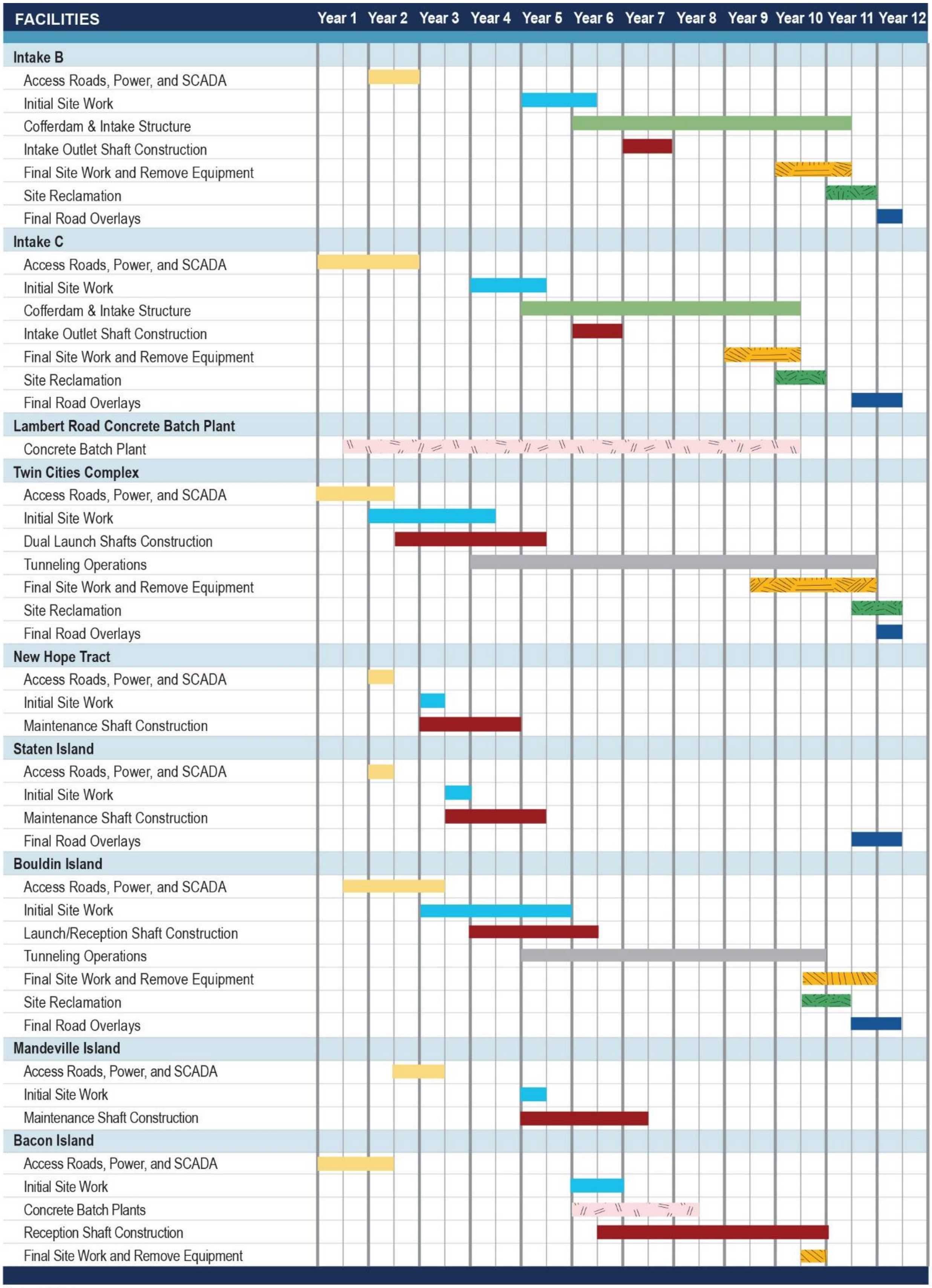
cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

[b] Number of shafts for the main tunnel from intakes to Southern Forebay, counting the double shaft at Twin Cities Complex as one shaft.

3.9.1 Construction Schedule

Construction of Alternative 2c would take approximately 12 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with site work at the intakes and Twin Cities Complex and power and SCADA at maintenance shafts, and proceeding to equipment decommissioning, site reclamation, and road overlays in the final years, as shown in Figure 3-23.



Central 4,500 cfs

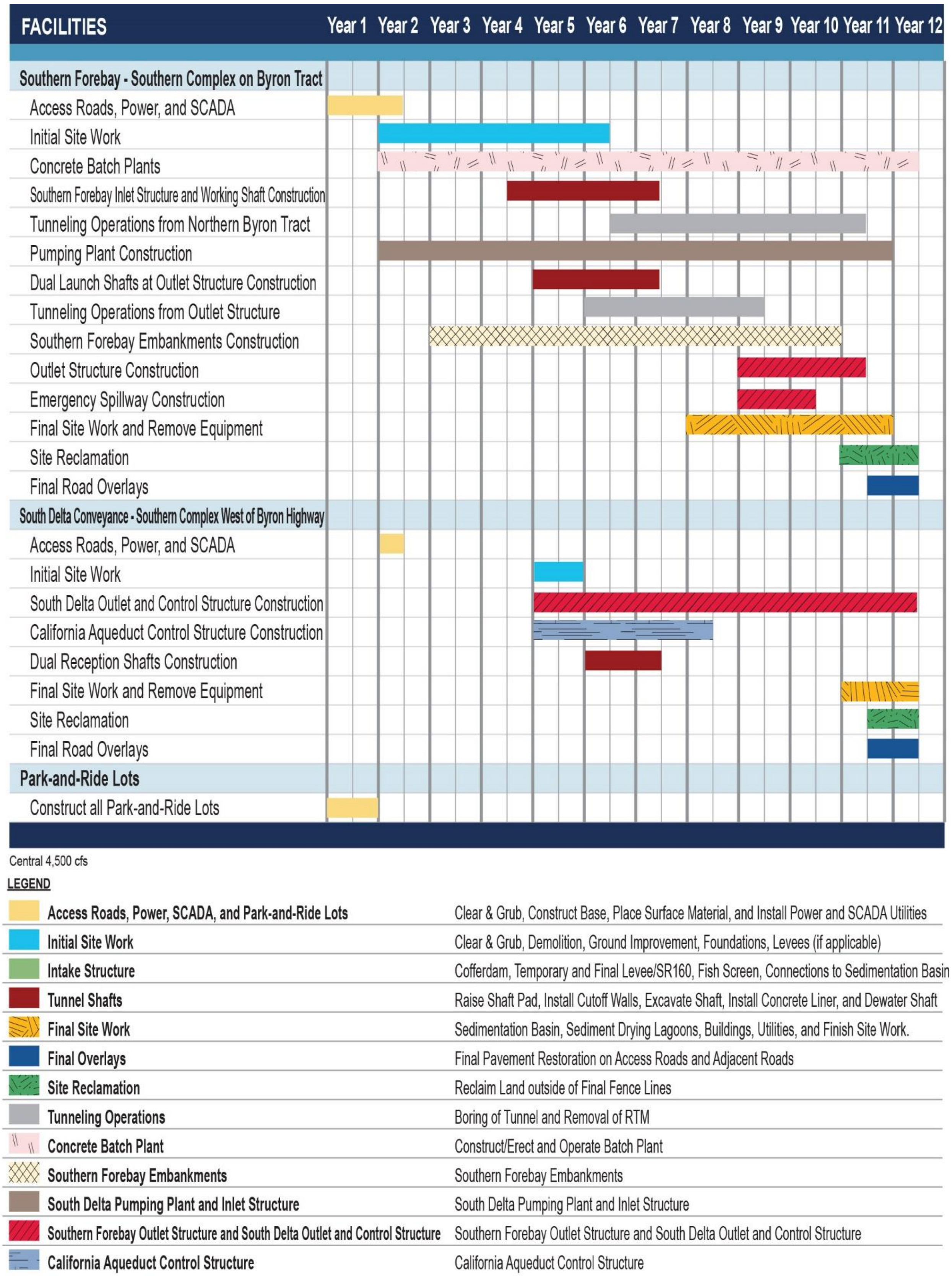


Figure 3-23. Alternative 2c Construction Schedule

3.10 Alternative 3—Eastern Alignment, 6,000 cfs, Intakes B and C

This section summarizes the distinctive characteristics of Alternative 3, which includes the major features described in Section 3.4 that are common to most eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c). Each eastern alignment alternative is then described relative to Alternative 3 and its corresponding central alignment alternative in the respective sections that follow. Figure 3-2b shows the eastern alignment and major project facilities. Figure 3-24 is a schematic diagram of the conveyance facilities associated with the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c). Figure 3-2b, Mapbook 3-2, and Figure 3-24 show locations of project facilities and major construction features for the eastern alignment alternative with 7,500 cfs conveyance capacity (Alternative 4a) in order to represent the potential maximum extent of the alignment. Alternatives with 6,000 cfs conveyance capacity would use only Intakes B and C; alternatives with 3,000 cfs conveyance capacity would use only Intake C.

Alternative 3 would have the same 6,000-cfs capacity as Alternative 1, but water from the north Delta Intakes B and C would be conveyed from the Twin Cities Complex to the south Delta through a tunnel on an eastern alignment, with tunnel shafts at different locations than under Alternative 1, as shown on Figure 3-2b.

The tunnel diameter would be 36 feet inside and 39 feet outside, the same as Alternative 1, but on this alignment the tunnel would extend 42 miles from the north Delta intakes to the new pumping plant at the Southern Forebay. The invert elevations of the tunnel would the same as under Alternative 1. Table 3-2 presents tunnel dimensions by alternative.

Beyond the Twin Cities Complex double launch shaft, eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c) would have shafts along the main tunnel route at the following locations.

- New Hope Tract maintenance shaft (eastern)
- Canal Ranch Tract maintenance shaft
- Terminous Tract reception shaft
- King Island maintenance shaft
- Lower Roberts Island reception and launch shaft
- Upper Jones Tract maintenance shaft
- Byron Tract Working Shaft (launch shaft)
- Southern Forebay Inlet Structure launch shaft
- Southern Forebay Outlet Structure and dual launch shafts (Section 3.4.5.4)
- Dual reception shafts at the South Delta Outlet and Control Structure along SWP Banks Pumping Plant approach channel (Section 3.4.6.1)

Reception shafts under Alternative 3 would be located at Intake B, Terminous Tract, and Lower Roberts Island. The Lower Roberts Island reception shaft would also serve as a launch shaft, as described below. The reception shaft on Terminous Tract would receive the TBM launched from Lower Roberts Island and the TBM launched from Twin Cities Complex.

The double launch shaft at the Twin Cities Complex that would allow the TBM to tunnel north toward the intakes and south toward the Southern Forebay would be the same as under Alternative 1. Under Alternative 3, however, the TBM would tunnel south on the eastern alignment. The total size of the permanent site under Alternative 3 would be 170 acres because of a larger permanent RTM storage area necessitated by the longer tunnel length, which would generate more RTM.

Under Alternative 3, the tunnel launch site on Lower Roberts Island would launch the TBM north toward Terminous Tract. The launch shaft would also serve as a reception shaft for recovery of the TBM launched from Byron Tract.

The Lower Roberts Island site would accommodate the shaft pad with shaft, tunnel liner segment storage, slurry/grout mixing plant, shops and offices for construction crews, RTM handling facilities (including RTM temporary wet storage and RTM natural drying areas), water treatment plant, emergency response facilities, a helipad, and other equipment and structures. Under the eastern alignment alternatives, RTM would be handled at Lower Roberts Island (instead of Bouldin Island) in addition to the Twin Cities Complex and the Southern Complex. A conveyor would move RTM from the shaft site approximately 2 miles along the access road to a separate RTM handling and storage area. RTM generated at Lower Roberts Island would be used to backfill borrow areas on-site. Approximately 71 acres of the site would be used for permanent RTM stockpiles up to 15 feet high that could potentially be used for future, as yet unidentified projects.

Portions of the existing perimeter levee on the Lower Roberts Island site do not comply with the Public Law 84-99 Delta-specific levee design standard because of insufficient freeboard or slopes. To address flood risk, the project would perform targeted repairs to existing levees to address geometry and historic performance issues that could recur during a potential high-water event. Following this standard, the Lower Roberts Island levee would be designed with 1.5 feet of freeboard above the 100-year flood elevation, minimum 16-foot crest width, exterior slopes of 2H:1V, and interior slopes ranging from 3H:1V to 5H:1V, depending on levee height and peat thickness. Levee modifications would occur along the Turner Cut eastern levee adjacent to West Neugebauer Road. All of the modifications would occur on the landside of the levees. Temporary levee modification access roads would be constructed along the landside toe of the existing levee at current grade level. The construction and postconstruction site for levee modifications would occupy approximately 30 acres, plus an additional 37 acres for temporary levee modification access roads.

Table 3-9 summarizes the distinguishing characteristics of Alternative 3.

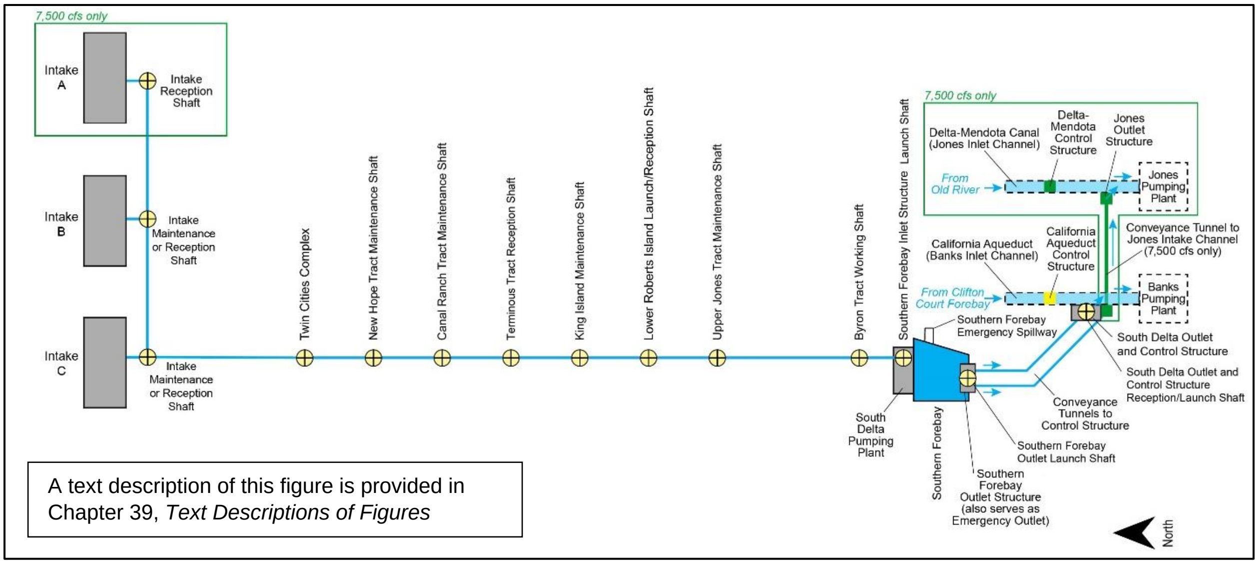


Figure 3-24. Project Schematic Eastern Alignment Alternatives

Under Alternative 3, the construction site for the Southern Complex on Byron Tract would occupy 1,488 acres, and the permanent footprint would cover 1,220 acres. The project facilities of the Southern Complex would be the same as described in Sections 3.4.5 and 3.4.6, and under Alternative 1 (Section 3.6) except for RTM, peat, and topsoil storage areas. The TBM would bore from the Byron Tract working shaft toward the reception shaft on Lower Roberts Island instead of Bouldin Island.

The Southern Complex would have two temporary RTM storage areas with a total maximum of 56 acres with stockpiles up to 10 feet high, for RTM generated on-site or at the Twin Cities Complex. Excess RTM from tunneling at the Southern Complex would be moved to a long-term storage area north of the Southern Forebay on the Southern Complex; the RTM stockpile there would occupy about 30 acres and be 15 feet high. Peat soils (51 acres) and topsoil and other soil materials (41 acres) would also be stored in that area.

Table 3-9. Summary of Distinguishing Physical Characteristics of Alternative 3

Characteristic	Description [a]
Alignment	Eastern
Conveyance capacity	6,000 cubic feet per second
Number of Intakes	2; Intakes B and C at 3,000 cfs each
Tunnel from Intakes to Southern Forebay	
Diameter	36 feet inside, 39 feet outside
Length	42 miles
Number of tunnel shafts [b]	11
Launch shaft diameter (including each shaft at double launch shafts and combined launch/reception shafts)	115 feet inside
Reception and maintenance shafts diameter	70 feet inside
Twin Cities Complex	Construction acres: 479 Permanent acres: 170

Characteristic	Description [a]
Lower Roberts Island Launch/Reception Shaft	Construction acres: 407 Permanent acres: 176
Southern Complex	Same as Alternative 1 except for facilities on Byron Tract
Facilities on Byron Tract	Construction acres: 1,488 Permanent acres: 1,220
Facilities west of Byron Highway	Construction acres: 164 Permanent acres: 112
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	159 acres x 15 feet high
Lower Roberts Island long-term RTM storage (approximate)	71 acres x 15 feet high
Southern Forebay long-term RTM storage (approximate)	30 acres x 15 feet high
Total wet excavated RTM volume (for single main tunnel from intakes to Southern Forebay and dual South Delta Conveyance tunnels)	14.8 million cubic yards

cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

[b] Number of shafts for the main tunnel from intakes to Southern Forebay, counting the double shaft at Twin Cities Complex as one shaft.

Access roads to Intakes B and C, relocation of SR 160, and new or modified access roads for the Twin Cities Complex and Southern Complex would be the same as under Alternative 1. Separate access roads would be constructed for New Hope Tract, Canal Ranch Tract, Terminous Tract, King Island, Lower Roberts Island, and Upper Jones Tract. All eastern alignment alternatives and the Bethany Reservoir alignment would involve constructing an overpass over the EBMUD) Mokelumne Aqueducts. Approximately 20 feet of clearance would be provided from the top of the Mokelumne Aqueducts to the bottom of the bridge deck. This height would be subject to design development and coordination with EBMUD. Figure 3-25 shows access roads specific to the eastern alignment alternatives.

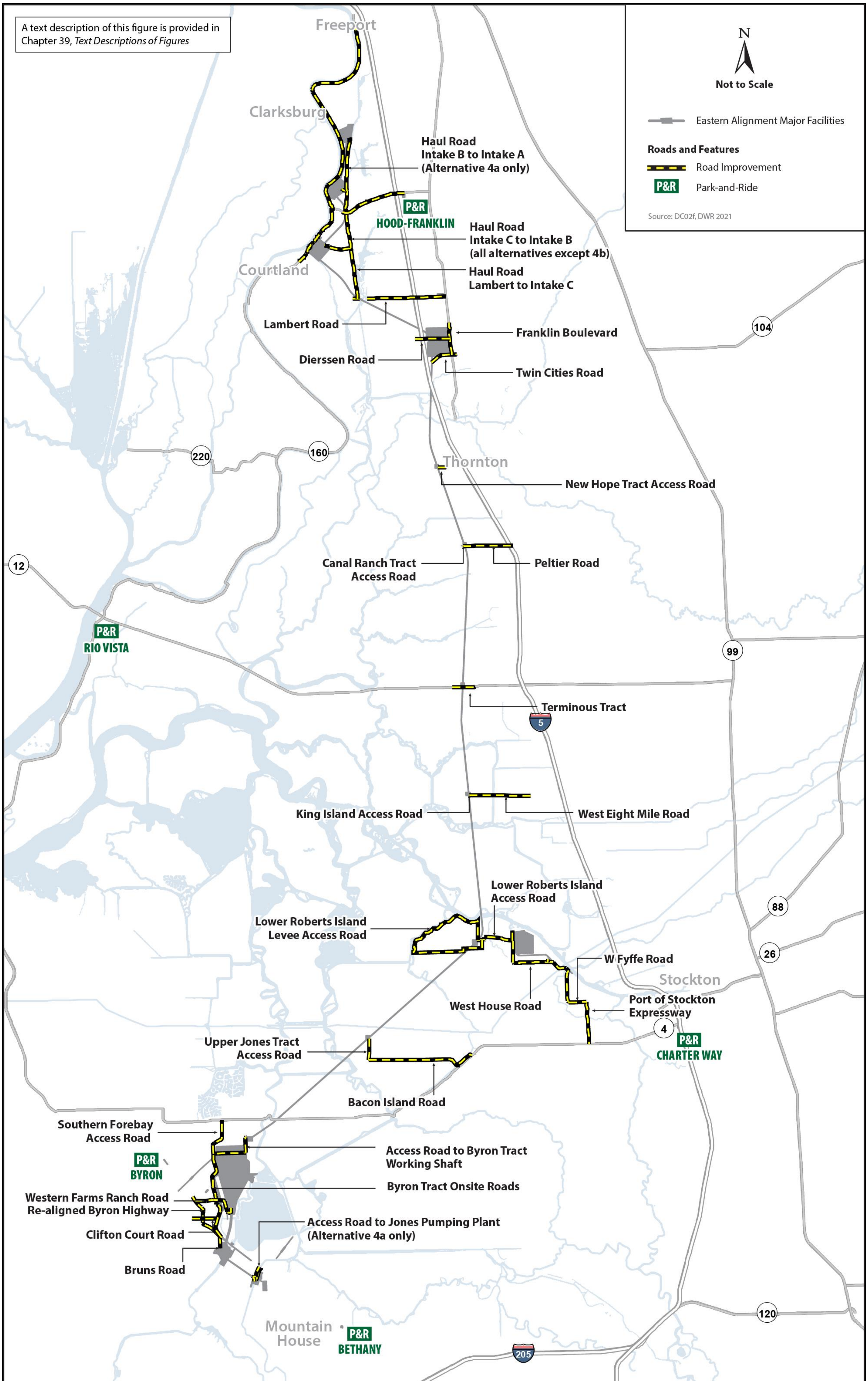


Figure 3-25. Road Modifications under Eastern Alignment Alternatives

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Alternative 3 would use the same rail-served materials depots serving the Twin Cities Complex and the Southern Complex described in Section 3.4.8, *Rail-Served Materials Depots*. Alternative 3 would also have a rail depot on Lower Roberts Island. The rail-served materials depot at Lower Roberts Island would involve 3.9 miles of new track, 15 rail turnouts, an aggregate unloading pit, and materials storage and vehicle staging areas. The railroad would connect the rail lines on the Port of Stockton to rails on Lower Roberts Island. A new railroad bridge would be constructed across Burns Cut, using the same bridge as proposed for road modifications shown on Figure 30-25. No additional construction access roads would be needed for access to the Lower Roberts Island tunnel shaft site besides those shown.

Electric power lines and SCADA facilities would be similar to those described in Section 3.4.10, *Electrical Facilities*, and Section 3.4.11, *SCADA Facilities*. Different electric power alignments would be used for the tunnel shafts on the eastern alignment between the Twin Cities Complex and the Southern Forebay. For instance, because Lower Roberts Island is so much closer to existing high-voltage transmission lines than Bouldin Island, the total distance of new lines for the eastern alignment is about 15% shorter than for Alternative 1. SCADA operations would be similarly customized to the eastern alignment facility locations.

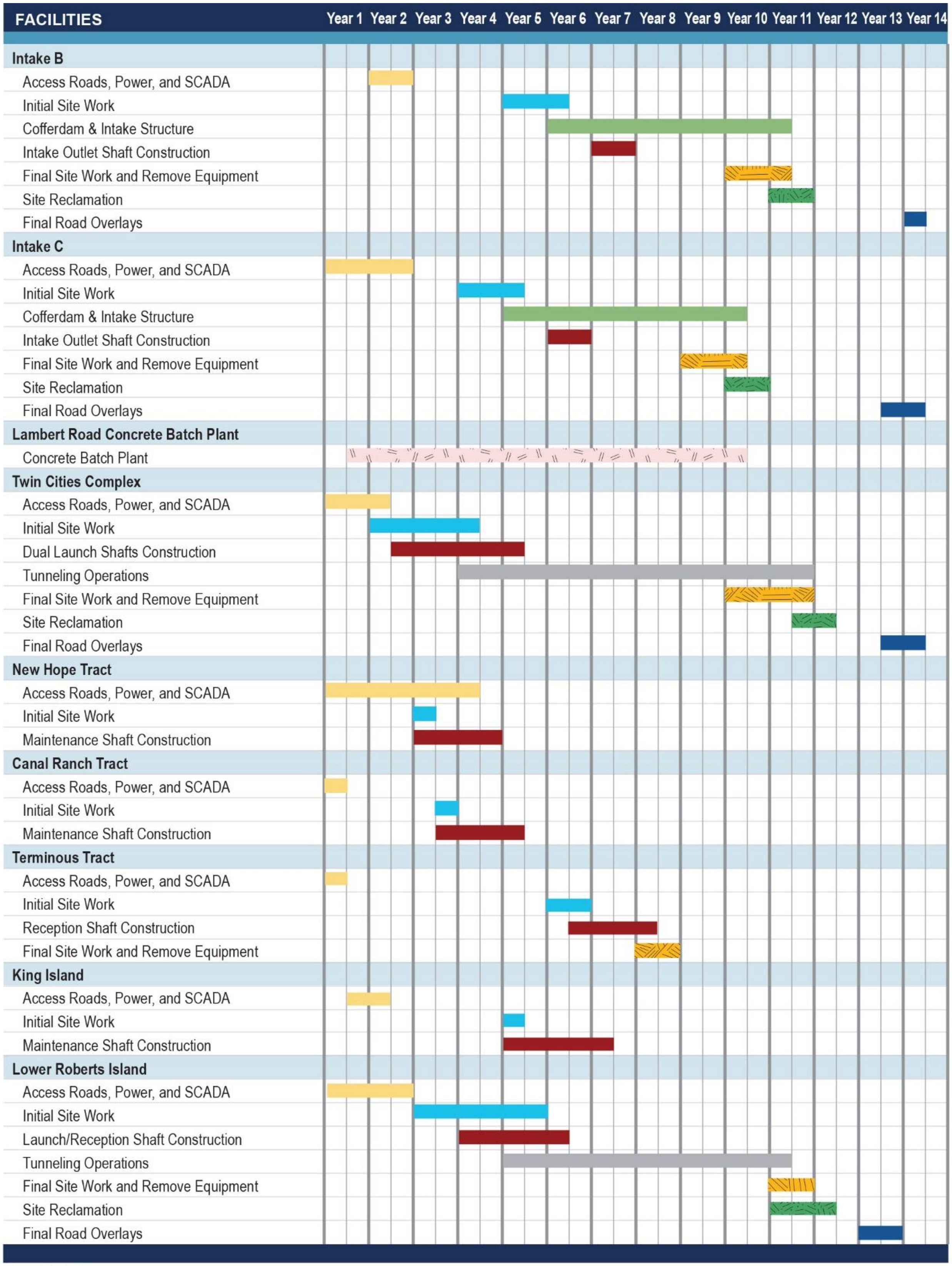
The same construction support facilities described in Section 3.4.15, *Other Construction Support Facilities*, would support Alternative 3. Support facilities described for Bouldin Island would be at Lower Roberts Island instead.

Water would be available for use under surface water rights at Lower Roberts Island. These surface water rights also serve adjacent areas. If the facilities used by adjacent properties to convey water are located on a parcel to be used for the tunnel shaft, the water pipelines or canals would be installed to maintain service to the adjacent properties.

Water supplies and water treatment, storage, and drainage strategies would be similar to those described in Section 3.4.15.5, *Local Water Supply, Drainage, and Utilities*. Different parcels would be affected at tunnel shaft locations on the eastern alignment.

3.10.1 Construction Schedule

Construction of Alternative 3 would take approximately 13 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with site work at the intakes and Twin Cities Complex and power and SCADA at maintenance shafts, and proceeding to equipment decommissioning, site reclamation, and road overlays in the final years, as shown in Figure 3-26.



Eastern 6,000 cfs

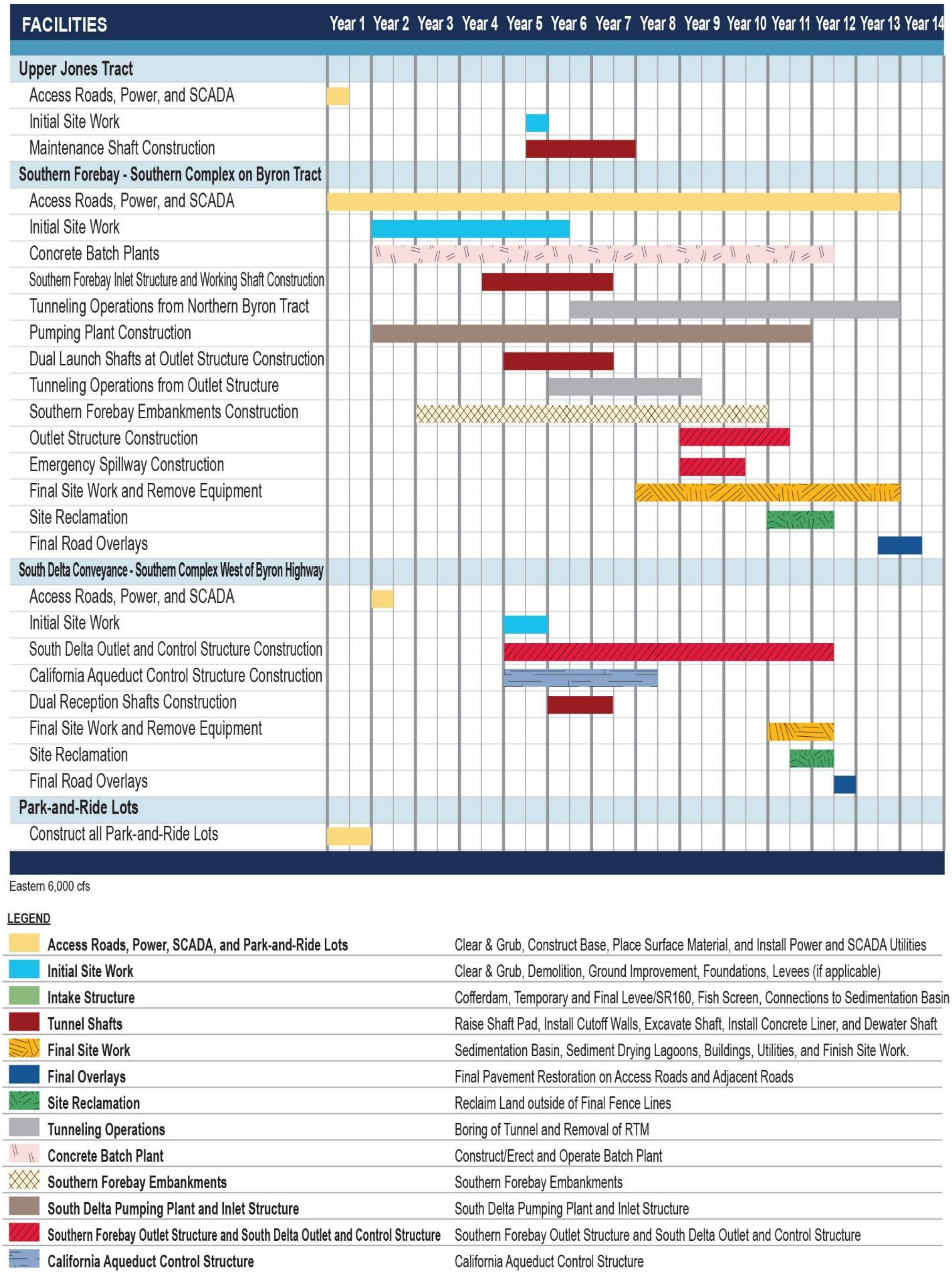


Figure 3-26. Alternative 3 Construction Schedule

3.11 Alternative 4a—Eastern Alignment, 7,500 cfs, Intakes A, B, and C

Under Alternative 4a, all conveyance facilities and operational features would be the same as under Alternative 2a, except that the main tunnel would follow the eastern alignment from the Twin Cities Complex, as described under Alternative 3. This alternative includes 1,500-cfs capacity for the CVP in coordination with Reclamation.

The tunnel diameter would be the same as under Alternative 2a, but its length on the eastern alignment would be 44 miles from the intakes to the South Delta Pumping Plant. Because of the tunnel diameter and longer length, this alternative would generate the most RTM of all the alternatives. Most shafts along the main tunnel alignment would be the same as shown in Table 3-9 for Alternative 3. Launch shaft sites at Twin Cities Complex and Lower Roberts Island would be larger than under Alternative 3 because of larger RTM storage areas required.

Under Alternative 4a, the Southern Complex facilities on Byron Tract would be the same as under Alternative 2a. The construction site for the Southern Complex would occupy 1,512 acres, and the permanent footprint would cover 1,244 acres. The Southern Complex would have two temporary RTM storage areas with a total maximum of 65 acres with stockpiles up to 15 feet high, and permanent RTM storage covering 51 acres up to 15 feet high.

Table 3-10 summarizes the distinguishing features and characteristics of Alternative 4a. Figures 3-2b and 3-24 provide, respectively, a map and a schematic diagram associated with all the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c). Mapbook 3-2 shows the location of major construction features associated with this proposed water conveyance facility alignment.

Table 3-10. Summary of Distinguishing Physical Characteristics of Alternative 4a

Characteristic	Description [a]
Alignment	Eastern
Conveyance capacity	7,500 cubic feet per second
Number of Intakes	3; Intakes A at 1,500 cfs; Intakes B and C at 3,000 cfs each
Tunnel from Intakes to Southern Forebay	
Diameter	40 feet inside, 44 feet outside
Length	44 miles
Number of tunnel shafts [b]	12
Twin Cities Complex	Construction acres: 546 Permanent acres: 302
Lower Roberts Island Launch/Reception Shaft	Construction acres: 445 Permanent acres: 207
Southern Complex	Same as Alternative 2a except for Facilities on Byron Tract
Facilities on Byron Tract	Construction acres: 1,512 Permanent acres: 1,244
Facilities west of Byron Highway	Construction acres: 293 Permanent acres: 210

Characteristic	Description [a]
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	291 acres x 15 feet high
Lower Roberts Island long-term RTM storage (approximate)	93 acres x 15 feet high
Southern Forebay long-term RTM storage (approximate)	51 acres x 15 feet high
Total wet excavated RTM volume (for single main tunnel from intakes to Southern Forebay and dual South Delta Conveyance tunnels)	19.5 million cubic yards
Wet excavated RTM volume for Jones Tunnel between Southern Forebay Complex and Jones Outlet Structure	0.15 million cubic yards

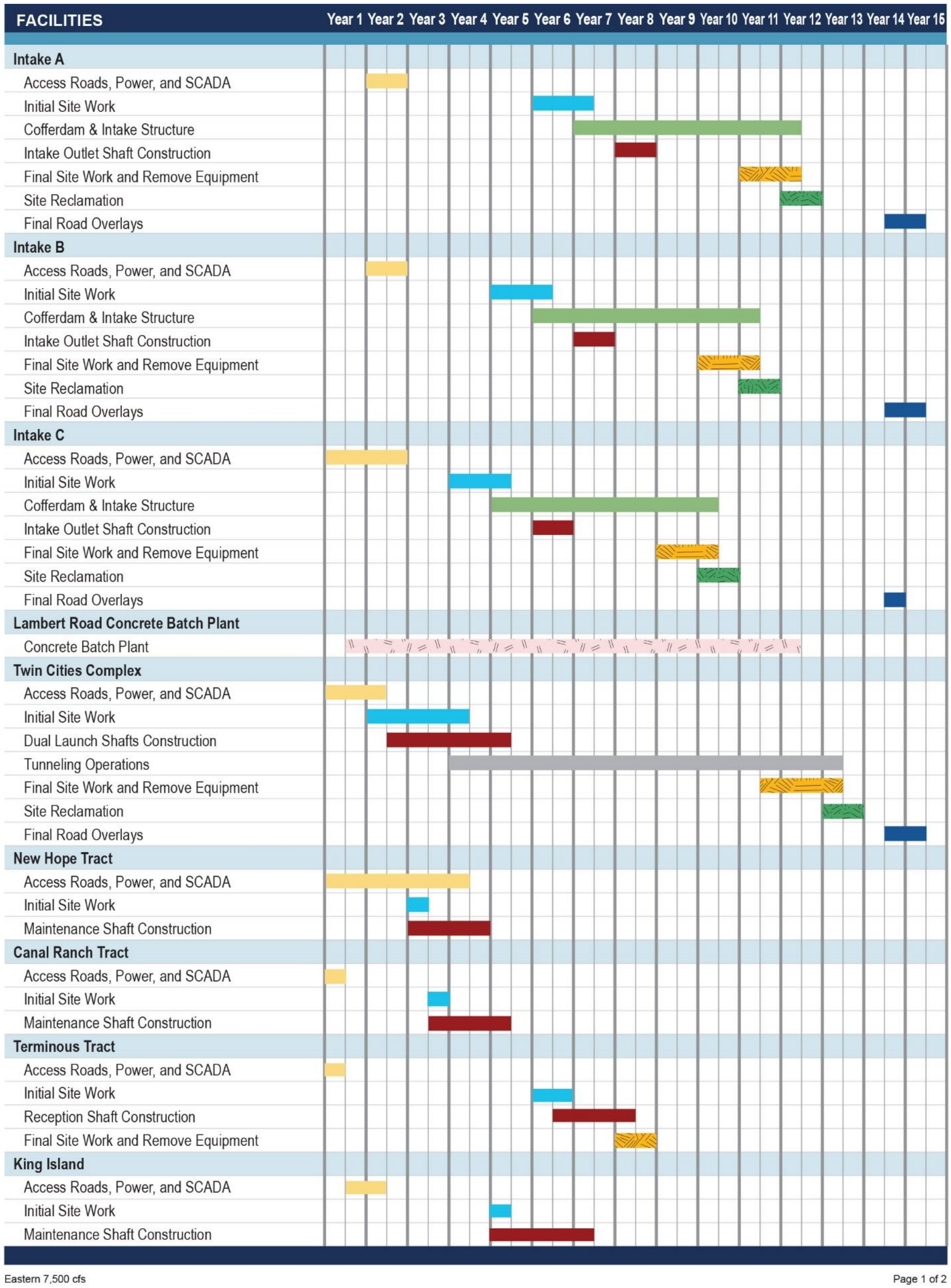
cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

[b] Number of shafts for the main tunnel from intakes to Southern Forebay, counting the double shaft at Twin Cities Complex as one shaft.

3.11.1 Construction Schedule

Construction of Alternative 4a would take approximately 14 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with site work at the intakes and Twin Cities Complex and power and SCADA at maintenance shafts, and proceeding to equipment decommissioning, site reclamation, and road overlays in the final years, as shown in Figure 3-27.


FACILITIES
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
Year 7
Year 8
Year 9
Year 10
Year 11
Year 12
Year 13
Year 14
Year 15
Intake A
Access Roads, Power, and SCADA
Initial Site Work
Cofferdam & Intake Structure
Intake Outlet Shaft Construction
Final Site Work and Remove Equipment
Site Reclamation
Final Road Overlays
Intake B
Access Roads, Power, and SCADA
Initial Site Work
Cofferdam & Intake Structure
Intake Outlet Shaft Construction
Final Site Work and Remove Equipment
Site Reclamation
Final Road Overlays
Intake C
Access Roads, Power, and SCADA
Initial Site Work
Cofferdam & Intake Structure
Intake Outlet Shaft Construction
Final Site Work and Remove Equipment
Site Reclamation
Final Road Overlays
Lambert Road Concrete Batch Plant
Concrete Batch Plant
Twin Cities Complex
Access Roads, Power, and SCADA
Initial Site Work
Dual Launch Shafts Construction
Tunneling Operations
Final Site Work and Remove Equipment
Site Reclamation
Final Road Overlays
New Hope Tract
Access Roads, Power, and SCADA
Initial Site Work
Maintenance Shaft Construction
Canal Ranch Tract
Access Roads, Power, and SCADA
Initial Site Work
Maintenance Shaft Construction
Terminous Tract
Access Roads, Power, and SCADA
Initial Site Work
Reception Shaft Construction
Final Site Work and Remove Equipment
King Island
Access Roads, Power, and SCADA
Initial Site Work
Maintenance Shaft Construction
Eastern 7,500 cfs
Page 1 of 2

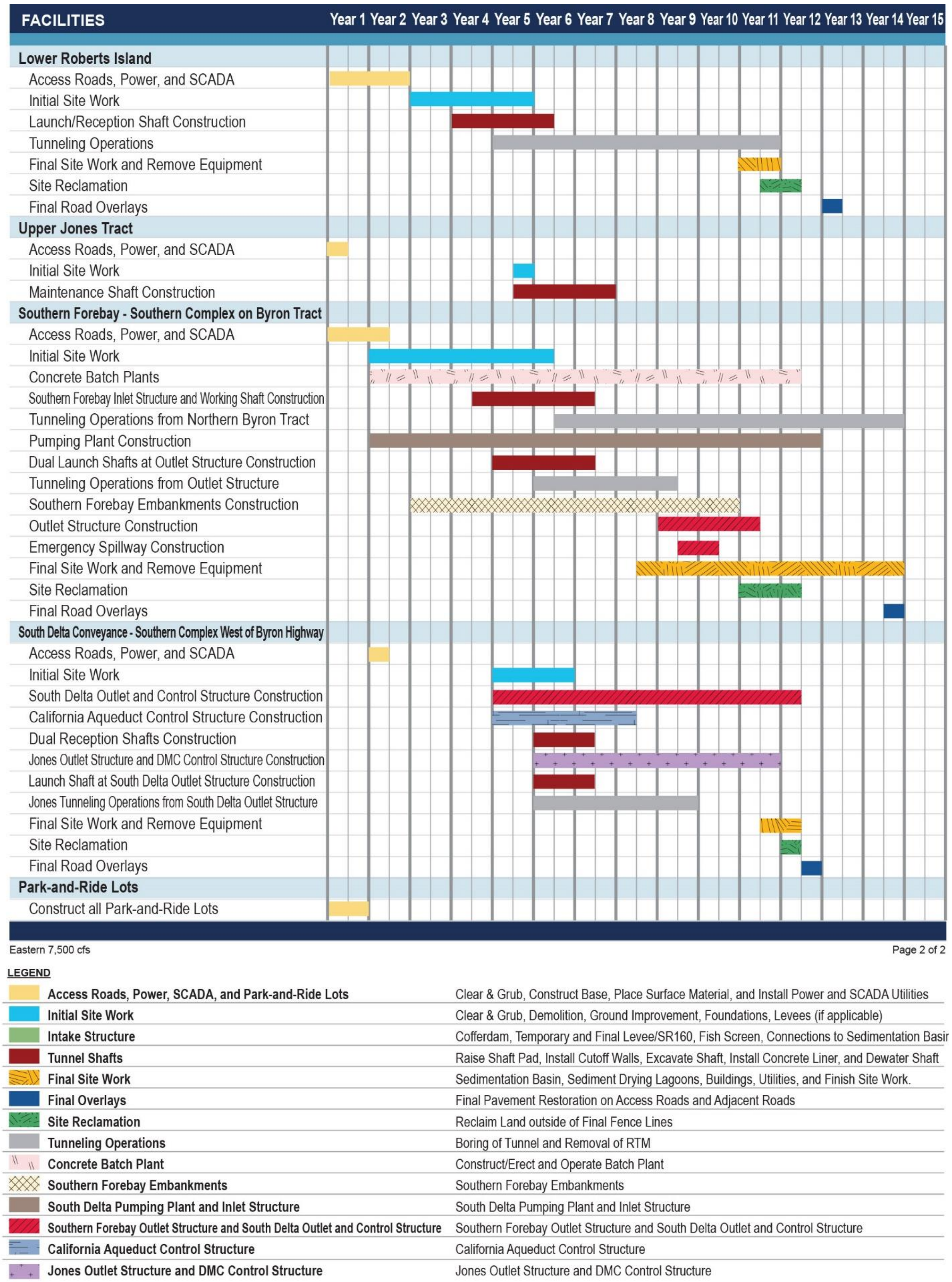


Figure 3-27. Alternative 4a Construction Schedule

3.12 Alternative 4b—Eastern Alignment, 3,000 cfs, Intake C

Under Alternative 4b, all conveyance facilities and operational features would be the same as under Alternative 2b, except the main tunnel would follow the eastern alignment from the Twin Cities Complex to the Southern Forebay, as described under Alternative 3. The tunnel diameter would be 26 feet inside, 28 feet outside, and 40 miles long on this alignment. TBM launch shaft sites would be correspondingly smaller than under other alternatives because less area would be needed for RTM storage. Other shaft sites would be the same as under Alternative 3.

Under Alternative 4b, the construction site for the Southern Complex on Byron Tract would occupy 1,457 acres and the permanent footprint would cover 1,189 acres. Otherwise, the Southern Complex would be the same as described in Sections 3.4.5 and 3.4.6 and under Alternative 2b (Section 3.8)

Access roads and road modifications, electrical transmission lines, and SCADA would be the same as under Alternative 3 but would not require the work related to Intakes A and B. The Southern Complex, rail-served materials depots, construction support facilities, and all other features would be the same as under Alternative 3. The Southern Complex would have two temporary RTM storage areas with a total maximum of 38 acres with stockpiles up to 10 feet high. No RTM would be permanently stored at the Southern Complex.

Table 3-11 summarizes the distinguishing features and characteristics of Alternative 4b. Figures 3-2b and 3-24 provide, respectively, a map and a schematic diagram associated with all the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c). Mapbook 3-2 shows the major construction features associated with this alignment (including facilities exclusive to Alternative 4a to show the greatest potential extent of the alignment).

Table 3-11. Summary of Distinguishing Physical Characteristics of Alternative 4b

Characteristic	Description [a]
Alignment	Eastern
Conveyance capacity	3,000 cubic feet per second
Number of Intakes	1; Intake C at 3,000 cfs
Tunnel from Intakes to Southern Forebay	
Diameter	26 feet inside, 28 feet outside
Length	40 miles
Number of tunnel shafts [b]	10
Launch shafts diameter	110 feet inside
Reception and maintenance shafts diameter	53 feet inside
Twin Cities Complex	Construction acres: 322 Permanent acres: 26
Lower Roberts Island Launch/Reception Shaft	Construction acres: 327 Permanent acres: 136
Southern Complex	Same as Alternative 2b
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	15 acres x 15 feet high

Characteristic	Description [a]
Lower Roberts Island long-term RTM storage (approximate)	33 acres x 15 feet high
Southern Forebay long-term RTM storage (approximate)	0
Total wet excavated RTM volume (for single main tunnel from intakes to Southern Forebay and dual South Delta Conveyance tunnels)	7.9 million cubic yards

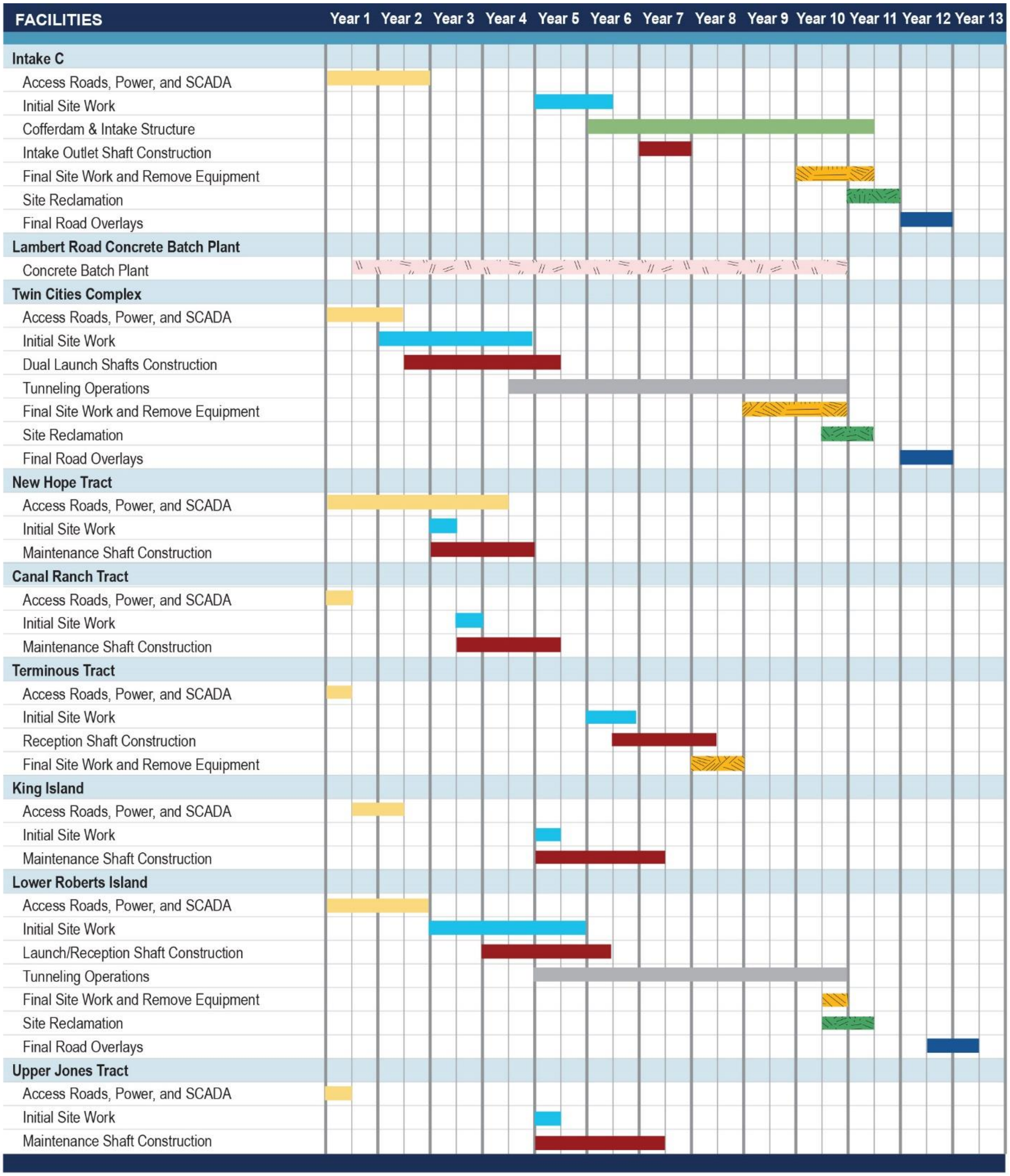
cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

[b] Number of shafts for the main tunnel from intakes to Southern Forebay, counting the double shaft at Twin Cities Complex as one shaft.

3.12.1 Construction Schedule

Construction of Alternative 4b would take approximately 13 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with site work at the intakes and Twin Cities Complex and power and SCADA at maintenance shafts, and proceeding to equipment decommissioning, site reclamation, and road overlays in the final years, as shown in Figure 3-28.



Eastern 3,000 cfs

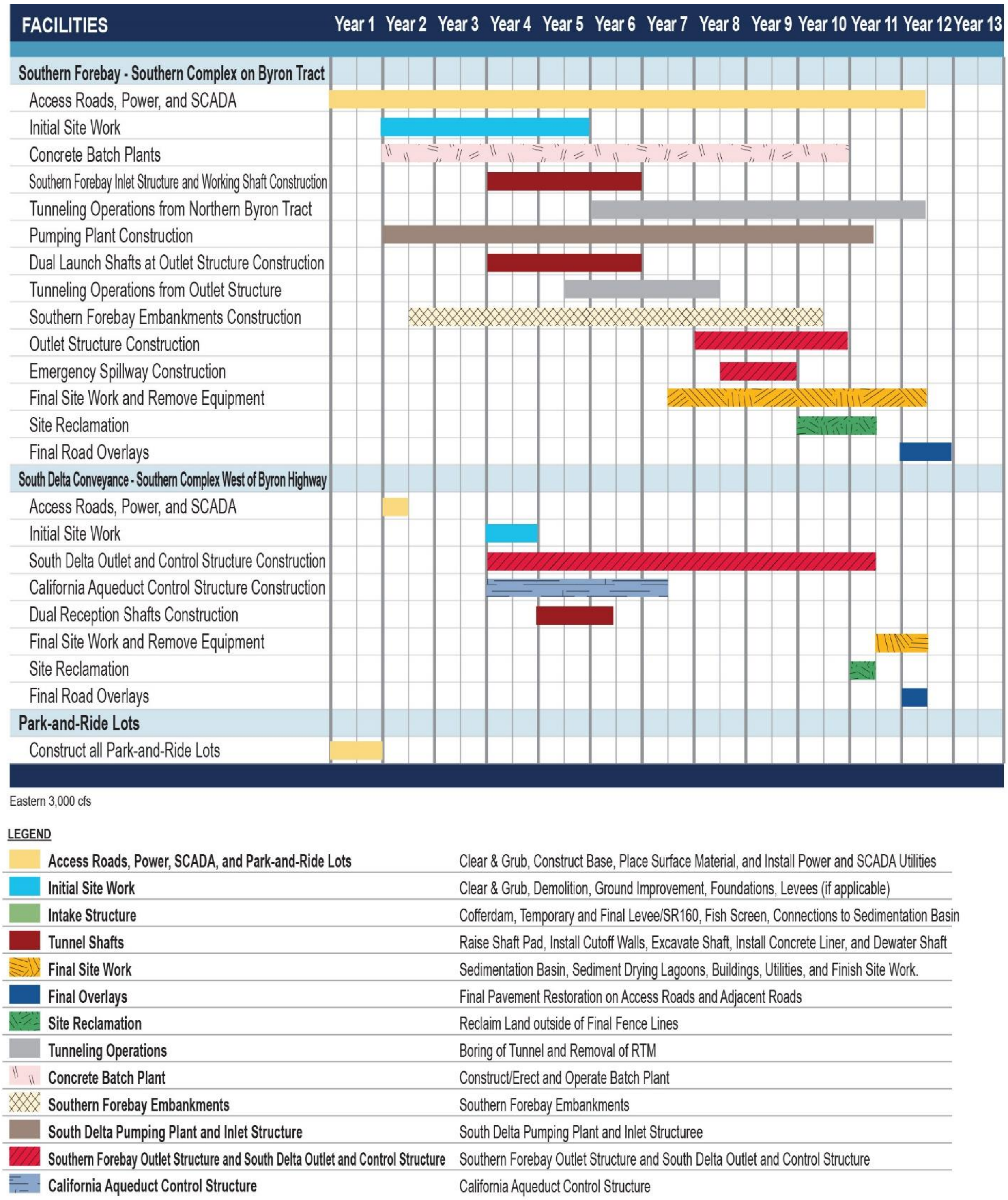


Figure 3-28. Alternative 4b Construction Schedule

3.13 Alternative 4c—Eastern Alignment, 4,500 cfs, Intakes B and C

Under Alternative 4c all conveyance facilities and operational features would be the same as under Alternative 2c (Section 3.9), except that this alternative would follow the eastern alignment, as described under Alternative 3. The main tunnel would be 31 feet inside diameter, 34 feet outside diameter, and extend 42 miles from the intakes to the Southern Forebay.

With an intake capacity of 1,500 cfs, the cylindrical tee fish screen at Intake C would have 15 units with 100-cfs capacity each instead of 30 units, and the intake's finished footprint would be smaller than under Alternative 3.

Intake shafts would have an inside diameter of 83 feet. The Intake B tunnel shaft would also serve as the tunnel's TBM reception shaft. Shaft locations would be the same as under Alternative 3, but shaft diameters would be smaller. Launch shafts along the main tunnel alignment would have inside diameter of 110 feet; reception and maintenance shafts would have inside diameters of 63 feet. Alternative 4c would generate less soil material and RTM for on-site reuse, export, or storage. Launch shaft sites at Twin Cities Complex and Lower Roberts Island would be smaller than under Alternative 3 because the volume of RTM generated by boring the smaller tunnel would be less and would require smaller RTM storage areas at TBM launch shaft sites. The Southern Complex would have two temporary RTM storage areas with a total maximum of 44 acres with stockpiles up to 10 feet high. A permanent RTM stockpile at the Southern Forebay would cover about 17 acres up to 15 feet high.

Under Alternative 4c, the construction site for the Southern Complex on Byron Tract would occupy 1,475 acres and the permanent footprint would cover 1,207 acres. Otherwise, the Southern Complex would be the same as described in Sections 3.4.5 and 3.4.6 and under Alternative 2c (Section 3.9). Access roads and road modifications, electrical power lines, and SCADA would be the same as under Alternative 3. The rail-served materials depots, construction support facilities, and all other features would be the same as under Alternative 3.

Table 3-12 summarizes the distinguishing features and characteristics of Alternative 4c. Figures 3-2b and 3-25 provide a map and a schematic diagram, respectively, depicting the conveyance facilities associated with eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c). Mapbook 3-2 shows the major construction features associated with eastern alignment alternatives.

Table 3-12. Summary of Distinguishing Physical Characteristics of Alternative 4c

Characteristic	Description [a]
Alignment	Eastern
Conveyance capacity	4,500 cubic feet per second
Number of Intakes	2; Intake B at 3,000 cfs, Intake C at 1,500 cfs
Tunnel from Intakes to Southern Forebay	
Diameter	31 feet inside, 34 feet outside
Length	42 miles
Number of tunnel shafts [b]	11
Launch shafts diameter	110 feet inside
Reception and maintenance shafts diameter	63 feet inside
Twin Cities Complex	Construction acres: 392 Permanent acres: 95
Lower Roberts Island Launch/Reception Shaft	Construction acres: 376 Permanent acres: 158
Southern Complex	Same as Alternative 2c except for Facilities on Byron Tract
Facilities on Byron Tract	Construction acres: 1,475 Permanent acres: 1,207
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	84 acres x 15 feet high
Lower Roberts Island long-term RTM storage (approximate)	50 acres x 15 feet high
Southern Forebay long-term RTM storage (approximate)	17 acres x 15 feet high
Total wet excavated RTM volume (for single main tunnel from intakes to Southern Forebay and dual South Delta Conveyance tunnels)	11.3 million cubic yards

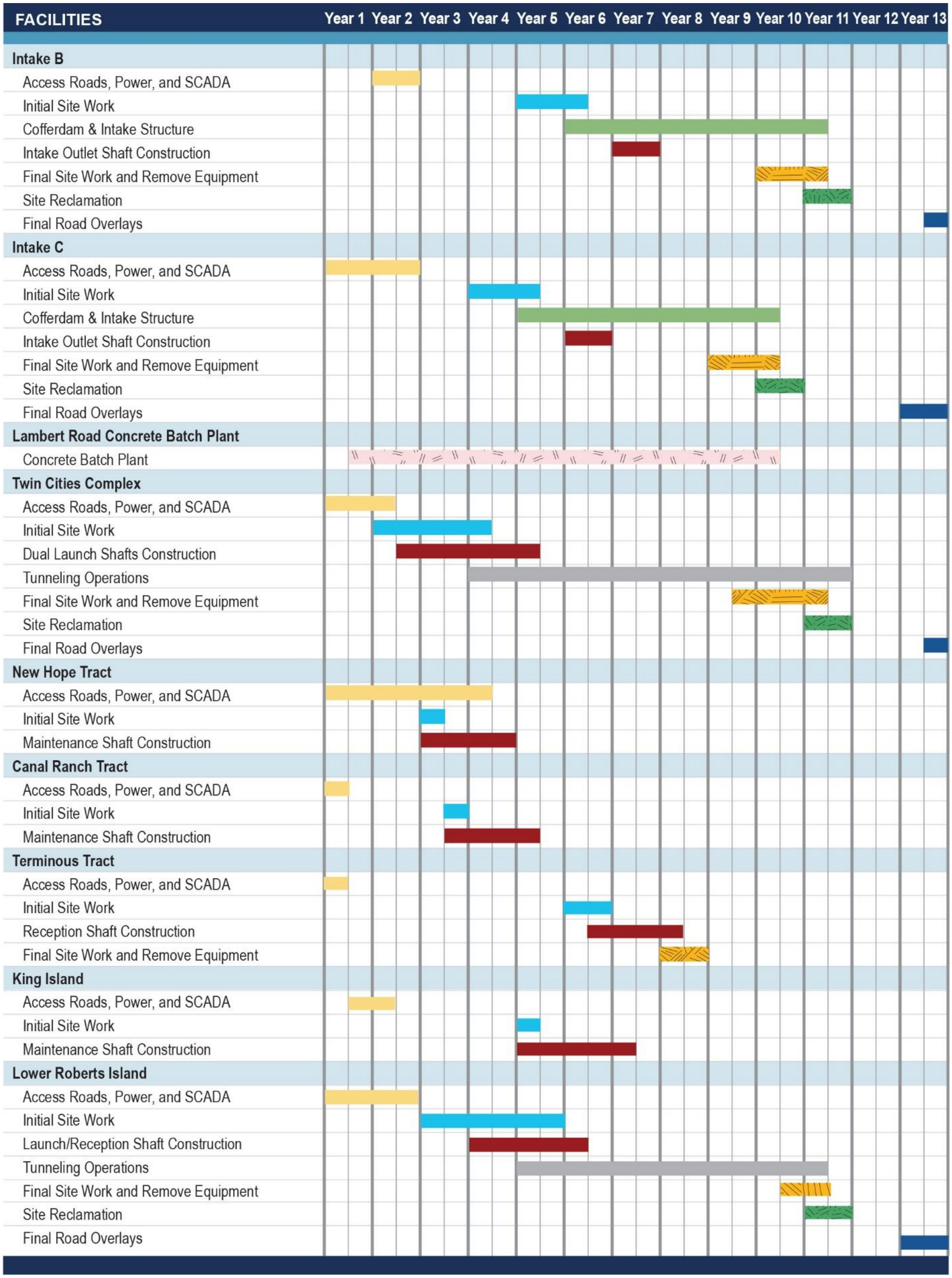
cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

[b] Number of shafts for the main tunnel from intakes to Southern Forebay, counting the double shaft at Twin Cities Complex as one shaft.

3.13.1 Construction Schedule

Construction of Alternative 4c would take approximately 13 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with site work at the intakes and Twin Cities Complex and power and SCADA at maintenance shafts, and proceeding to equipment decommissioning, site reclamation, and road overlays in the final years, as shown in Figure 3-29.



Eastern 4,500 cfs

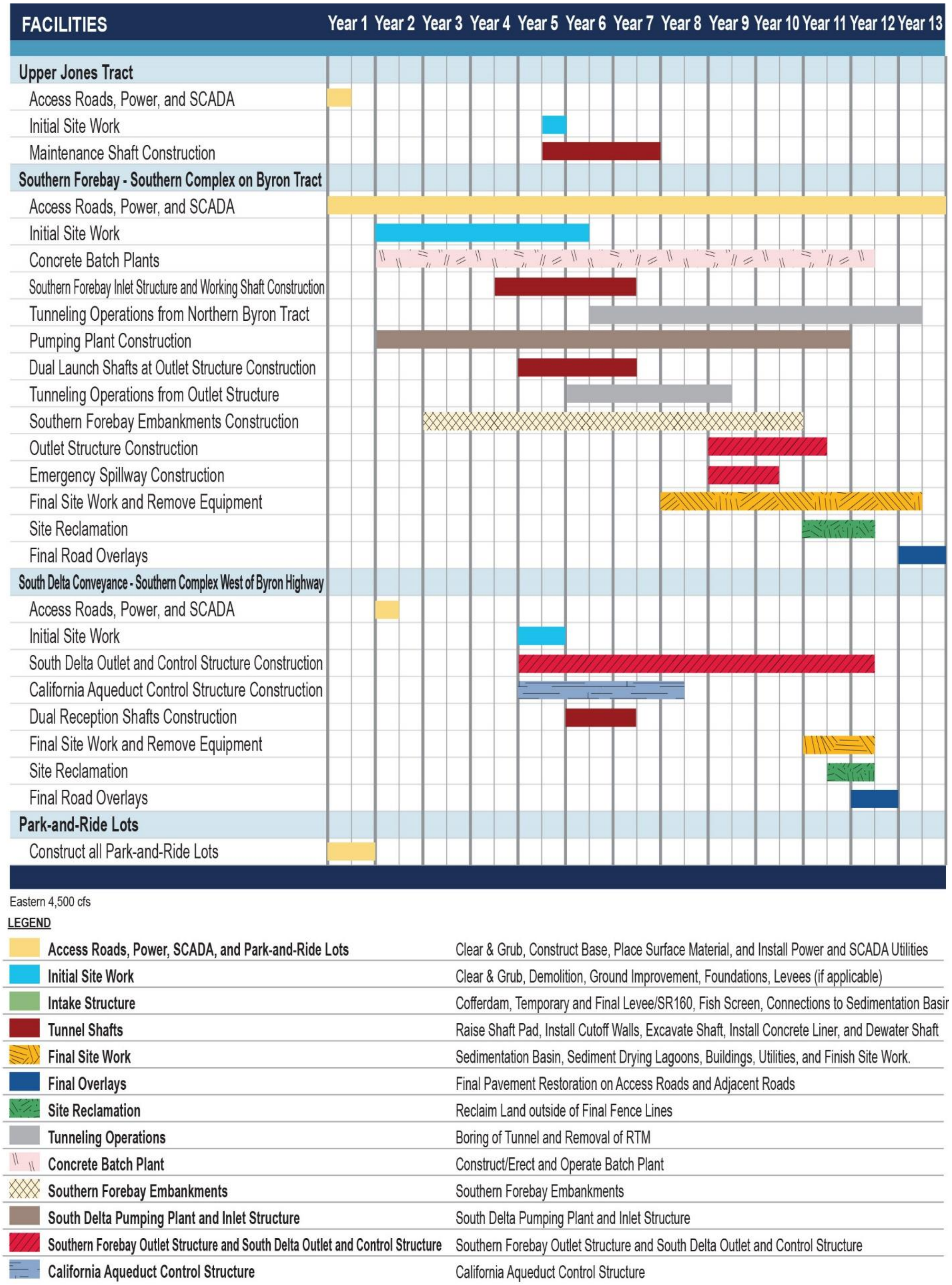


Figure 3-29. Alternative 4c Construction Schedule

3.14 Alternative 5—Bethany Reservoir Alignment, 6,000 cfs, Intakes B and C (Proposed Project)

Alternative 5 would use Intakes B and C to convey up to 6,000 cfs of water from the north Delta along the eastern alignment as described under Alternative 3 as far as the launch shaft at Lower Roberts Island. From Lower Roberts Island, the tunnel would follow a different route to a location south of Clifton Court Forebay and terminate at the Bethany Complex. This tunnel alignment is referred to as the Bethany Reservoir alignment. Figures 3-2c and 3-30 provide, respectively, a map and a schematic diagram depicting the alignment and conveyance facilities associated with Alternative 5. Mapbook 3-3 depicts the locations of Bethany Reservoir alignment project facilities and major construction features.

From the Twin Cities Complex, the Bethany Reservoir alignment would extend along the same easterly route as Alternative 3, using the same tunnel shaft locations as far as Lower Roberts Island, where the corridor would turn southwest, traveling from Lower Roberts Island under Lower and Upper Jones Tracts, Victoria Island, Union Island, Coney Island, and Clifton Court Tract to the Surge Basin reception shaft. Tunnel shafts would be located at the following sites.

- Intake B
- Intake C
- Twin Cities Complex Double Launch Shaft
- New Hope Tract maintenance shaft (eastern)
- Canal Ranch Tract maintenance shaft
- Terminous Tract reception shaft
- King Island maintenance shaft
- Lower Roberts Island double launch shaft
- Upper Jones Tract maintenance shaft (Bethany)
- Union Island maintenance shaft
- Surge Basin reception shaft (at Bethany Complex)

Alternative 5 would eliminate the Southern Complex facilities described in Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c. Instead, this alternative would include a new Bethany Reservoir Pumping Plant and Surge Basin to the south of Clifton Court Forebay, and the new Bethany Reservoir Aqueduct that would convey flows to a new Bethany Reservoir Discharge Structure on the shore of Bethany Reservoir. The aqueduct would consist of four pipelines including tunneled segments under the existing CVP Jones Pumping Plant discharge pipelines and existing conservation easement adjacent to Bethany Reservoir. Collectively, these facilities are called the Bethany Complex, described in Section 3.14.1, *Bethany Complex*.

The tunnel from the intakes to the Bethany Complex would have an inside diameter of 36 feet and outside diameter of 39 feet and extend 45 miles from the intakes to the surge basin at the Bethany Reservoir Pumping Plant. Alternative 5 would have the same tunnel shafts as described under Alternative 3 from the north Delta to Lower Roberts Island. Lower Roberts Island would have a double launch shaft, similar to that at the Twin Cities Complex, which would allow one TBM to bore north to the Terminous Tract reception shaft and one to bore south toward the final reception shaft at the Bethany Reservoir Surge Basin via maintenance shafts on Upper Jones Tract (at a different location than under Alternative 3) and on Union Island. The maintenance shaft site on Upper Jones Tract would require a different access road than under Alternative 3 because it is in a different location. The Union Island maintenance shaft would be unique to Alternative 5. Construction access to Union Island would be via Bonetti Road. The shaft pads at Upper Jones Tract and Union Island tunnel maintenance shafts would be constructed of soil excavated from Lower Roberts Island. Because the Southern Forebay, Southern Complex, and South Delta Conveyance Facilities are not included in this alternative, the shafts associated with those features would not be needed.

The Twin Cities Complex under the Bethany Reservoir alignment (Alternative 5) would be similar to Alternative 3, but larger because RTM that would be used or stored at the Southern Complex under other alternatives would not be transported to that site and would need to be stored on-site instead. Tunnel segments, TBM machinery, other soil materials, and equipment would be delivered to the Twin Cities Complex by road; there would be no rail-served materials depot at the Twin Cities Complex under Alternative 5. Access road modifications, RTM storage, and facility layouts would change accordingly. RTM handling at the Twin Cities Complex and Lower Roberts Island TBM launch shafts would be the same as described for the eastern alignment alternatives (Alternatives 3, 4a, 4b, and 4c), except that mechanical dryers would not be used at Lower Roberts Island and no RTM would be transported for forebay construction.

The double launch shaft at Lower Roberts Island would require a larger shaft site than under Alternative 3 constructed in a figure eight configuration to accommodate two TBMs, larger RTM storage area, and corresponding adjustments to access roads and railroad alignments. Material excavated on-site would be used to construct the shaft pad. The site would also house a rail-served materials depot similar to the facility described under Alternative 3. Rail access to Lower Roberts Island would be provided from existing UPRR and/or BNSF tracks at the Port of Stockton. Rail lines could be extended from one of the existing rail facilities at the Port of Stockton. Rail access would be extended over a new bridge over Burns Cut and continue to the launch shaft site and RTM storage area.

Portions of existing perimeter levee on the Lower Roberts Island site do not comply with the Public Law 84-99 Delta-specific levee design standard because of insufficient freeboard or slopes. Levee modifications for this alternative would be made as described for Alternative 3, described in Section 3.10.

Table 3-13 summarizes the distinguishing characteristics of Alternative 5.

Table 3-13. Summary of Distinguishing Physical Characteristics of Alternative 5

Characteristic	Description [a]
Alignment	Bethany Reservoir
Conveyance capacity	6,000 cubic feet per second
Number of Intakes	2; Intakes B and C at 3,000 cfs each
Tunnel from Intakes to Bethany Reservoir Pumping Plant	
Diameter	36 feet inside, 39 feet outside
Length	45 miles
Number of tunnel shafts	11 [b]

Characteristic	Description [a]
Launch shafts diameter	115 feet inside
Reception and maintenance shafts diameter	70 feet inside
Surge Basin reception shaft diameter	120 feet inside
Twin Cities Complex	Construction acres: 586 Permanent acres: 222
Lower Roberts Island Double Launch Shaft site	Construction acres: 610 Permanent acres: 300
Upper Jones Tract Maintenance Shaft [c]	Construction acres: 11 Permanent acres: 11
Union Island Maintenance Shaft [c]	Construction acres: 14 Permanent acres: 14
Bethany Complex	
Bethany Reservoir Pumping Plant and Surge Basin site size (all facilities)	Construction acres: 213 Permanent acres: 184
Bethany Reservoir Pumping Plant pad site	1,166 foot wide x 1,260 feet long (approximately 34 acres)
Surge basin	815 feet wide x 815 feet long x 35 feet deep, approximately 15 acres
Bethany Reservoir Aqueduct	Four 15-foot-diameter parallel below-ground pipelines Approximately 14,900 linear feet each Construction acres: 128 acres Permanent acres: 68
Aqueduct tunnels	Four 20-foot-diameter parallel tunnels, two reaches
Bethany Reservoir Discharge Structure	Construction acres: 15 Permanent acres: 13
RTM Volumes and Storage	
Twin Cities Complex long-term RTM storage (approximate)	214 acres x 15 feet high
Lower Roberts Island long-term RTM storage (approximate)	189 acres x 15 feet high
Bethany Complex	No TBM RTM generated or stored
Total wet excavated RTM volume (for single main tunnel from intakes to Bethany Reservoir Surge Basin shaft)	14.4 million cubic yards

cfs = cubic feet per second; RTM = reusable tunnel material; TBM = tunnel boring machine. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[a] Acreage estimates represent the permanent surface footprints of selected facilities. Overall project acreage includes some facilities not listed, such as permanent access roads.

[b] Number of shafts for the main tunnel from intakes to Bethany Reservoir Surge Basin shaft, counting the double shaft at Twin Cities Complex and the double shaft at Lower Roberts Island each as one shaft.

[c] These maintenance shafts are included in this table because they are distinctive to the Bethany Reservoir alignment. Upper Jones Tract maintenance shaft is in a different location than in other eastern alignment alternatives and Union Island maintenance shaft is unique to this alternative.

Characteristics of fencing and lighting at intakes, tunnel shaft sites, Bethany Reservoir Pumping Plant and Surge Basin, and Bethany Reservoir Discharge Structure during construction and operation would be the same as described in Section 3.4.12, *Fencing and Lighting*. These features would also be the same at the Bethany Complex during aqueduct construction, but once operational, the aqueduct would require only gates at access points along county roads.

The power and SCADA alignment for all facilities north of the Lower Roberts Island double launch shaft and two new park-and-ride lots—Hood-Franklin and Charter Way—would be the same as under Alternative 3. A new electrical power substation at Lower Roberts Island would be in a slightly different location than under Alternative 3. The two maintenance shafts between Lower Roberts Island and the Bethany Complex would require different electric power connections than under Alternative 3. Electric power lines for the Bethany Complex would be primarily aboveground on new poles and a few towers.

SCADA facilities for the Bethany Reservoir alignment and Bethany Complex would be controlled through three operations centers, including one that would be installed at the Bethany Reservoir Pumping Plant.

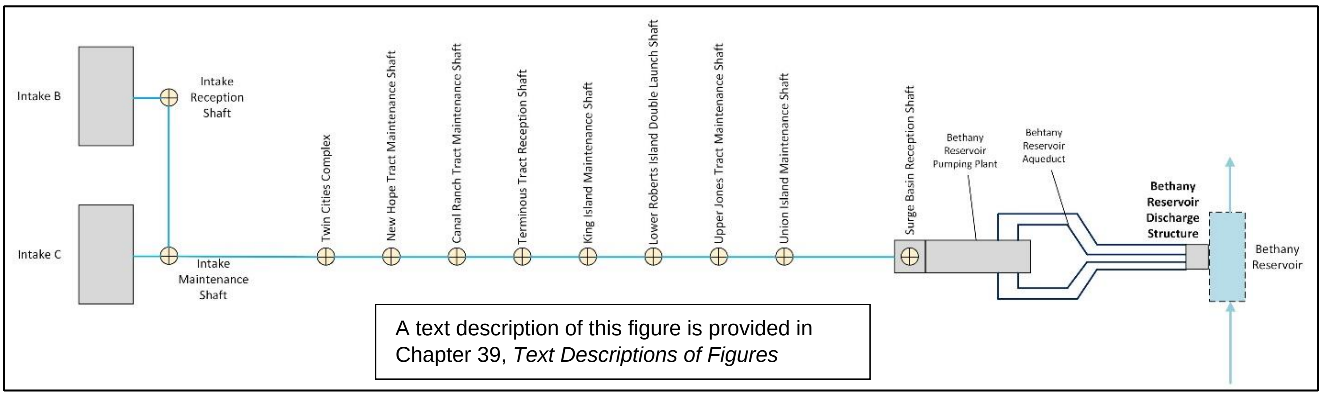


Figure 3-30. Alternative 5 Bethany Reservoir Alignment Schematic

RTM would be generated by boring the main tunnel north of the Bethany Complex, but excavation for the Bethany Reservoir Pumping Plant, Aqueduct, and Discharge Structure would not require the use of a TBM and would not generate the same type of RTM. Spoil material from construction of the aqueduct would be placed on top of and adjacent to the aqueduct for permanent storage or placed in the excess excavated material stockpile near the Bethany Reservoir Pumping Plant.

RTM generated at the Twin Cities Complex and Lower Roberts Island launch shafts sites would be processed and reused at the launch shaft sites to backfill borrow areas. Approximately 40 acres of excavated areas within the limits of the permanent RTM stockpile at Twin Cities and 26 acres at Lower Roberts Island would be filled with RTM to raise the elevation to existing ground levels. Surplus RTM would be stockpiled on-site for future uses by DWR. Alternative 5 is expected to generate 14.4 million cubic yards of wet excavated RTM—6.7 million cubic yards at Twin Cities Complex and 7.7 million cubic yards at Lower Roberts Island.

Excess excavated soil from construction of the surge basin, pumping plant, and aqueduct would be used on-site for grading as much as possible. Excess topsoil and excavation material would be stockpiled at five locations at the Bethany Complex (Delta Conveyance Design and Construction Authority 2023b). A permanent 33-foot high stockpile of excavated material from the Bethany

Reservoir Pumping Plant and Surge Basin would occupy about 70 acres(Delta Conveyance Design and Construction Authority 2023b). The stockpile area would be cleared, grubbed, and stripped of topsoil before stockpiling. Soil from this location and excess soil from other portions of the Bethany Complex would be spread over the completed stockpiles and hydroseeded.

The two concrete batch plants at Lambert Road proposed for Alternative 3 would serve construction of the intakes, Twin Cities Complex, New Hope Tract, Canal Ranch Tract, and King Island. Concrete for Terminous Tract, Lower Roberts Island, Upper Jones Tract, and Union Island tunnel shafts would come from existing local concrete suppliers from the Sacramento or Stockton areas. Another two concrete batch plants at the Bethany Reservoir Pumping Plant and Surge Basin would serve construction of all portions of the Bethany Complex. They would occupy about 11.5 acres north of Kelso Road, adjacent to the contractor's yard behind the pumping plant (Delta Conveyance Design and Construction Authority 2023b). Each batch plant site would be approximately 330 feet wide by 330 feet long with a 50- to 75-foot-tall batch plant that would include three bulk cement storage silos, a portable cement silo, a 500-square-foot batch trailer, propane and diesel fuel tanks, a reclaimed water system and related collection facilities for stormwater and wash water, and dust collectors to minimize particulate matter in the air. Filtered particulates would be hauled to licensed off-site disposal facilities or added to raw materials used to produce concrete. The batch plants would be removed after construction.

Alternative 5 would include only the Hood-Franklin Park-and-Ride Lot and Charter Way Park-and-Ride Lot presented under Alternative 3. On-site parking would be provided at the Twin Cities Complex, Lower Roberts Island construction sites, all maintenance and reception shafts, and Bethany Complex.

One 4,000-gallon diesel tank and one 4,000-gallon gasoline tank would be present at the Bethany Reservoir Pumping Plant and Surge Basin during construction. Both tanks would be elevated and inside fully contained fueling areas. Fuel stations along the main tunnel alignment would be the same as under Alternative 3.

Emergency response facilities for the Bethany Complex would be located just south of the Bethany Reservoir Pumping Plant and Surge Basin, near the aqueduct alignment. Facilities would include two ambulances; fire, rescue, and medical equipment; accommodations for one full-time crew during work hours; and a helipad for emergency evacuations. Emergency personnel could include construction management staff that would be cross-trained.

Water supplies and water treatment, storage, and drainage strategies would be similar to those described in Section 3.4.15.5 and subject to the same water rights and limitations. At the Bethany Reservoir Pumping Plant and Surge Basin, some water would be supplied from the California Aqueduct. Bethany Reservoir Aqueduct construction activities would move along the alignment over 57 months of construction. Accordingly, water supplies would have to be hauled to each progressive construction site. These supplies would also come from the connection to the California Aqueduct at the Bethany Reservoir Pumping Plant site.

Water for the discharge structure construction site would be pumped from the Bethany Reservoir. All dewatering flows would receive treatment to reduce concentrations of constituents such as boron in the groundwater, and be discharged to local channels or Bethany Reservoir.

Water supplies for access road construction would be hauled from nearby fill stations. Runoff from the construction site would be contained by portable berms and tested. Berms and other barriers around the site would contain stormwater runoff before testing to confirm compliance with the project's SWPPP. If found compliant, runoff would be directed to adjacent stormwater ditches or storm drains. It is expected that stormwater runoff volumes from road construction would be similar to existing conditions.

3.14.1 Bethany Complex

The Bethany Complex would be constructed southeast of Clifton Court Forebay. The Bethany Reservoir Pumping Plant and Surge Basin would be located along Mountain House Road approximately 0.5 miles south of the intersection with Byron Highway (Figure 3-31). The Bethany Reservoir Aqueduct would extend approximately 2.8 miles from the pumping plant to a new discharge structure on the banks of the Bethany Reservoir (Figure 3-32). Approximately 35 acres, located within the proposed footprint Bethany Complex and adjacent to the Bethany Reservoir Pumping Plant and Surge Basin facilities, would not be acquired by DWR and remain undisturbed. The Bethany Complex, including the pump facilities, surge basin, electrical substation, and other appurtenant facilities, would be approximately 215 acres. The facilities that comprise the Bethany Complex are described in the following sections. The Bethany Complex would be located on ground above the flood elevations for the 200-year flood event with sea level rise and climate change hydrology for year 2100, as defined by DWR (Delta Conveyance Design and Construction Authority 2023b).

3.14.1.1 Bethany Reservoir Pumping Plant

The Bethany Reservoir Pumping Plant would be needed to lift the water from the tunnel to Bethany Reservoir. The main tunnel from the intakes would terminate at a reception shaft within the surge basin on the north side of the Bethany Reservoir Pumping Plant. Water would enter the Bethany Reservoir Pumping Plant and be conveyed directly to Bethany Reservoir in a cement-mortar-lined, welded steel aqueduct system (described in Section 3.14.1.3, *Bethany Reservoir Aqueduct*).

The Bethany Reservoir Pumping Plant would be a multilevel underground structure with its roof at grade. Flow capacity would range from a minimum of 300 cfs to a maximum of 6,000 cfs. The pumping plant would have twelve 500-cfs pumps to achieve the flow of 6,000 cfs and two standby pumps. In addition to the below-ground pumping plant and wet well, the site would include aboveground water storage tanks for hydraulic transient-surge protection of the discharge pipelines, electrical building with variable speed drives and switchgear, heating and air conditioning mechanical equipment yard, transformer yard, electrical substation adjacent to the electrical building, standby engine generator building with an isolated and fully contained fuel tank, equipment storage building with drive-through access, offices, shops, storage area for spare aqueduct pipe sections and accessories, and a walled enclosure/storage facility for bulkhead panel gates that would be used to isolate portions of the Bethany Reservoir Pumping Plant during maintenance procedures. The pumping plant would include two separate dry-pit pump bays adjacent to the wet well.

Electrical, generator, and maintenance buildings, an electrical substation, surge tanks, and protective canopies on the site would be aboveground structures (Figure 3-31). The finished site pad elevation of 46.5 feet above mean sea level, at about existing grade, would be substantially above the elevation required to protect the facilities from surge events and the 200-year flood event including sea level rise in 2100, which is calculated to be a water surface elevation of 27.3 feet within the surge basin.

3.14.1.2 Bethany Reservoir Surge Basin

The surge basin would normally be empty when the Bethany Reservoir Pumping Plant is in operation. The top of the surge basin would be at existing grade and the bottom would be about 35 feet below the ground surface. The tunnel shaft within the surge basin would accommodate portable submersible pumps for dewatering the tunnel, if necessary. The top of the tunnel shaft would be at the floor of the surge basin and would be surrounded by an overflow weir wall inside the basin. A shaft pad would not be required at the surge basin reception shaft since natural ground elevations at this site are considerably above the potential flood stage, and groundwater intrusion is unlikely based on available information.

Under rare circumstances, potential transient-surge conditions could occur in the main tunnel between the intakes and Bethany Reservoir Pumping Plant or in the Bethany Reservoir Aqueduct. Along the main tunnel, the transient surge could occur if there was a simultaneous shutdown of the main raw water pumps in the pumping plant. Under Alternative 5, the surge flows would discharge into the surge basin through the tunnel reception shaft. The circular weir wall around the top of the tunnel reception shaft (Figure 3-31) would allow the overflows to enter the surge basin but prevent water that enters the surge basin from reentering the main tunnel unless DWR operators open gates to allow the water to flow back in. The surge basin would also have pumps to remove the water more rapidly than gravity flow into the pumping plant to facilitate restarting the pumping plant after a surge event.

Transient-surge conditions in the Bethany Reservoir Aqueduct pipeline could also occur if there was a simultaneous shutdown of the Bethany Reservoir Pumping Plant pumps. Under this transient-surge scenario, water would flow from surge tanks located at the Bethany Reservoir Pumping Plant into the aqueduct pipelines and excess surge flows would be conveyed into Bethany Reservoir.

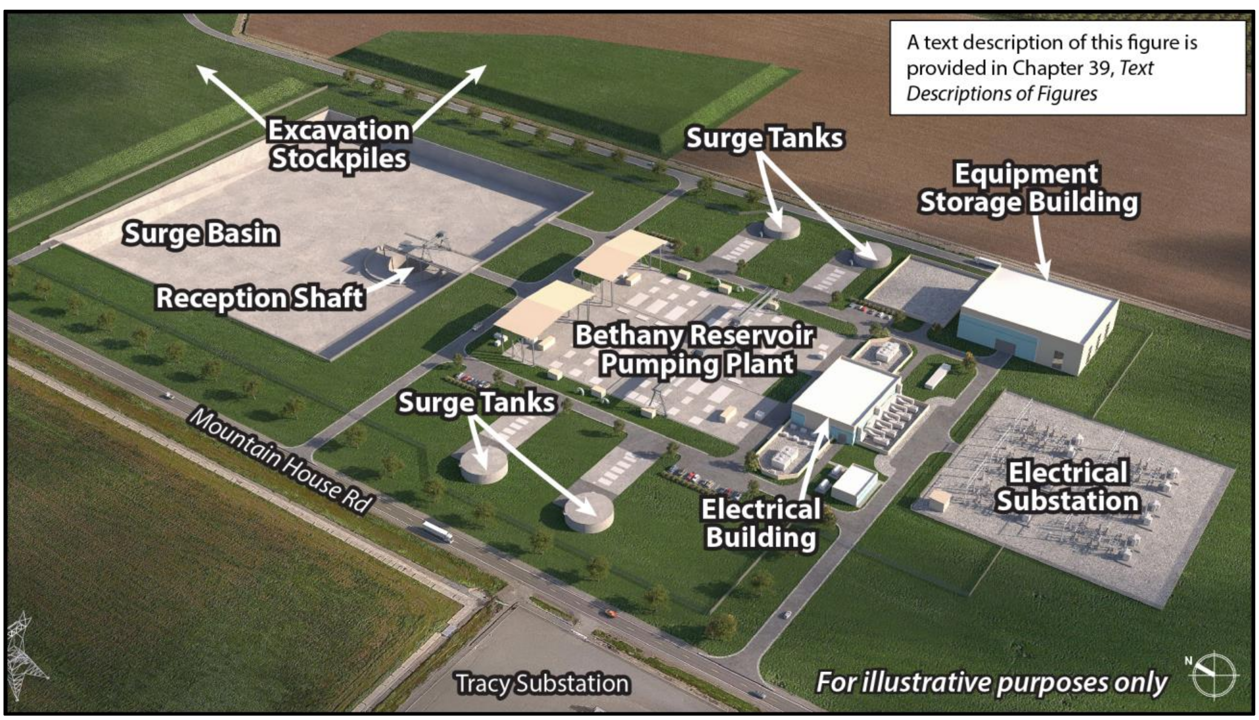


Figure 3-31. Bethany Reservoir Pumping Plant and Surge Basin

3.14.1.3 Bethany Reservoir Aqueduct

The aqueduct system would consist of four 15-foot-diameter parallel pipelines that would convey water from the Bethany Reservoir Pumping Plant to the Bethany Reservoir Discharge Structure, a distance of approximately 2.8 miles each. Each pipeline would have a maximum capacity of 1,500 cfs. The permanent footprint of the aqueduct system would be about 200 feet wide. Two separate aqueduct reaches would require tunnels to carry each pipeline under existing features. The first reach would be under the Jones Pumping Plant discharge pipelines (about halfway from the Bethany Reservoir Pumping Plant to the discharge structure); at this location pipelines would run about 50 feet below ground surface for about 200 feet. Tunnels would also be needed under the existing conservation easement adjacent to Bethany Reservoir (at the last downstream reach of the aqueduct; Figure 3-32) for about 3,064 feet, ranging from 45 to 180 feet below ground surface.

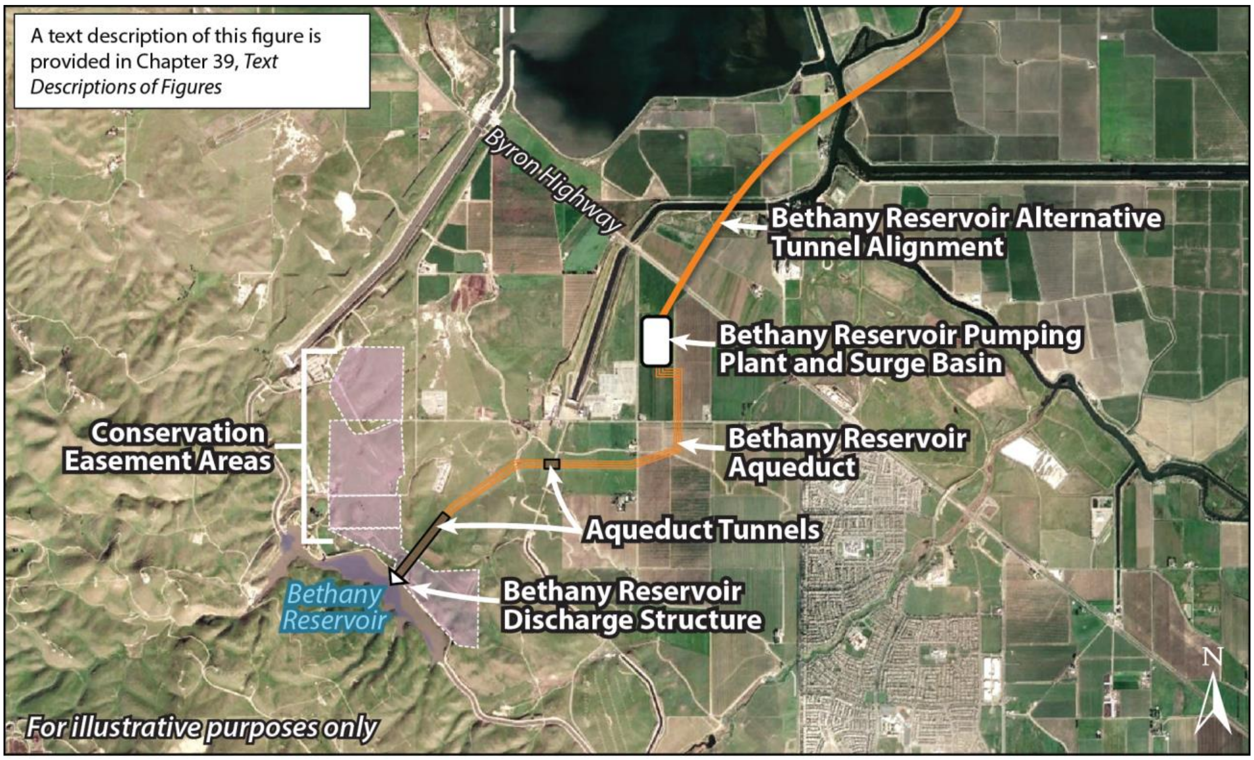


Figure 3-32. Bethany Reservoir Aqueduct Route with Tunnel Reaches

The aqueduct pipelines would be laid mostly in open trenches, constructed by open cut and backfill methods. The tops of the pipes would extend above the existing ground surface and be covered by a minimum of 6 feet of soil that would form a single mound of earth above the four pipelines (Figure 3-33). Excavated material from the Bethany Reservoir Aqueduct trenches and tunnels would be used for backfill of the trenches and also used to make controlled low-strength backfill material (CLSM) for pipe bedding and zone material.

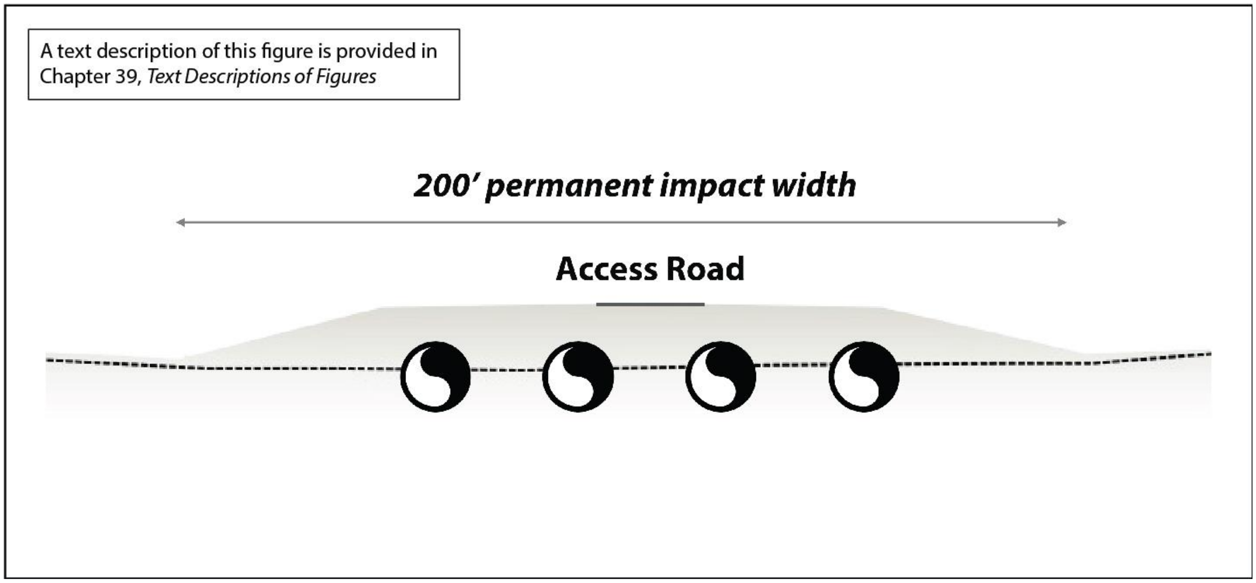


Figure 3-33. Typical Completed Section for Open Cut Reaches of Pipeline Alignment

The aqueduct pipelines would terminate near the bottom of four 55-foot-inside-diameter below-ground vertical shafts at the Bethany Reservoir Discharge Structure. The pipelines would make a 90-degree bend upward inside the shafts, ending at the floor of the discharge structure and flowing through a concrete channel into Bethany Reservoir (Figure 3-34). Bethany Reservoir serves several purposes: a forebay for the South Bay Pumping Plant (the start of the South Bay Aqueduct of the State Water Project), an afterbay for Banks Pumping Plant, a conveyance facility for the California Aqueduct, and a recreational facility. The reservoir does not serve as a storage reservoir.

In addition to pipelines and tunnels, the aqueduct construction site would include contractor staging areas, CLSM batch plants, and ancillary facilities. The CLSM would be used to improve the strength of soil placed under the aqueduct pipes installed in the trenches, and possibly to fill the space between the inside wall of the tunnel and the outside of the pipeline wall for the tunnels that carry the pipelines below the Jones discharge pipelines and the conservation easement adjacent to Bethany Reservoir.

A CLSM processing area along the tunnel portion of the aqueduct would include two side-by-side CLSM batch plants for trench work, each 100 feet wide by 100 feet long and 50 to 75 feet tall. CLSM production would also require 2.75 acres for soil storage of up to 30,000 cubic yards of soil up to 7 feet deep; two 30-foot-diameter, 10-foot-tall water storage tanks mounted on 8-foot-tall platforms and holding a total of 100,000 gallons of water; and cement storage silos 50 to 75 feet tall on a site 50 feet wide by 100 feet long.

Aqueduct Tunnels

The aqueduct tunnels to carry the pipelines under the Jones discharge pipelines and the conservation easement would be constructed using a different method than that used for the main tunnel between the intakes and the Bethany Reservoir Pumping Plant. Because of the shorter length of these tunnels compared to the main tunnel, a TBM would not be used during construction. For the Jones pipeline crossing, a digger shield outfitted with an excavator arm could be used for the anticipated ground conditions. To avoid extensive disturbance of sensitive habitat areas within the conservation easement crossing, several excavation methods have been identified including a roadheader. Soil material would be moved out of the tunnels at the entry portals. The excavation would be supported with rock reinforcement and/or steel ribs or lattice girders and shotcrete depending on the ground conditions.

The excavated material from the aqueduct tunnels would be removed by different methods and would be in different geologic formations compared to the main tunnel bore; therefore, the excavated material characteristics would be different from the RTM from the main tunnel. The Bethany Reservoir Aqueduct tunneling machines also would not need additives; therefore, the excavated soil would not need to undergo the extensive drying that would be required for RTM from the TBMs on the main tunnel. Materials excavated from the aqueduct tunnels that are too wet or otherwise unsuitable for CLSM of backfill would be transported to the permanent excavation stockpile adjacent to the Bethany Reservoir Pumping Plant and dried as part of final disposal.

Tunneling under the Jones discharge pipelines would require excavation of a large cut to establish entry and exit portals. The entry portal would be located on the east side of the Jones discharge pipeline crossings. Excavation of these tunnels would end at the exit portal about 200 feet away on the west side of the Jones pipelines. Major facilities at the site would include mobile cranes, construction shops and offices, parking, material laydown and erection area, equipment staging, tunnel ventilation system housing, temporary electrical substation, and storage for topsoil stripping. Construction activities would include clearing and grubbing, water quality protection, ground improvement, and other activities as needed.

Tunneling under the conservation easement also would require tunnel entry portals on the east side and tunnel exit portals on the west side of the 3,064-foot crossing. The entry portals would be located on the east side of the conservation easement and west of the existing high voltage power lines. Excavation of these tunnels would end at the vertical shafts, serving as the exit portal, on the east side of the Bethany Reservoir Discharge Structure.

3.14.1.4 Bethany Reservoir Discharge Structure

This discharge structure portion of the Bethany Complex comprises the structure itself near the bank of Bethany Reservoir, the aqueduct conservation easement tunnel vertical exit shafts, contractor staging areas, and ancillary facilities. The proposed discharge structure site would be on a narrow strip of land between the conservation easement and Bethany Reservoir; a 10-foot-wide buffer would separate the disturbance area from the conservation easement. Significant grading would be required to build the structure on the site, which is above reservoir surface water level but varies considerably in elevation. Constructing a temporary cofferdam within the water near the shore in the reservoir would allow excavation, concrete, and backfill work to be completed on the reservoir bank within an area of dry ground excavated as much as 25 feet below the reservoir water surface.

The discharge structure would occupy 13 acres postconstruction. It would be divided into four separate channels, with a total width of approximately 327 feet encompassing the four 55-foot-wide aqueduct shafts with required approximately 81.5-foot center-to-center spacing (Figure 3-34). Each channel of the discharge structure would taper from about 81 feet wide at the top of the aqueduct shafts to approximately half of that width at the bank of the Bethany Reservoir. The concrete floor of the discharge structure at elevation 227.0 feet above mean sea level would end near the reservoir bank, and a layer of riprap would be placed between the structure and the temporary cofferdam to help stabilize and protect the bank and bed of the reservoir from the energy of the water being discharged, which is expected to be minor, given the relatively low discharge velocity. The top of the discharge would be approximately at the same elevation as the existing California Aqueduct Bikeway, which would be modified to traverse through and over the new structure.

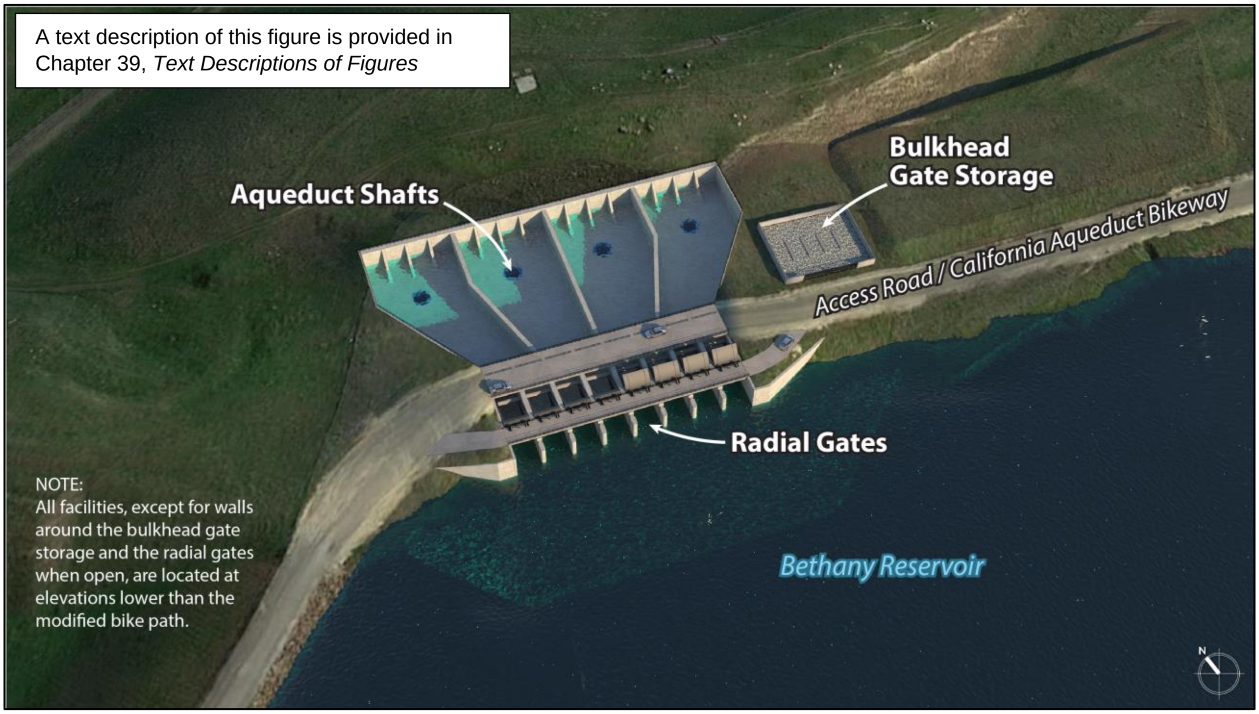


Figure 3-34. Bethany Reservoir Discharge Structure

The Bethany Reservoir Discharge Structure would cross the existing California Aqueduct Bikeway, which is also used as a maintenance road. A 32-foot-wide bridge would span the four Bethany Reservoir Discharge Structure channels to maintain access for bikes and maintenance vehicles. Each of the four channels would be divided into two 21-foot-wide bays with radial gates and stop logs to prevent backflow in an emergency and to doubly isolate the aqueduct system from Bethany Reservoir. A 16-foot-wide service deck would be installed on the opposite (reservoir) side of the gate and stop log area to facilitate operations and maintenance of the gates and installation and removal of stop logs. The bridge would include applicable openings for stop log installation and removal through traffic-rated hatches. Similarly, stop logs would be installed in open stop log grooves adjacent to the service deck. The radial gates would automatically close under pressure-loss conditions in the aqueduct pipelines to prevent water from Bethany Reservoir from flowing into the aqueduct pipelines during the unlikely event of a pipeline break or valve malfunction. Due to the critical control nature of this facility, a standby engine generator would be provided for backup power in case of a power outage. A storage yard for isolation bulkhead gates is also included at the site.

3.14.2 Access Roads

Access roads to the intakes, New Hope Tract tunnel maintenance shaft, Canal Ranch Tract tunnel maintenance shaft, Terminous Tract tunnel reception shaft, King Island tunnel maintenance shaft, and Lower Roberts Island dual launch shaft site would be the same under Alternative 5 as under

Alternative 3. Road improvements for the Twin Cities Complex would be slightly different than under Alternative 3 and are described in Section 3.4.7. Access to the Union Island maintenance shaft (unique to Alternative 5) would be via Clifton Court Road and Bonetti Road; these roads would not require project modifications.

Access to the Bethany Reservoir Pumping Plant would be from the Byron Highway immediately north of the site, at a new interchange constructed at Lindemann Road. Byron Highway would be realigned and widened to four lanes for 0.5 mile from the new Lindemann Road interchange to Great Valley Parkway. New bridges would be built over UPRR tracks and Byron Highway. A new 1.2-mile paved frontage road would be constructed for the Lindemann Road interchange parallel to the Byron Highway on the southern side, extending south into the site. This new frontage road would also connect to Byron Highway at the existing Mountain House Road intersection. A new 2.1-mile paved road would provide access to the surge basin between new Byron Highway frontage road and Mountain House Road. Mountain House Road would be widened for 1.34 miles between Byron Highway and Connector Road.

The pumping plant and surge basin would also be accessible from I-580, located approximately 3 miles south of the site, via West Grant Line Road and Mountain House Road. Improvements to Kelso Road would provide roadway connections to Mountain House Road and the new north–south access road along the site's southern side. A merge lane on West Grant Line Road would be widened for 0.14 mile west of Mountain House Road to Mountain House Road. Mountain House Road would be extended by 0.6 mile to West Grant Line, including a new roundabout at Grant Line Road and a new bridge over a swale. Mountain House Road would be widened for 2.2 miles from the new extension to a point 0.18 mile north of the surge basin access road.

The Bethany Reservoir Aqueduct would require widening 1.23 miles of Kelso Road between a location 0.14 mile east of Mountain House Road and the new access road to the aqueduct construction staging area, and a new 0.27 mile paved road extension of Connector Road from Mountain House Road to the surge basin access road.

The Bethany Reservoir Discharge Structure would be accessed via a new 1.2-mile paved road from Mountain House Road to the existing Bethany Reservoir (California Aqueduct Bikeway). A 0.6-mile segment of existing paved road (California Aqueduct Bikeway) along Bethany Reservoir would be widened from the new access road to the discharge structure. The California Aqueduct Bikeway would not be accessible across the Bethany Reservoir Discharge Structure during construction.

The site access and interior circulation roads would generally be two-lane roads with 12-foot-wide travel lanes and 3-foot-wide paved shoulders. Paved access would be provided to each of the pumping plant facilities. Figure 3-35 shows the roads associated with Alternative 5.

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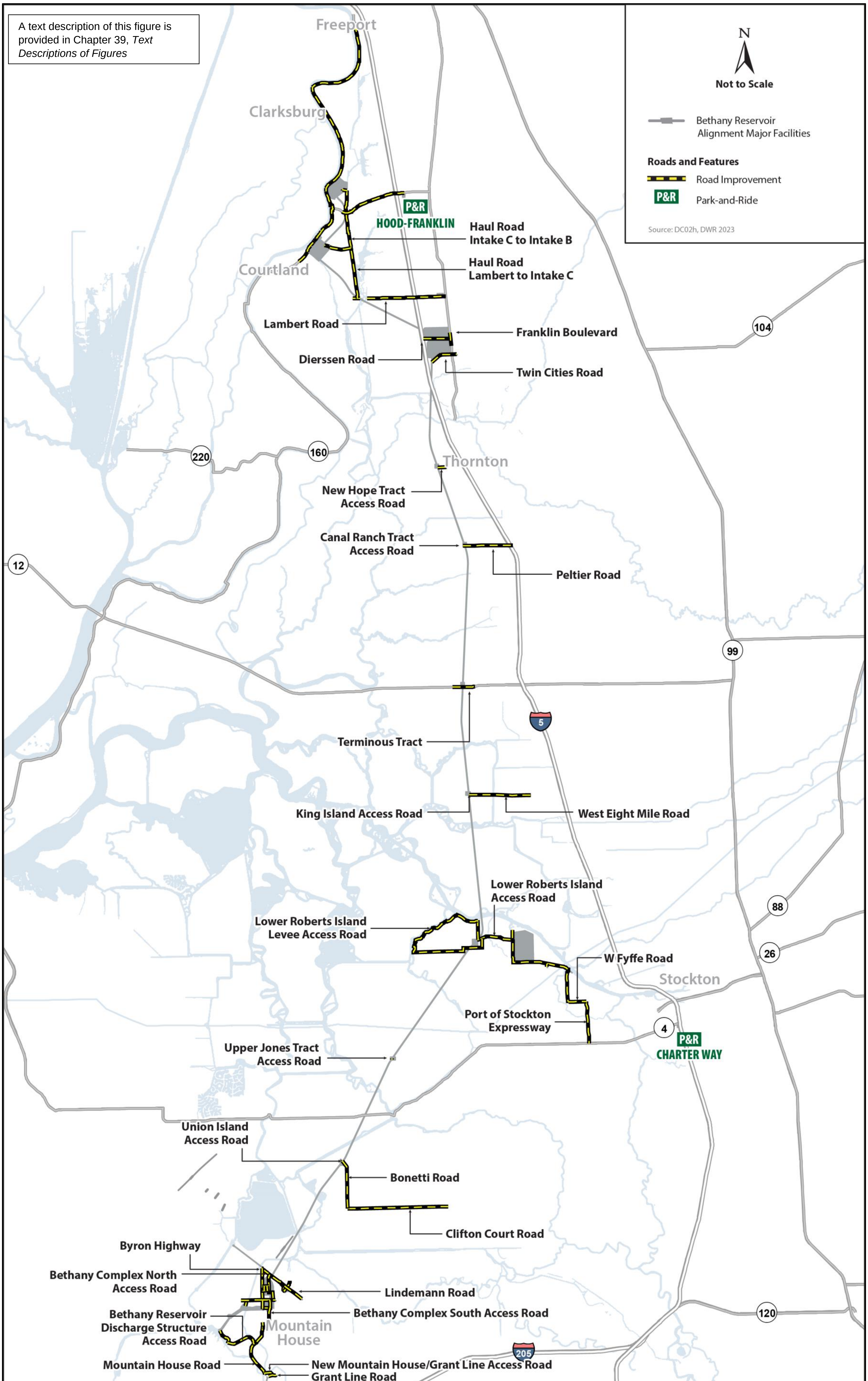

Figure 3-35. Road Modifications under the Bethany Reservoir Alignment

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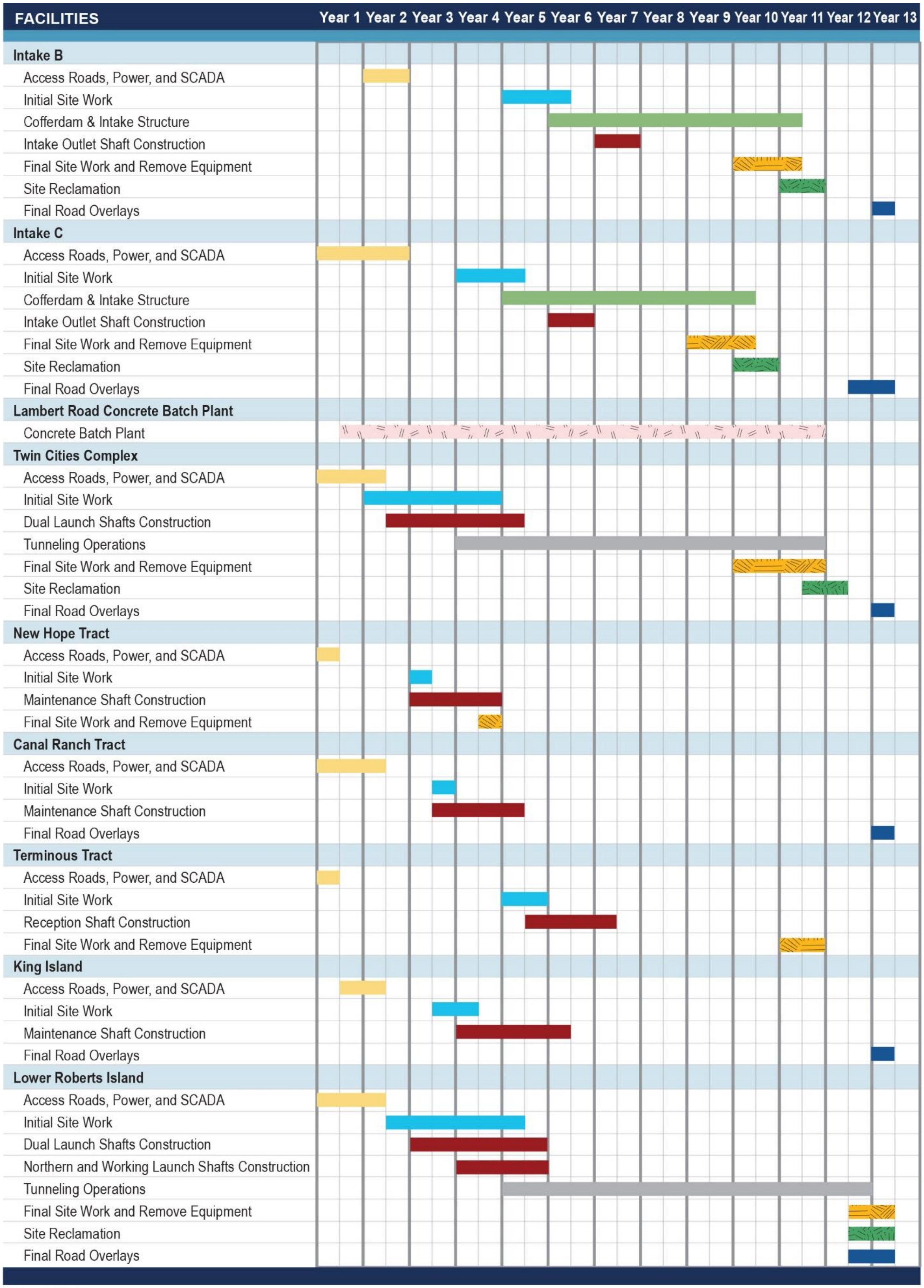
3.14.3 Maintenance

Maintenance activities for intakes, tunnel shafts, and tunnel for the Bethany Reservoir alignment would be the same as under the central and eastern alignments. Daily maintenance activities would include inspections, security checks, and operations oversight. Less frequent maintenance activities include operability testing, cleaning, sediment removal (at intakes), dewatering, and repaving. General and grounds maintenance would occur annually, and debris removal would be required periodically at the surge basin. If tunnel maintenance activities required dewatering, two portable 60-cfs dewatering pumps would be installed within the Surge Basin reception shaft. Each submersible pump would be equipped with a variable frequency drive with a flow meter and a flow control valve. The submersible pumps would discharge directly into the Bethany Reservoir Pumping Plant discharge pipelines and ultimately to the Bethany Reservoir Discharge Structure.

The Bethany Reservoir Pumping Plant site would contain an equipment storage and operations maintenance building with office space, a welding shop, machine shop, and interior storage for spare pumps and rotating assemblies, motors, and accessories. Interior storage space would also accommodate large equipment such as tunnel dewatering pumps, cable reels, and discharge piping assemblies. An exterior isolation bulkhead gate panel storage and equipment laydown area would be provided on the north side of the building. Bridge and gantry cranes plus other cranes would be located both inside and outside of the buildings to move equipment during maintenance procedures.

3.14.4 Construction Schedule

Construction of Alternative 5 would take approximately 13 years. Construction would not take place in all locations at the same time. Rather, it would proceed in stages, starting with access roads and site work at the intakes and Twin Cities Complex and power and SCADA at maintenance shafts, and proceeding to equipment decommissioning, site reclamation, and road overlays in the final years, as shown on Figure 3-36.



Bethany 6,000 cfs

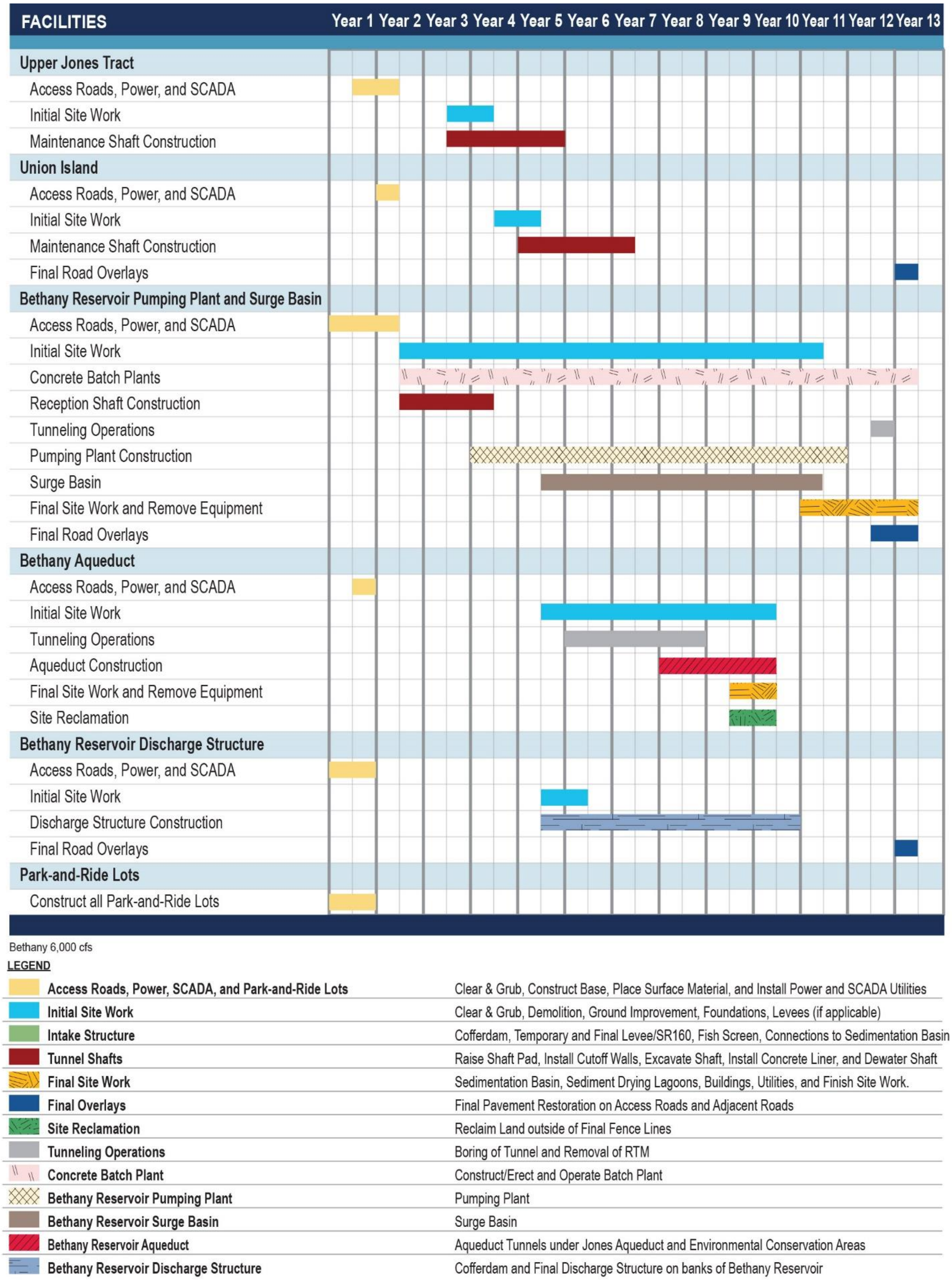


Figure 3-36. Alternative 5 Construction Schedule

3.15 Field Investigations

Field investigations refer to data collection efforts to inform more detailed design and construction.

In 2020, DWR adopted a Final Initial Study/Mitigated Negative Declaration (IS/MND) (California Department of Water Resources 2020b) for the *Soil Investigations for Data Collection in the Delta Project* and issued a Notice of Determination approving it. The purpose of *Soil Investigations for Data Collection in the Delta Project* is to collect data on soil conditions to help determine the composition, location, and geotechnical properties of rock and soil materials commonly found in and around the Delta. This information is expected to contribute to DWR's overall understanding of Delta geology, and this will inform the ongoing development of alternatives, environmental analysis, and conceptual design for the proposed Delta Conveyance Project to support preparation of the Delta Conveyance Project Final EIR. Addenda to the IS/MND (California Department of Water Resources 2021, 2022) were approved and Notices of Determination were issued for minor project changes in February 2021 and June 2022. Approval of the *Soil Investigations for Data Collection in the Delta Project* is separate from the proposed Delta Conveyance Project.

Separate from the soil investigations covered in the 2020 IS/MND, the February 2021 addendum, and the June 2022 addendum (California Department of Water Resources 2020b, 2021, 2022), data collection and field work investigations would be conducted after completion of the Delta Conveyance Project CEQA process and possible project approval. Work related to geotechnical, hydrogeologic, agronomic testing, and construction test projects (geotechnical investigations) would occur during the preconstruction and construction periods following adoption of the Final EIR, identification of an approved project footprint, and acquisition of all required permits. These potential future investigations would, among other things, support Section 408 permitting, design, and construction phases (described below) and would be performed in accordance with standards of USACE, the American Society of Civil Engineers, California Division of Occupational Safety and Health, California Building Code, San Francisco Public Utilities Commission Seismic Design Criteria, American Nuclear Standards Institute, DWR's Division of Safety of Dams, Caltrans Seismic Design Criteria, Southern California Earthquake Center, and other relevant entities. Additional actions not analyzed in this EIR associated with field investigations would comply with the necessary state environmental review requirements and may require additional CEQA review.

3.15.1 Investigations to Support Section 408 Permitting

If DWR determines after completion of the CEQA process to approve the proposed project or project alternative, the following activities are anticipated to take place prior to the start of 65% level of design to support the submission of a formal Section 408 permit application to USACE to address intake construction and the tunneled undercrossing of the Stockton Deep Water Ship Channel. Geotechnical investigations and the installation of groundwater monitoring equipment would begin following completion of all required permits. These activities are expected to be completed within approximately 2 years following completion of all required permits, depending on availability of access to the project sites. Groundwater and other monitoring activities would be performed prior, during, and after intake construction completion.

The following subsections discuss the investigations that would be conducted at the intakes and where the tunnel would be located beneath the Stockton Deep Water Ship Channel.

3.15.1.1 Soil Borings and Cone Penetration Tests

Soil borings and cone penetration tests (CPTs) would be conducted within the construction boundaries at the intakes and within the Stockton Deep Water Ship Channel and adjacent non-project levees at the location of the proposed tunnel undercrossing. Drilling techniques would generate an approximately 4- to 8-inch-diameter boring. For CPTs, a cone-tipped rod with a diameter of 1 to 2 inches would be pushed through the ground. All CPT holes would be filled with grout following completion and prior to abandonment, and all soil borings not planned for completion as a groundwater monitoring well would be completely grouted following boring. Groundwater monitoring wells would be constructed with casings, in accordance with state and local laws, as all groundwater wells would be.

The information gained through soil borings and CPTs would be used to develop detailed design criteria for structure foundations, new and modified levee cross sections, ground improvement, dewatering methods and quantities, below-grade construction methods, need for impact pile driving, and methods to reduce ground settlement risk at all construction sites and at the undercrossing of the Stockton Deep Water Ship Channel. The information would also be used to determine the depths and widths of groundwater cutoff walls to be installed at the intakes. Soil samples obtained during soil borings would also be analyzed to determine the specific structural capabilities of the soil to construct embankments and levees.

3.15.1.2 Groundwater Testing and Monitoring

At each intake, one 12-inch-diameter steel-cased test well would be installed in a 24-inch-diameter borehole to conduct pumping tests. It is also assumed that vibrating wire piezometers would be installed in several levee borings, and 4-inch groundwater monitoring wells would be installed in several site borings at each intake to permit measurements of groundwater head, monitoring of groundwater elevations during the pumping tests, and the collection of water quality samples at the intake locations.

At each intake, a surface water gage would be installed to track the elevation of the adjacent river for use in analysis of the results.

Pumping tests would be conducted in the test wells. Water levels before, during, and following the various tests would be monitored using automated data loggers, which would also record barometric pressure and the level of the river. It is assumed that the groundwater monitoring program would be conducted partially using remotely monitored instrumentation and partially by on-site personnel.

3.15.2 Investigations Prior to Construction Phase

If DWR determines after completion of the CEQA process to approve the Delta Conveyance Project, the following activities are anticipated to be conducted prior to the start of construction, exclusive of the previous investigations made in support of Section 408 permitting. Geotechnical investigations or the installation of monitoring equipment would be conducted within approximately 2 years following completion of all required permits.

3.15.2.1 Investigation at Facility Locations

Explorations would occur at the intakes, tunnel shafts, tunnel alignments, power lines, access roads and bridges, railroads, levees, and at the terminal facilities. Locations where investigations would occur include the Southern Complex on Byron Tract and Southern Complex west of Byron Highway for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c; and the Bethany Reservoir Pumping Plant and Surge Basin, Bethany Reservoir Aqueduct, and Bethany Reservoir Discharge Structure for Alternative 5.

Soil Borings and Cone Penetration Tests

Land-based soil borings, overwater soil borings, and CPTs would be conducted within the construction boundaries of the intakes, tunnel shafts, tunnel alignments, power lines, access roads and bridges, railroads, and levees. For Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, they would also be conducted at the pumping plant and the entire Southern Complex on Byron Tract and west of Byron Highway. For Alternative 5, they would also be conducted at the Bethany Reservoir Pumping Plant and associated Surge Basin and aqueduct, and the Bethany Reservoir Discharge Structure. The methods for soil borings and CPTs are as described in Section 3.15.1.1, *Soil Borings and Cone Penetration Tests*.

The information collected would be used to develop detailed design of the structure and bridge foundations, new or modified levee cross sections, ground improvement methodology; and to determine selection of tunnel boring machine methods, dewatering methods and quantities, below-grade construction methods (such as at the shafts and the pumping plant), need for impact pile driving, and methods to reduce ground settlement risk at all construction sites and along the tunnel alignment. The information would also be used to determine the specific depths and widths of groundwater cutoff walls to be installed at select construction sites.

Soil samples obtained during soil borings also would be analyzed to determine the structural capabilities of the soil and/or RTM to construct tunnel shaft pads, levee improvements, and the Southern Forebay embankments. Soil and water quality tests would be conducted to determine the potential for the presence of high concentrations of metals, organic materials, or hazardous materials that would require specific treatment and/or disposal methods.

Bethany Fault Study

The Bethany Fault Study would apply only to Alternative 5 on the Bethany Reservoir alignment. Electrical resistivity tomography (ERT) would be used to characterize subsurface soil characteristics above the proposed Bethany Reservoir Aqueduct tunnels. ERT involves “a linear array of removable small steel electrodes (approximately 0.5 inches in diameter by 8 inches long) driven into the ground approximately every 10 feet over several hundred feet to induce a low current in the ground, while a small readout unit provides the measurements” (California Department of Water Resources 2020b:17).

Groundwater Testing and Monitoring

A test well for pumping tests would be installed at each tunnel shaft and at each intake. At each intake, a surface water gage would be installed to track the elevation of the adjacent river for use in analysis of the results. For the tunnel alignment, it is assumed that vibrating wire piezometers would be installed in boreholes drilled along the tunnel alignment at a frequency of, on average, every third borehole, or approximately every 3,000 feet. Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c would also include two test wells at the Southern Complex. Alternative 5 would include two test wells to be installed at the Bethany Reservoir Pumping Plant and Surge Basin, and at each of the two planned tunneled sections of the Bethany Reservoir Aqueduct.

Monitoring well and test well installation methods are described in Section 3.15.1.2, *Groundwater Testing and Monitoring*. The groundwater monitoring program would be implemented to determine the seasonal variations in groundwater elevations, the constituents of the groundwater (including the nature and presence of dissolved gas), and the interrelation between groundwater and surface water levels for several years before construction. It is assumed that the groundwater monitoring program would be conducted partially using remotely monitored instrumentation and partially by on-site personnel.

Test Trenches

Test trenches approximately 30 feet long, 3 feet wide, and 10 feet deep would be implemented at all the facilities to confirm near-surface soils and to investigate potential buried magnetic anomalies. Trenches would be immediately backfilled following observations of the soil conditions encountered in the trench.

Monument Installation

Metal survey monuments would be installed at all construction sites and approximately every mile along the tunnel alignments to allow the remote monitoring of surface elevations prior to the start of construction, during construction, and during operations. Monuments would be approximately 10 feet by 10 feet base and 3 feet high to be of adequate size to be visible from satellite-based Interferometric Synthetic Aperture Radar (inSar) used for remote monitoring. Concrete foundations would be installed for the monuments and the monuments would be left in place for the duration of construction. It is assumed that periodic monitoring of survey monuments would be conducted by security and on-site personnel.

3.15.2.2 Geotechnical Pilot Studies for Settlement

Site-specific pilot studies would be conducted to test the geotechnical response to placement of fill at tunnel shaft sites. For Alternatives 1, 2a, 2b, and 2c, pilot studies are proposed test fills at New Hope Tract (central alignment location), Staten Island, Bouldin Island, Mandeville Island, and Bacon Island. For Alternatives 3, 4a, 4b, and 4c, pilot studies would be conducted at New Hope Tract (eastern alignment location), Canal Ranch Tract, Terminous Tract, King Island, Lower Roberts Island, and Upper Jones Tract (eastern alignment location). For Alternative 5, pilot studies are proposed at New Hope Tract (eastern and Bethany Reservoir alignments location), Canal Ranch Tract, Terminous Tract, King Island, Lower Roberts Island, Upper Jones Tract (Bethany Reservoir alignment location), and Union Island.

Test fills would be within the construction boundaries of the project and, where feasible, within or adjacent to the shaft pad sites. The test fills would be approximately 10 feet high and roughly 1,000 square feet in base area. The material would be purchased from a commercial enterprise that provides soil. The studies would include the installation of inclinometers, piezometers, and borehole extensometers within soil borings, as well as settlement plates buried within the fill, to verify estimates of consolidation and lateral spreading of pad fills in peat and soft soils.

Additional soil borings and CPTs would be completed within and adjacent to the test fill areas prior to their placement. Inclinometers and extensometers would be installed in holes drilled within and adjacent to the test fills. It is assumed that management of the pilot studies would be conducted by on-site personnel.

3.15.2.3 Validation of Ground Improvement Methods

Ground improvement would likely consist of a combination of excavation of unsuitable soils and replacement with compacted suitable fill material, surcharging to induce consolidation before final construction, and *in situ* techniques such as deep mechanical mixing (DMM) method to mix amendments (such as cement) into the foundation to add strength and resistance to liquefaction, including the installation of a grid of DMM soil shear walls with cement under the footprints of large structures. Final site-specific methods would be determined through geotechnical investigations and test installations, especially on land with substantial deposits of peat and loose or soft soils. These investigations would include trial mix and DMM construction programs to confirm appropriate area and volume replacement ratios, desired cement content, and testing to confirm *in situ* strength and lateral extent.

For Alternatives 1, 2a, 2b, and 2c, these activities are proposed at New Hope Tract (central alignment location), Staten Island, Bouldin Island, Mandeville Island, and Bacon Island. For Alternatives 3, 4a, 4b, and 4c, investigations are proposed at New Hope Tract (eastern alignment location), Canal Ranch Tract, Terminous Tract, King Island, Lower Roberts Island, Upper Jones Tract (eastern alignment location), and Byron Tract. For Alternative 5, these activities are proposed at New Hope Tract (eastern and Bethany Reservoir alignments location), Canal Ranch Tract, Terminous Tract, King Island, Lower Roberts Island, Upper Jones Tract (Bethany Reservoir alignment location), and Union Island.

3.15.2.4 Pile Installation Methods at the Intake Locations

The intake locations would include the construction of temporary in-river cofferdams. The cofferdams would employ the use of interlocking steel sheet piles. Pilot studies would be conducted to test pile installation and possible acoustic mitigation measures in the river at one intake site along the Sacramento River. The studies would include use of equipment to monitor vibrations in air and water and noise while test driving a variety of a pile types using vibratory and driving methods to validate rates and penetration depths. Noise associated with vibratory pile driving is considerably lower than noise associated with impact hammer pile driving. Additionally, CPTs would be performed in the river from a barge to determine the *in situ* density of the soils prior to, during, and after test pile installation.

3.15.2.5 Vibratory Testing of Dynamic Properties

Vibratory testing of dynamic properties of peat would be conducted in the Delta for validation of peat soil response during earthquakes. This would include continuation of previous studies in the Delta, including those on Sherman Island (Reinert et al. 2014), or additional peat studies at up to two sites at Bouldin Island, Lower Roberts Island, or Byron Tract for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c or at Lower Roberts, Upper Jones Tract, or Union Island for Alternative 5.

3.15.2.6 Location of Buried Groundwater and Natural Gas Wells

Desktop surveys of documented wells would be conducted and would include research of historical topographical mapping that may document the presence of wells that were not identified in the State of California oil and gas database, as maintained by California Department of Conservation (previously known as DOGGR, and now known as CalGem [Geologic Energy Management Division]). A field test program would be used to evaluate the suitability of various geophysical techniques to detect buried and abandoned wells.

To identify and/or confirm the location of well casings, including wells that have not been identified in the published database, the use of wide-area airborne methods (drone, helicopter, and/or fixed-wing aircraft) to conduct magnetic surveys followed by more site-specific walk- or tow-over ground-based magnetic surveys is assumed. These surveys would be conducted at intake and tunnel shaft locations, along tunnel alignments, and at the Bethany Complex to identify buried groundwater and natural gas and oil wells. Surface geophysical surveys would also be conducted at these locations. The locations of identified wells would be evaluated to determine methods to abandon, relocate, or avoid the wells.

3.15.2.7 West Tracy Fault Study

Up to six test trenches (up to approximately 1,000 feet long, 3 feet wide, and 20 feet deep) would be excavated along a line running from the southeast of Byron to the southeast of Clifton Court Forebay to further investigate the nature and location of the West Tracy Fault between the town of Byron and the area southeast of the forebay. The trenches would remain open for up to 6 weeks, depending on the findings, and would be backfilled completely upon the completion of observation of soil conditions within the trench.

In addition to the test trenches, two arrays of surface geophysical surveys would be completed before, and along the alignment of, the excavation of the test trenches. Geophysical surveys would consist of noninvasive techniques that could be used to provide information on subsurface geologic conditions and anomalies, such as buried casings or abandoned wells. Seismic refraction/reflection techniques would be used at each of the two linear sites, referred to as geophysical arrays.

CPTs and soil borings would also be conducted. Select soil samples from the test borings would be subjected to age-dating laboratory testing.

3.15.2.8 Agronomic Testing

If field investigations described above indicate it is warranted, additional agronomic testing would be conducted. Agronomic testing would include investigations and testing of compacted soil rehabilitation methods and rehabilitation treatments for establishing agricultural crop or native grass species. Agronomic testing would validate the reuse assumptions prior to reclamation of disturbed areas based on representative samples and likely tunneling conditioners. This pilot-scale testing would be used to refine program-level approaches and strategies for RTM stockpiling and reuse.

3.15.2.9 Utility Potholing

Utility potholing, utilizing either a vacuum excavator or a backhoe, would be conducted to confirm locations of existing utilities such as public and residential utilities, surface water diversions, and agricultural drainage features. Utility potholing would be conducted at locations near the intakes, underground SCADA and power corridors, road and bridge modifications including intersections, tunnel shaft sites, and at utility crossings along the tunnel alignment. For Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, utility potholing would also be conducted at the Southern Complex. For Alternative 5, utility potholing would also be conducted at Union Island, Bethany Reservoir Pumping Plant and Surge Basin, the Bethany Reservoir Aqueduct, the Bethany Reservoir Discharge Structure, the raw water feed from the Skinner Fish Facility, and at new road and road widening locations. The investigations would be conducted within the construction boundaries of the project.

The investigations would include vacuum or backhoe excavations, followed by noninvasive surface field surveys. Some features would not require utility potholing and would be located using only noninvasive surface field surveys.

3.15.3 Investigations during Construction Phase

If DWR determines after completion of the CEQA process to approve the proposed project or project alternative, the following activities would be conducted after the start of construction. These activities are primarily related to the installation of monitoring equipment, such as inclinometers, confirmatory sampling for areas of ground improvement, and investigations related to evaluation of changes in anticipated conditions or alternative contractor means and methods. These activities would also address USACE Section 408 and CVFPB requirements for monitoring through construction. Geotechnical investigations or the installation of monitoring equipment would be conducted within the first 2 years following the start of construction.

3.15.3.1 Soil Boring and Cone Penetration Tests

Soil boring and CPT investigations during construction would occur in the same locations as described in Section 3.15.2.1, *Investigations at Facility Locations*. These geotechnical investigations would generally be conducted within the first 2 years of the proposed construction period, including during the period when ground improvement activities would be conducted, although they could extend throughout the duration of construction and commissioning to account for delayed starts and to resolve disputes. These investigations could be conducted at any location within the construction boundaries and would also be used to confirm the suitability of construction means and methods planned by the contractor.

3.15.3.2 Construction Monitoring

Monitoring for Ground Movement during Construction

Inclinometers and extensometers would be installed in vertical borings along levees at the intakes, along the tunnel alignment and at tunnel shafts. For Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, they would also be installed at Bouldin Island (central alignment), Lower Roberts Island (eastern and Bethany Reservoir alignments), and Byron Tract; and along levees near bridge improvements along Hood-Franklin Road over Snodgrass Slough, SR 12 over Little Potato Slough, access road to Mandeville Island over Connection Slough, access road to Lower Roberts Island over Burns Cut and Turner Cut; the bridge across the California Aqueduct near Byron Highway, and at the Southern Complex. For Alternative 5, they would also be installed at King Island, Lower Roberts Island, Upper Jones Tract, Victoria Island, Union Island, and Coney Island; and along levees near bridge improvements along Hood-Franklin Road over Snodgrass Slough, the access road to Lower Roberts Island over Burns Cut and Turner Cut, and at Bethany Complex.

No instrumentation is assumed at the new levees, while inclinometers are planned at 1000-foot centers along areas of levee improvements. Tilt meters, settlement plates, and survey monuments would be installed at all construction sites and approximately every mile along the tunnel alignment.

Groundwater Monitoring

Where groundwater monitoring wells were installed before construction, they could continue to be used during and following construction. Additional groundwater monitoring wells would be installed during construction if permanent easements or land ownership were not acquired before construction, or if initial monitoring results indicated the need for more detailed information related to groundwater elevation or water quality. It is anticipated that the groundwater monitoring locations would be located at the intakes, tunnel shafts, access roads. For Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, monitors would also be located at the Southern Complex on Byron Tract and west of the Byron Highway. For Alternative 5, monitors would also be located at Bethany Complex. For all alternatives, monitoring wells would be located approximately every 2 miles along the tunnel alignment between shafts. It is assumed that the groundwater monitoring program would be conducted partially using remotely monitored instrumentation and partially by on-site personnel.

Location of Buried Groundwater and Natural Gas Wells

Land surveys, drilling, and trenching would be used at all intake and tunnel shaft locations, along tunnel alignments, and at the Bethany Complex or the Southern Complex to identify and abandon buried groundwater and natural gas and oil wells before and during construction.

3.16 Intake Operations and Maintenance

The proposed north Delta intakes would operate in conjunction with the existing SWP and potentially CVP intakes in the south Delta for all alternatives. Operations of the existing SWP facilities, and in coordination with CVP operations pursuant to the Coordinated Operations Agreement, will be governed by the applicable regulatory requirements specified under the State Water Board *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary* (Bay-Delta WQCP) and assigned to the SWP in the applicable water right decision, applicable biological opinions under ESA, applicable incidental take permit under CESA, and USACE Clifton Court diversion limits. The operations of the proposed north Delta intakes would remain consistent with these existing regulatory requirements. The proposed project is seeking a new point of diversion, and is not seeking to expand water right quantity. In addition, diversions at the proposed north Delta intakes would be governed by new operational criteria specific to these intakes, such as the fish screen approach velocity requirements, bypass flow requirements, and pulse protection. These new criteria provide additional protections to the fish species over and above the protections from the state-of-the-art positive barrier fish screens included at the proposed intakes. Following the narrative description of proposed operations in Sections 3.16.1 through 3.16.6, a detailed table describing the proposed operational criteria is provided (Table 3-14). Additional detail for the proposed north Delta intakes is provided in Table 3-15 in Section 3.16.7, *Delta Conveyance Project Preliminary*

Proposed Operations Criteria. Also, in Section 3.16.7, Figure 3-37 provides a visual depiction of maximum allowable diversions in winter/spring and expected diversions in summer/fall. Figure 3-38 provides a depiction of the north Delta diversion operations concepts to minimize potential effects to aquatic species.

3.16.1 New Operational Criteria for the Proposed North Delta Intakes

Several new operational criteria would govern the diversions at the proposed north Delta intakes to minimize the near-field and the far-field effects of the intake operations.[5] The following criteria aim to minimize effects of the proposed intake operations on fish passage, survival in the intake reach, and through-Delta survival of migrating fish.

- Approach and sweeping velocity requirements at the intake fish screens
- North Delta diversion bypass flow requirements
- Pulse protection
- Low-level pumping

3.16.1.1 Approach and Sweeping Velocity Requirements

Approach velocity is the velocity of water moving perpendicular to the screen surface, while sweeping velocity is the velocity of water moving parallel to and past the screens. The instantaneous diversions at the proposed intakes would be subject to fishery agency velocity criteria: currently a maximum approach velocity of 0.2 feet per second (per U.S. Fish and Wildlife Service [USFWS] criteria for delta smelt). In addition, the Delta Conveyance Project would also include a minimum sweeping velocity of 0.4 feet per second (informed by real-time flow and river stage/cross-sectional area data downstream of the proposed screened intake facility) to further minimize near-field effects of the intake operations, consistent with fish agency criteria. Recognizing that the proposed intake facilities operate in a tidally influenced environment, these criteria are designed to reduce potential effects on the subset of fish exposed to the intake screens. The low approach velocity is intended to minimize effects associated with screen contact (e.g., impingement), while the sweeping velocity facilitates passage of fish and debris past the intakes. Refinements to these criteria would be considered through ongoing fish agency coordination as well as through real-time operations and adaptive management.

3.16.1.2 Bypass Flow Requirements

Bypass flow is the 3-day tidally averaged flow remaining in the Sacramento River immediately downstream of the proposed north Delta intakes computed as flow measured at Freeport minus the diversion rate. The objectives of the north Delta diversion bypass flow criteria include regulation of diversions to minimize survival changes for emigrating salmonids in the intake reach, as well as through-Delta, and minimize the potential for upstream movement of fish with flow at two points of control: (1) Sacramento River upstream of Sutter Slough, and (2) Sacramento River downstream of

[5] Near-field effects are those occurring in close proximity to intake screens, for example, entrainment or impingement; far-field effects are those occurring farther from intakes, for example, reduced survival because of less flow in the Sacramento River downstream of the intakes.

Georgiana Slough. These points of control are used to minimize the potential for upstream advection toward the proposed intakes and to minimize upstream advection into Georgiana Slough.

To ensure that these objectives are met, the bypass flow requirements are designed to reduce diversions at the proposed intakes at certain times of the year (more restrictive from December through June) when the majority of listed fish are present. The bypass flow requirements are calculated based upon Sacramento River inflows at Freeport and vary progressively with increasing inflows.

From December through June, three levels (Levels 1, 2, and 3) of bypass flow requirements are proposed, with Level 1 being the most restrictive and Level 3 being the least restrictive of the diversions at the proposed intakes. If high Sacramento River inflows occur for long durations, the bypass flow requirement can transition from Level 1 to Levels 2 and 3. To illustrate the effect of the bypass rules on the volume of Sacramento River flow that may be diverted, Table 3-15, Sub-Table A, shows the allowable north Delta diversions by month for each level, based on Sacramento River inflows at Freeport. The Level 1 bypass requirement would apply until the occurrence of 15 total days of bypass flows above 20,000 cfs. Following that, the Level 2 bypass flow requirement would apply. Level 2 would govern the allowable diversions until the occurrence of 30 total days of bypass flows above 20,000 cfs. At this point, the Level 3 bypass flow requirement would apply.

From July through September, the bypass flow requirement of at least 5,000 cfs in river after diverting at the north Delta intakes would apply. From October through November the minimum bypass flow requirement of at least 7,000 cfs in river after diverting at the north Delta intakes would apply.

3.16.1.3 Pulse Protection

Pulse protection is initiated when a large number, and relatively high concentration, of winter-run-sized juvenile salmonids begin migrating into the Delta from upstream locations. Pulse protection helps further minimize potential decreases in survival for emigrating salmonids in the intake reach, as well as through-Delta, and minimize the potential for upstream advection of fish, further enhancing the protections offered by the bypass flow requirements.

A pulse flow is a natural occurrence typically caused by the first runoff event(s) of the season. Monitoring data suggests that these winter run-off events (e.g., as indicated by sharp increases in Wilkins Slough flows, located upstream of the confluence of the Feather and Sacramento Rivers) are often associated with large numbers of juvenile, winter-run-sized salmonids, moving from natal upstream locations into lower Sacramento River reaches and the Delta (del Rosario 2013). When the pulse protection operation is triggered, bypass flow (and co-occurring fish) would be further protected by operating the north Delta intakes to the low-level pumping rules (Section 3.16.1.4, *Low-Level Pumping*).

If the pulse period begins before December 1, bypass criteria for that month (Section 3.16.1.2, *Bypass Flow Requirements*) would be implemented following the pulse period; and the second pulse period would have the same protective operation as the first pulse period, resulting in up to two pulse protection periods per water year.

The initiation and ending of pulse protection is defined by the following criteria: (1) increase in flow of the Sacramento River at Wilkins Slough by more than 45% within a 5-day period, and (2) Sacramento River flows greater than 12,000 cfs measured at Wilkins Slough. Low-level pumping would continue until (1) Wilkins Slough returns to pre-pulse flows (flow on first day of the 5-day increase), (2) Sacramento River at Wilkins Slough flows decrease for 5 consecutive days, or (3) bypass flows are greater than 20,000 cfs for 10 consecutive days. Up to two pulse protections are proposed.

3.16.1.4 Low-Level Pumping

Low-level pumping of up to 6% of total Sacramento River flow at Freeport such that diversions would not reduce bypass flow below 5,000 cfs. No more than 900 cfs (total) can be diverted by all the intakes combined. Low-level pumping can occur in October through November during a pulse protection event. It can also occur in December through June during a pulse protection event or if the bypass flow rules defined in Table 3-15 result in less diversion than the low-level pumping. In addition, north Delta diversion levels at all the intakes would be subject to a maximum approach velocity of 0.2 feet per second and a minimum sweeping velocity of 0.4 feet per second at the proposed fish screens. Velocity compliance would be informed by real-time hydrological data measured at the intakes.

3.16.2 Key Existing Delta Operations Criteria

Operations of the existing facilities will be governed by the applicable existing and relevant future regulatory requirements. The operations of the proposed north Delta intakes would remain consistent with these existing regulatory requirements.

3.16.2.1 Old and Middle River Flows

The Old and Middle River (OMR) flow criteria chiefly serve to constrain the magnitude of reverse flows in the Old and Middle Rivers to limit fish entrainment into the south Delta. The OMR criteria defined in the regulatory baseline (currently 2019 BiOps and 2020 SWP ITP) are applicable. Key OMR criteria under the current BiOps and SWP ITP are listed in Table 3-14.

3.16.2.2 Delta Cross Channel Gate Operations Criteria

The operational criteria for the Delta Cross Channel are as specified in the regulatory baseline, which is currently State Water Board Water Right Decision 1641 (D-1641), with additional days closed from October 1 through January 31 based on the 2019 NMFS BiOp (closed based on fish migration from October 1 through December 14 unless water quality conditions are adverse).

- **October–November.** Delta Cross Channel gates closed if fish are present.
- **December–May.** Delta Cross Channel gates closed.
- **June–September.** Delta Cross Channel gates open.

3.16.2.3 Rio Vista Minimum Instream Flow Criteria

Rio Vista minimum instream flow criteria are as specified in the regulatory baseline (currently State Water Board D-1641).

- **September–December.** Operate in accordance with State Water Board D-1641.

3.16.2.4 Delta Outflow Criteria

Delta outflow criteria are as defined in the regulatory baseline, which include the State Water Board D-1641, 2019 BiOps, and 2020 SWP ITP (Table 3-14).

- **Spring outflow.** As defined in the regulatory baseline (currently 2020 SWP ITP).
- **Summer and Fall Habitat Actions.** Same as 2019 BiOps and 2020 SWP ITP requirements.
  - **Outflow.** State Water Board D-1641 and for summer/fall delta smelt habitat operate to meet X2 of 80 kilometers for September and October of above normal and wet years with transitional flows in last half of August; considered as In-Basin Use and shared according to Coordinated Operating Agreement Article 6(c).
  - **Suisun Marsh Salinity Control Gates (SMSCG) Action.** In wet (if needed), above normal, below normal, and dry years following wet and above normal years (conditioned on successful carryover of water from 100 thousand acre-feet [TAF]), operate SMSCG for 60 days; in dry years following below normal years operate SMSCG for 30 days.
  - **Additional 100 TAF of Delta Outflow.** Same as 2020 SWP ITP requirements. A flexible block of water provided by SWP in wet and above normal years. Can be used in wet or above normal years to enhance Delta outflow or carried over to the following year, but subject to spill.

Delta outflow requirements established under D-1641 will be followed unless the outflow requirements are greater under the criteria listed above.

3.16.2.5 Export to Inflow Ratio

Export to inflow (E:I) ratio requirements specified in State Water Board D-1641 are applicable. In computing the E:I ratio, the Sacramento River inflow is measured at Freeport upstream of the proposed north Delta intakes and diversions at north Delta intakes are included in the total exports calculation.

3.16.3 Integration of North Delta Intakes with South Delta Facilities

The north Delta intakes would operate in conjunction with the existing south Delta intakes. The proposed intakes would augment the ability to capture excess flows and improve the flexibility of the SWP operations such as for meeting the State Water Board D-1641 Delta salinity requirements. The Delta Conveyance Project would not change operational criteria associated with upstream reservoirs. Upstream of Delta facilities will continue to be operated to meet regulatory, environmental, and contractual obligations consistent with existing operations. The Delta Conveyance Project is not proposing to increase the total quantity of water permitted for diversion under existing DWR water rights. The following text describes the proposed dual conveyance operations.

During the winter and spring, when there are excess flows in the system:

- The SWP and potentially CVP would first use south Delta facilities to export water up to what is permitted under the existing water rights and all applicable state and federal law and regulations.

- The north Delta intakes would be used to capture additional excess flows when the south Delta exports are limited and not able to capture those flows.
- Shifting from south Delta intakes to proposed north Delta intakes has trade-offs and is not expected unless there is an operational advantage to do so at DWR's discretion under limited circumstances (e.g., to provide additional real-time south Delta fish protections, to reduce salinity at Jersey Point) See Appendix 4B, *North Dleta Diversion Priority Sensitivity Analysis*, for the analysis of whether this type of operational flexibility would change the types of impacts disclosed in the main body of the EIR.
- There would likely be conditions where diversions through the proposed north Delta intakes are not maximized even when the bypass flow requirements would allow greater diversions. Examples could be when other operational criteria are controlling or when south-of-Delta storage is full.

During the late spring, summer, and fall, when the SWP are typically operating to meet State Water Board D-1641 salinity requirements in the Delta:

- Both the existing south Delta intakes and the proposed north Delta intakes would be operated together to meet the State Water Board D-1641 salinity requirements.
- Some level of combined SWP and CVP south Delta exports would be needed to manage salinity in the Old River and Middle River corridor. If the combined SWP and CVP south Delta exports are less than 3,000 cfs, SWP water would not be moved through the proposed north Delta iintakes.
- The south Delta exports and the north Delta diversions would be balanced and adjusted to meet the State Water Board D-1641 salinity requirements at the western Delta stations on the Sacramento and San Joaquin Rivers (e.g., increasing salinity at Jersey Point would cause a shift in diversions from south Delta to north Delta, whereas increasing salinity at Emmaton would cause a shift from north Delta to south Delta). This operation is expected to result in a more efficient system operation where less water would be required to meet the same water quality standards and result in additional water that could either remain in storage or be exported.
- Upstream SWP storage operations would continue to be managed to the existing and future regulatory and contractual obligations of the SWP in determining the amount of stored water available for exports. DWR would not increase storage withdrawal for exports even though the proposed Delta Conveyance Project may provide additional diversion capacity. The only exception would be to divert any stored water that was a result of a more efficient system operation because of the proposed Delta Conveyance Project. The upstream storage would be managed such that the benefit of the stored water is the same for all SWP contractors whether they choose to participate in the Delta Conveyance Project or not (Section 3.22).

3.16.4 Use of North Delta Intakes for Wheeling

Under State Water Board D-1641 (December 1999, revised March 2000), Reclamation and DWR are authorized to use and exchange existing south diversion capacity between the SWP and CVP to enhance the beneficial uses of both projects. The sharing of the SWP and CVP export facilities is referred to as Joint Point of Diversion (JPOD). In general, JPOD capabilities are used to accomplish the following four objectives.

- When wintertime excess pumping capacity is available during Delta excess conditions, and total SWP and CVP San Luis Reservoir storage is not projected to fill before the spring pulse flow period, the project with the deficit in San Luis Reservoir storage may elect to use JPOD capabilities.
- When summertime pumping capacity is available at the Banks Pumping Plant and CVP reservoir conditions can support additional releases, the CVP may elect to use JPOD capabilities to enhance annual CVP releases for south-of-Delta water supplies.
- When summertime pumping capacity is available at the Banks or Jones Pumping Plants to facilitate water transfers, the JPOD may be used to further facilitate the water transfer.
- During certain coordinated SWP and CVP operation scenarios for fish entrainment management, the JPOD may be used to shift SWP and CVP exports to the facility with the least fish entrainment impact and minimize exports at the facility with the most fish entrainment impact.

The term *wheeling* means the transmission of water owned by one entity through the facilities owned by another entity, in this case CVP water wheeled through the SWP north Delta intakes. Wheeling through JPOD Stage 1 and Stage 2[6] would not be allowed through the proposed north Delta intakes as part of the proposed project. In general, if conveyance capacity is available, wheeling[7] for CVP may be allowed subject to appropriate environmental review, permitting, and compensation.

Water transfers are voluntary actions proposed by willing buyers and sellers. DWR is one of several public agencies involved in approval and management of proposed water transfers that use SWP facilities. Because DWR's jurisdiction is limited to water transfers involving the Delta export facilities of the SWP, it has limited involvement in the statewide water transfer market.

Although the Delta Conveyance Project is not proposed specifically to accommodate water transfers, new Delta conveyance facilities could provide the ability for water transfers to occur through the facility by providing increased capacity. Related, DWR and other public agencies must allow bona fide transferors use of up to 70% of the unused capacity of a public conveyance facility in exchange for fair compensation.[8] The project can potentially (1) add additional export capacity if current facilities are limited and/or (2) provide additional efficiency in moving water transfers across the Delta by potentially lowering the required carriage water to export the transfer supplies. Because of this potential, and the likely demand to use the project's conveyance capacity for future water transfers, this section and Appendix 3H, *Non-Project Water Transfer Analysis for Delta Conveyance*, analyze post-processed CalSim 3 results to identify available export capacity for water transfers with current facilities and increased available export capacity with the project if existing facilities are limited. In addition, these post-processed CalSim 3 results are compared with other transfer

[6] The State Water Resources Control Board (State Water Board) Water Right Decision 1641 (D-1641) establishes three stages under which Joint Points of Diversion (JPOD) can be used by either DWR or the Reclamation for diversions of Delta water supplies at the SWP Banks Pumping Plant and CVP Tracy Pumping Plant (now called Jones Pumping Plant), respectively. Stage 1 allows JPOD use for selected purposes including the recovery of export reductions taken to benefit fish. Stage 2 allows JPOD use for any authorized purpose up to the current regulatory capacity of these facilities. Stage 3 allows JPOD use up to the physical capacity of these facilities authorized under their water right permits.

[7] The provisions of California Water Code Section 1810 outline the conditions under which wheeling can occur.

[8] Water Code Section 1810 *et seq*.

information such as (1) regulatory limitations, (2) supply limitations, and (3) historical water transfers. Of note, the proposed project does not include water transfers.

The analysis presented in Appendix 3H concluded that there is more than sufficient available export capacity for water transfers in all water year types with the current facilities. Maximum historical water transfers in each water year type were less than the permitted annual volumes. In below normal years, when there is greater demand for water transfers, historical data shows there was still sufficient available export capacity even after water transfers were exported. The analysis in Appendix 3H also describes conveyance of transfers with the new Delta Conveyance Project facilities. The use of the project facilities for water transfers, and a potential change in carriage water volumes, would result in minimal effects on Delta water quality relative to current operations. Carriage water as part of the water transfer is required to maintain water quality conditions in the Delta, as measured by salinity; thus, Delta water quality would be the same as without the water transfer. Therefore, the project is unlikely to increase the amount of water transfers or substantially change Delta water quality because the current capacity is not fully utilized.

3.16.5 Intake Maintenance Activities

Maintenance activities at the intakes would be conducted at varying frequencies. Daily maintenance activities would include inspections, security checks, and operations oversight. Less frequent maintenance activities include operability testing, cleaning, sediment removal, dewatering, and repaving.

The cylindrical tee fish screens and panels would be regularly inspected and maintained by manual cleaning to remove algae and other biofouling not cleaned by the automatic cleaning system. The screens would be raised out of the water and power washed with a high-pressure power washer approximately every 6 months. Sediment jetting the apron area below the screens at the base of the screen structure in the water to help keep sediment from accumulating would occur hourly or daily, depending on needs. A diver would inspect the screens and panels while in place and operating once or twice per year, often in conjunction with manual screen cleaning activities.

The debris fender at the upstream end of the log boom and the log boom would require maintenance to prevent corrosion and related deterioration. Debris would be removed manually from the top deck of the structure, by workers on boats, or by divers.

Sedimentation basins would be dredged once per year using a portable floating hydraulic suction dredge. Dredging would occur during summer months (assumed to be May through September) to maximize natural drying in the sediment drying lagoons. The dredge would discharge a sediment slurry into the sediment drying lagoons. The drying lagoons would include an outlet structure with an adjustable weir to decant water off the top of the sediment slurry and underdrains to transport water from beneath the dredged sediment. Decant and underdrain water would be pumped back into the sedimentation basin. It is expected that it would take about 2 days to fill each sediment drying lagoon, and 6 to 8 days to fill all four lagoons. The sediment is anticipated to be large silt and sand particles with minimal organic material. Once dry, the sediment would be trucked off-site for disposal at a permitted disposal site or for beneficial uses. The fill and drain/dry sequence would take about 7 to 9 days, which would approximately match the dredged material filling rate so continuous, or nearly continuous, operation would be possible.

Minor vegetation management would be conducted at least monthly along the side slopes of the basins to keep them free of unwanted growth. Minor debris collection would be conducted continually.

Since the basin embankments would be the jurisdictional flood control levee, the levee side slopes and outside of the toe area would be inspected and maintained in full conformance with the CVFPB and USACE requirements. These requirements would include routine inspection and repair of all bulges, leaks, erosion, or other damage as soon as possible after detection.

3.16.6 Pump Maintenance Activities

Maintenance diversions may be necessary throughout the year to perform routine maintenance and testing of the main water supply pumps at the South Delta Pumping Plant or at the Bethany Reservoir Pumping Plant (Alternative 5 only) on approximately a monthly basis. The maintenance flow diversion rate is assumed to be one-half of a pump's rated capacity for one day per month per unit (up to a maximum of 480 cfs, depending on the alternative, conditions, and need). At all times, diversions will not reduce bypass flow below 5,000 cfs. Maintenance diversions would also be subject to meeting the approach and sweeping velocity criteria as defined in Section 3.16.1.1, *Approach and Sweeping Velocity Requirements*. Maintenance diversions will likely occur only when the north Delta intakes have not been operated for extended periods of time.

3.16.7 Delta Conveyance Project Preliminary Proposed Operations Criteria

A detailed table describing the proposed operational criteria[9] is provided in Table 3-14, and additional detail for the proposed north Delta intakes is provided in Table 3-15. Figure 3-37 provides a visual depiction of maximum allowable diversions in winter/spring and expected diversions in summer/fall. Figure 3-38 provides a depiction of the north Delta diversion operations concepts to minimize potential effects to aquatic species.

[9] In addition to the operational criteria developed for the north Delta intakes, routine maintenance and testing of the main water supply pumps is described in Section 3.16.6, *Pump Maintenance Activities*.

Table 3-14. Delta Conveyance Project Preliminary Proposed Operations Criteria

Parameter	Delta Conveyance Project Criteria
New Criteria	
North Delta diversion operations	• Bypass Flow [a] Criteria (specifies bypass flow required to remain downstream of the north Delta intakes): ○ October through November: Minimum flow of 7,000 cfs required in river after diverting at the north Delta intakes. ○ December through June: Once the pulse protection (see below) ends, north Delta diversions will not exceed Level 1 pumping unless specific criteria have been met to increase to Level 2 or Level 3. If those criteria are met, operations can proceed as defined in Table 3-15. Allowable diversion will be the greater of the following options: low-level pumping or the diversion allowed by the bypass flow rules in Table 3-15. ○ July through September: Minimum flow of 5,000 cfs required in river after diverting at the north Delta intakes. • Pulse Protection Criteria (October through June): ○ Low-level pumping is allowed when river conditions are adequate during the pulse protection period. ▪ Definition: Low-level pumping of up to 6% of total Sacramento River flow at Freeport such that diversions will not reduce bypass flow below 5,000 cfs. No more than a total of 900 cfs can be diverted by all the intakes combined. Low-level pumping can occur in October–November during a pulse protection event and in December–June as defined in Table 3-15. In addition, north Delta diversion levels at all the intakes will be subject to a maximum approach velocity of 0.2 feet per second and a minimum sweeping velocity of 0.4 feet per second at the proposed fish screens. Velocity compliance would be informed by real-time hydrological data measured at the intake locations. ○ Pulse triggering, duration, and conclusion is determined based on the criteria defined in Table 3-15. ○ If the initial pulse begins before December 1, the bypass flow criteria for the month (October and November) when the pulse occurred would take effect, following a pulse protection period. On December 1, the Level 1 rules defined in Table 3-15 apply unless a second pulse occurs. • Real-Time Operations: The proposed operations criteria and tidal restoration mitigation are intended to minimize and fully mitigate the potential impacts of the NDD operations. The real time decision-making specific to the NDD operations would be mainly associated with reviewing real-time abiotic and fish monitoring data and ensuring proposed weekly, daily and sub-daily operations are consistent with the permitted criteria and within the effects analyzed in the permits. See Section 3.17, *Real-Time Operational Decision-Making Process,* for additional details. • Adaptive Management: The Operations Adaptive Management and Monitoring Plan (OAMMP)will be used to evaluate and consider changes in operational criteria based on information gained before and after the new facilities become operational. This program will be used to consider and address scientific uncertainty regarding the Delta ecosystem and to inform project operations. See Section 3.18, *Adaptive Management and Monitoring* for more details.

Parameter	Delta Conveyance Project Criteria
Key Existing Delta Criteria	
South Delta operations	• Same as D-1641, 2019 BiOps and 2020 SWP ITP requirements including adult, larval, and juvenile longfin smelt protections • Adult, larval, and juvenile delta smelt protections (e.g., First Flush and Turbidity Bridge) • Winter-run/Spring-run/Steelhead Protection (discrete daily thresholds, onset of OMR, early and mid-season daily thresholds, single-year loss thresholds) • OMR Flex (storm flex) • Beginning and end of OMR protections
Head of Old River Barrier operations	Same as 2019 BiOps and 2020 SWP ITP requirements; temporary barrier is not installed.
Delta Cross Channel Gates	State Water Board D-1641 with additional days closed from October 1 to January 31 based on 2019 NMFS BiOp (closed based on fish migration from October 1 to December 14 unless adverse water quality conditions).
Spring Outflow[10]	Same as 2020 SWP ITP requirements
Additional 100 TAF of Delta Outflow	Same as 2020 SWP ITP requirements
Summer and fall habitat actions	Same as 2019 BiOp and 2020 SWP ITP requirements
Delta outflow	Delta outflow requirements established under D-1641 will be followed to the extent not superseded by criteria listed above requiring additional outflow.
Rio Vista minimum flow standard[b]	September through December: flows per D-1641
Export to inflow ratio	Operational criteria are the same as defined under D-1641; north Delta intakes proposed to be included in the export term for the E:I ratio calculation, such that combined export rate is defined as the Clifton Court Forebay inflow rate (minus actual Byron-Bethany Irrigation District diversions from Clifton Court Forebay), north Delta diversion rate, and the export rate of the Tracy pumping plant (now called Jones Pumping Plant).

BiOp = Biological Opinion; cfs = cubic feet per second; E:I = export/inflow; ITP = Incidental Take Permit; OAMMP = Operations Adaptive Management and Monitoring Plan; OMR = Old and Middle River; NDD = north Delta diversion; State Water Board = State Water Resources Control Board; TAF = thousand acre-feet.

[a] Sacramento River flow upstream of the intakes to be measured flow at Freeport. Bypass flow is the 3-day tidally averaged Sacramento River flow computed as flow measured at Freeport minus the diversion rate. Sub-daily north Delta intakes' diversion operations will maintain fish screen approach and sweeping velocity criteria.

[b] Rio Vista minimum monthly average flow in cfs (7-day average flow not less than 1,000 below monthly minimum), consistent with the State Water Board D-1641.

[10] Spring outflow requirement is an existing regulatory requirement for the SWP. In complying with this existing requirement, total SWP exports including the north Delta diversions and the existing south Delta exports will be curtailed as needed.

Table 3-15. Proposed North Delta Diversion Bypass Flow and Pulse Protection Requirements

North Delta Diversion Bypass Flow and Pulse Protection Requirements This table further details a few of the criteria for the north Delta diversion operations included in Table 3-14.
Pulse Protection Low-level pumping (see Table 3-14) will be allowed when river conditions are adequate during the pulse protection period. Initiation of the pulse protection is defined by the following criteria: (1) Sacramento River daily average flow at Wilkins Slough increase by more than 45% within a 5-day period and (2) flow on the 5th day greater than 12,000 cfs. The pulse protection continues until either (1) Sacramento River flow at Wilkins Slough returns to pre-pulse flow level (flow on first day of 5-day increase), or (2) Sacramento River flow at Wilkins Slough decreases for 5 consecutive days, or (3) Sacramento River flow at Wilkins Slough is greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A). If the initial pulse period begins before Dec 1, then any second pulse that may occur during December through June will receive the same protection, i.e., low-level pumping as described in Table 3-14, resulting in up to two pulses which would receive this protection per water year.
Bypass Flow Criteria After initial pulse(s), allowable diversion will be subject to Level 1 bypass flow criteria (Sub-Table A) until 15 total days of bypass flows above 20,000 cfs occur. Then allowable diversion will be subject to the Level 2 bypass flow criteria until 30 total days of bypass flows above 20,000 cfs occur. Then allowable diversion will be subject to the Level 3 bypass flow criteria.

cfs = cubic feet per second.

Sub-Table A. North Delta Diversion Bypass Flow Criteria [a]

Level 1 Bypass Flow Criteria			Level 2 Bypass Flow Criteria			Level 3 Bypass Flow Criteria		
If Sacramento River flow is over...	But not over...	The bypass is...	If Sacramento River flow is over...	But not over...	The bypass is...	If Sacramento River flow is over...	But not over...	The bypass is...
December through April (Allowable diversion will be greater of the low-level pumping or the diversion allowed by the following bypass flow rules)								
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after low-level pumping	5,000 cfs	9,000 cfs	Flows remaining after low-level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs

Sub-Table A. North Delta Diversion Bypass Flow Criteria [a]								
Level 1 Bypass Flow Criteria			Level 2 Bypass Flow Criteria			Level 3 Bypass Flow Criteria		
If Sacramento River flow is over...	But not over...	The bypass is...	If Sacramento River flow is over...	But not over...	The bypass is...	If Sacramento River flow is over...	But not over...	The bypass is...
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May (Allowable diversion will be the greater of the low-level pumping or the diversion allowed by the following bypass flow rules)								
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after low-level pumping	5,000 cfs	9,000 cfs	Flows remaining after low-level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs
June (Allowable diversion will be the greater of the low-level pumping or the diversion allowed by the following bypass flow rules)								
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs

Sub-Table A. North Delta Diversion Bypass Flow Criteria [a]

Level 1 Bypass Flow Criteria			Level 2 Bypass Flow Criteria			Level 3 Bypass Flow Criteria		
If Sacramento River flow is over...	But not over...	The bypass is...	If Sacramento River flow is over...	But not over...	The bypass is...	If Sacramento River flow is over...	But not over...	The bypass is...
5,000 cfs	15,000 cfs	Flows remaining after low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after low-level pumping	5,000 cfs	9,000 cfs	Flows remaining after low-level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs

Bypass flow criteria for July through November		
If Sacramento River flow is over...	But not over...	The bypass is...
July through September		
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	No limit	A minimum of 5,000 cfs
October and November		
0 cfs	7,000 cfs	100% of the amount over 0 cfs
7,000 cfs	No limit	A minimum of 7,000 cfs

cfs = cubic feet per second.

[a] Level 1, Level 2 and Level 3 Bypass Flow Criteria do not apply July through November. Minimum Bypass Flow Criteria are applicable July through November as described in the table.

A text description of this figure is provided in Chapter 39, *Text Descriptions of Figures*

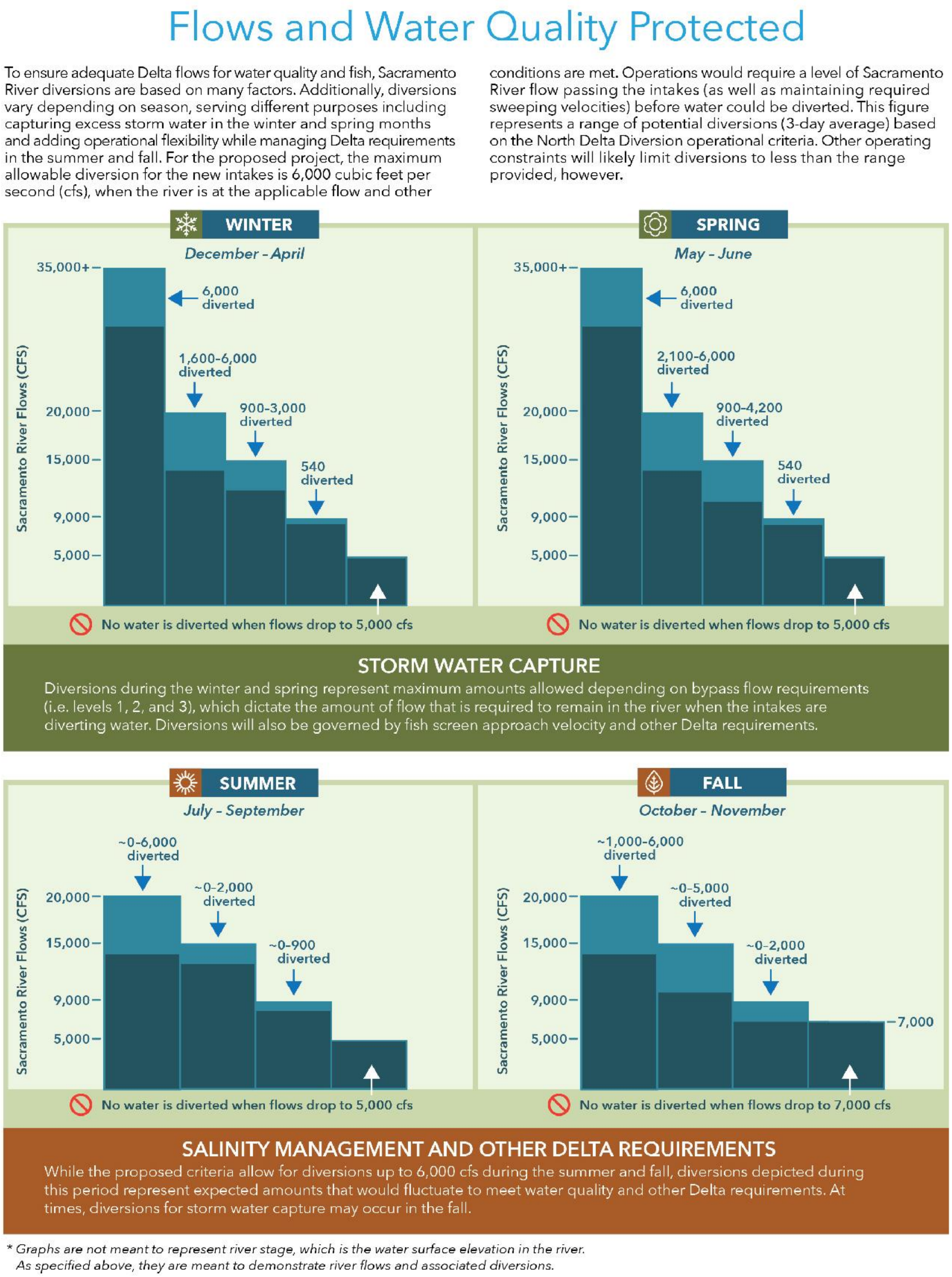


Figure 3-37. Seasonal Diversions

A text description of this figure is provided in Chapter 39, *Text Descriptions of Figures*

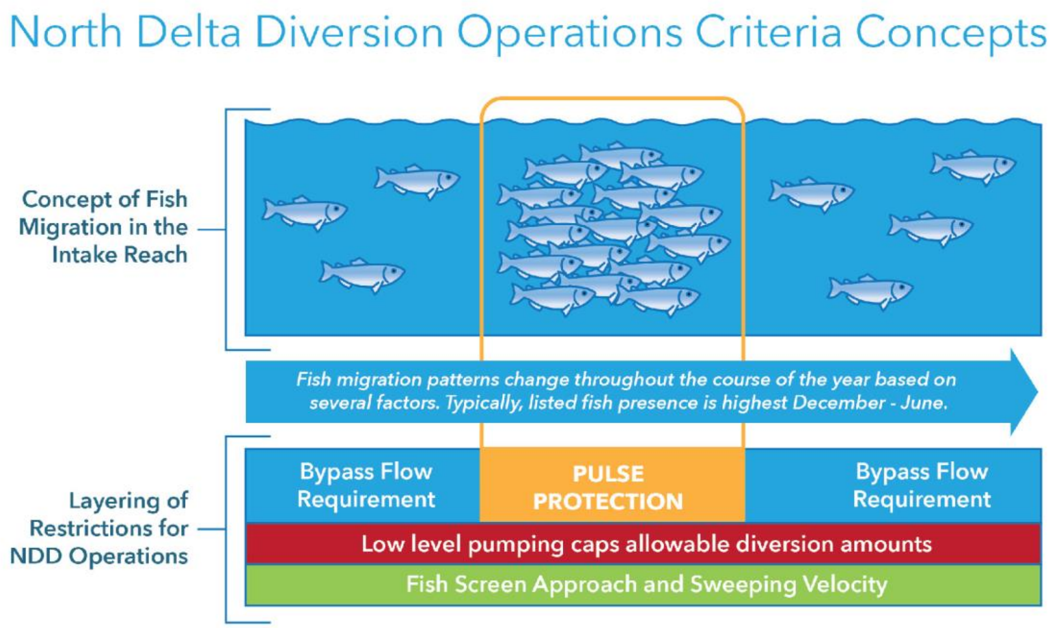


Figure 3-38. North Delta Diversion Operations Concepts

3.17 Real-Time Operational Decision-Making Process

The proposed operations criteria and the mitigation is intended to minimize and mitigate the potential impacts of operating the north Delta intakes. The real-time decision-making specific to the north Delta intake operations would be mainly associated with reviewing real-time abiotic and fish monitoring data and ensuring proposed weekly, daily, and sub-daily operations are consistent with the permitted criteria and within the effects analyzed in the permits.

3.17.1 Ongoing Processes to Support Real-Time Decision Making

The 2019 BiOps and 2020 SWP ITP define the real-time operations decision-making process under the current operations. In general, SWP and CVP operators provide a weekly outlook on forecasted hydrologic conditions, projected operations based on those conditions, and an assessment of potential changes in flow and water quality based on those projected operations to the Salmon Monitoring Team (SaMT) and Smelt Monitoring Team (SMT). SaMT and SMT consider this information along with the fish monitoring data to determine the risk to the listed fish species. For example, SaMT and SMT make recommendations when specific triggers specified in the 2019 BiOps or Conditions of Approval in the 2020 SWP ITP are active, typically from October through June. The two monitoring teams, including participants from CDFW, perform the ITP risk assessments. Based on these analyses, monitoring teams may recommend specific actions to the Water Operation Management Team (WOMT) that may change projected operations. The WOMT decides the final action. In addition, the WOMT may elevate the decision to the directors of DWR, Reclamation, and the permitting agencies if they are unable to agree on the action, consistent with the decision-making process identified in the 2019 BiOps and the 2020 SWP ITP.

DWR would work with the fishery agencies to integrate the Delta Conveyance Project into these existing real-time processes to facilitate additional real-time south Delta fish protections, depending on the conditions. The existing and/or future real-time decision processes would evaluate monitoring data and determine whether use of the new north Delta intakes could improve aquatic conditions in the south Delta, while maintaining species protections in the north Delta. Under these circumstances, the final decision would be at the discretion of DWR. In addition, the real-time decision-making framework would provide a process to consider operational decisions and ensure there are opportunities to respond to unique circumstances (e.g., where risks to species may be higher or lower than expected), although this is anticipated to be infrequent.

3.17.2 North Delta Diversions

During the time from permit issuance through initial north Delta diversion operations, DWR would conduct studies such as evaluating the relationship between the hydrologic conditions and the behavior of migrating juvenile salmonids in the Sacramento River reach between Wilkins Slough/Knights Landing and the north Delta intakes as part of the Operations Adaptive Management and Monitoring Plan (OAMMP). The studies would be focused on gathering additional real-time fish monitoring data to inform potential triggers for real-time operational responses of the north Delta intakes as a mechanism to further minimize exposure effects to the listed species. The real-time operation and the proposed criteria would be refined if needed through the adaptive management plan process. The operational criteria elements that would be studied further based on real-time fish monitoring include hydrologic/behavioral cues upstream of and in the Delta for triggering, duration, and conclusion of pulse protection, Level 1, Level 2, and/or Level 3 bypass flow criteria and transitions, as well as diel (night/day) behavior in the intake reaches. The decision-making framework and potential real-time operational responses and considerations are discussed below.

3.17.2.1 Real-Time Decision-Making Framework

Under existing operations, during periods of fishery concern for Delta water project operations (October to June) operators and fishery biologists meet frequently (typically weekly). Forecasted conditions and projected operations for the week ahead are presented to the SaMT and SMT technical teams and are considered in real time while taking into account fish monitoring data and other relevant information. With this weekly outlook, a risk-assessment is developed, and any potential concerns or real-time operational considerations are developed and presented to WOMT. This general process would continue and operations of the north Delta intakes would be integrated, as follows:

- **Weekly** – Continue the ongoing weekly outlook planning process.
- **Daily** – Operators (schedulers) will assess the hydrologic and Delta conditions and schedule a daily volume from the north Delta diversion within the regulatory requirements. These requirements would include north Delta diversion bypass requirements, Delta requirements,

and any other required limitations such as presence of excess conditions. This scheduled volume would be coordinated with other SWP and CVP operations.

- **Sub-Daily** – Operators would operate the facility within the constraints at each intake, including minimum sweeping requirements and allowable approach velocities. To the extent possible, the SWP would prioritize north Delta diversion sub-daily diversions during daylight hours. As noted above, the diel behavior in the intake reaches would be studied further.

Proposed Real-Time Actions

- **Near Field:** Fish screen performance criteria, including facility performance in meeting approach velocity compliance and sweeping velocity performance necessary to minimize entrainment and impingement impacts.
    - Provide and monitor real-time flows through each of the intake's screen units to demonstrate approach velocity compliance. During design of the intakes, computational modeling would be undertaken, and field measurements/baffle adjustments would be made during commissioning/operations, both to demonstrate compliance with velocity criteria. Individual intake screen unit flows can also be gathered and summed up to determine the intake's full diversion flow.
    - Provide and monitor velocity/flow gage downstream of each intake facility, along with the intake flows, to demonstrate sweeping velocity performance.
        - Velocity/flow gages (i.e., Acoustic Doppler Current Profilers) downstream of each facility, along with an additional acoustic fish monitoring station (similar to side-scan sonar technology as described below in Far Field), to investigate fish distribution within the river's flow/velocity field. In conjunction with the intake facility flow measurements, these velocity/flow gages can be used during facility operations to demonstrate screen sweeping-velocity performance. For example, following planned full-facility velocity performance evaluations, the average downstream river velocity would be correlated to each intake facility's sweeping-velocity performance and adjusted as appropriate.
    - Entrainment monitoring as necessary. As part of compliance monitoring, sub-sampling at each intake would be conducted to assess level of protection consistent with project design/assumptions.
    - Approach/sweeping criteria relaxation would be considered (with approval from regulatory agencies) when risk to covered species is low/absent (e.g., 0.3 feet per second approach velocity based on temperature/calendar off-ramps when smelt are unlikely to be in the intake reach). This would allow, among other opportunities, for periodic maintenance operational flexibility, such as during sedimentation basin dredging or individual screen unit outages, that may require a portion of the screen facility to be down. In no case would total designed diversion capacity be exceeded (e.g., 3,000 cfs as designed at intake facility).
    - Use of side-scan sonar technology (e.g., biosonic) to estimate presence and movement of large numbers of migrating juvenile chinook salmon-sized fish.

- **Far Field:** Bypass flow criteria and tidal restoration (i.e., sufficient acreage to minimize diversion-related increases in flow reversals at the Sacramento–Georgiana Slough junction)[11] proposed to minimize flow-survival effects of north Delta diversion operations are as follows.
  - For the previous week:
    - Provide daily and 3-day average Wilkins Slough, Freeport, and bypass flows including the daily north Delta diversion rates. Identify the north Delta diversion criteria in effect (pulse protection or level of the bypass flows). Provide cumulative count of days at the current bypass flow level or pulse protection.
    - Modeled Through-Delta Survival values.
    - Fish monitoring data (e.g., KLRST catch index) in addition to winter-run Chinook salmon and spring-run Chinook salmon juvenile production estimate and migration status (e.g., estimated fraction of population upstream, in Delta, past Chipps).
  - For the upcoming week:
    - Provide forecasted range of daily average Wilkins Slough and Freeport flows. Provide range of bypass flows and the estimated range of north Delta diversion rates. Identify the north Delta diversion criteria that will likely be in effect (pulse protection or level of the bypass flows).
    - Modeled Through-Delta Survival estimates for the likely bypass flows.
  - Data from the side-scan sonar technology (e.g., biosonic) to estimate presence and movement of large numbers of migrating juvenile Chinook salmon-sized fish.
- **Fish Considerations included in the OAMMP:** Depending on the real-time assessment of presence and exposure/vulnerability of migrating listed fish, identify potential operational adjustments (if necessary, as determined through the adaptive management plan process) to minimize estimated impacts determined to be of significant concern (e.g., moderate to large decrease in estimated survival based on flow-survival relationship). Overall, studies included in the OAMMP will focus on: (1) providing a process to ensure effects are within the range analyzed in the project permits; (2) informing and identifying specific biological triggers; and (3) informing potential refinements of operational criteria. Below are examples of OAMMP outcomes and processes to collect data.
  - For example, collecting alternative/additional real-time fish data to inform north Delta diversion decision making, such as use of acoustically tagged juvenile Chinook salmon as cohort survival/migration surrogates through the intake reaches and through the Delta.
  - Potential north Delta diversion operational responses as determined through adaptive management plan include: transitioning between bypass criteria levels (e.g., Level 1 to Level 2 or pulse protection); or adjusting planned diversions to a level consistent with low concern based on flow-survival estimates and fish presence (i.e., more or less restrictive operations based on hydrological, biological, and diurnal conditions).

[11] Efficacy of tidal restoration to offset potential hydrodynamic changes due to operations of the north Delta intakes would be evaluated and considered during potential refinements to real-time operations and associated operational criteria, where applicable. Evaluation would occur and continue through project development and during the adaptive management plan, including during initial operations.

- Alternative mechanisms, such as operation of non-physical barrier technology at the Georgiana Slough junction with the Sacramento River, may also be considered in lieu of or in addition to north Delta diversion operational responses if deemed appropriate.

3.18 Adaptive Management and Monitoring Program

CEQA requires a lead or responsible agency to adopt a program of monitoring or reporting when making findings requiring mitigation or project revisions to mitigate or avoid a significant impact in conjunction with approving a project, to ensure that the mitigation or project revisions are implemented (CEQA Guidelines §15097). Although CEQA's requirement relates to monitoring the implementation of mitigation, adaptive management, as a part of the monitoring program, allows the best available science to be incorporated into management decisions and address uncertainties associated with those mitigation actions. Specifically, adaptive management provides a means to evaluate the effectiveness of management actions in achieving resource objectives, by comparing the outcomes to predicted responses and providing the scientific basis for continuing or modifying the action or implementing an alternative action. While CEQA does not mandate that the monitoring program incorporate adaptive management, the Delta Reform Act, through a project's consistency with the Delta Plan, requires the use of science-based, transparent, and formal adaptive management strategies for ongoing ecosystem restoration and water management decisions (23 Cal. Code Regs. §.5002(b)(4)). Adaptive management is typically also a component of mitigation as part of compliance with the federal and California Endangered Species Acts and Section 404 of the Clean Water Act.

Adaptive management for the Delta Conveyance Project, as described in Appendix 1B of the *Delta Plan*, would encompass three major phases: planning, implementation, and evaluation and response (Delta Stewardship Council 2015). The adaptive management plans and programs would document all activities associated with the planning phase of adaptive management and describe the process to be followed during the implementation and evaluation and response phases. Project objectives were taken into consideration in identifying where adaptive management would be most effective and applicable for the project. As appropriate, mitigation measures identified in this Final EIR, such as the habitat creation and restoration actions in the CMP, would integrate the concept of adaptive management in mitigation plan design, stand-alone site and/or resources-specific adaptive management plans would be adopted if the project is approved. In addition, an OAMMP would be used to monitor and consider the design and operation of the new north Delta intakes and determine if new scientific or technical information that becomes available in the future may warrant refinements in design, management, and/or operation. Potential changes in operations could consider modified operational criteria (e.g., changes to the proposed pulse-protection period length based on information gathered through the Delta Conveyance Project monitoring program) and additional operational criteria (e.g., layered onto those proposed in Section 3.16.1, *New Operational Criteria for the Proposed North Delta Intakes*).[12]

Adaptive management will focus on project effects where uncertainties regarding the nature of the effects generally require a characterization of baseline conditions that can be compared to with-

[12] If any changes to the criteria included in Section 3.16.1 are identified that would allow increased diversions from the north Delta facilities that could potentially result in greater environmental effects, those changes would require additional CEQA and ESA/CESA review.

project effects. Monitoring is fundamental to adaptive management as a source of data with which to test alternative management strategies and measure progress toward accomplishing management objectives.

As described in the CMP (Appendix 3F, Section 3F.6.4, *Adaptive Management*), an adaptive management and monitoring plan would be prepared for each mitigation site to help ensure habitat creation goals are met. The plans would outline key uncertainties for tidal wetlands, channel margin, riparian, and floodplain restoration projects intended to benefit listed terrestrial and fish species and offset potential effects of the project. Effectiveness monitoring and research studies would be necessary to examine the ecological function of planned restoration. These site-specific adaptive management plans for habitat creation and restoration would track progress toward management objectives, to improve understanding of restoration effectiveness, and to trigger remedial actions as needed to adjust management to achieve mitigation goals.

The OAMMP would integrate with, as appropriate, existing monitoring programs and SWP adaptive management efforts in the Delta to better understand uncertainties associated with north Delta diversion effects on listed fish species. Monitoring studies would be included in the OAMMP and are intended to address uncertainties about the potential effects of the project on aquatic resources and inform the project's operation and adaptive management decision making. The following is a list of monitoring elements that are expected to be included in the OAMMP; however, final details of the OAMMP would be subject to fish and wildlife agency approval as part of compliance with the ESA/CESA process.

- Migration and survival studies through the intake reach and Delta
    - Including near-field assessment of intake exposure and far-field routing and survival.
    - Potential methods include acoustic telemetry studies of routing and survival in the Delta, including supplementation of existing acoustic arrays. The selection of acoustic telemetry technology (e.g., VEMCO, Juvenile Salmon Acoustic Telemetry System [JSATS]) for tags (transmitters), hydrophones, and receivers would likely be consistent with other concurrent studies and the regional acoustic telemetry array unless one technology is more optimal for a given experimental design.
- Predation studies
    - Including assessment of predator distribution and predation rates to evaluate predation risk.
    - Potential methods include using floating predation event recorders and tethering study designs, as well as acoustic tag data to capture potential predation events. In addition to studies to evaluate increased predation rates, Dual-Frequency Identification Sonar (DIDSON) or similar (e.g., Adaptive Resolution Imaging Sonar [ARIS]) camera surveys could be used to assess predator management strategies at in-water structures and habitat features of interest.
- Monitoring of abundance and distribution of listed species in the intake reach
    - Including assessment of baseline densities and seasonal and geographic distribution of all life stages of target aquatic species inhabiting the reaches of the lower Sacramento River and Delta.

- Potential methods and approach include leveraging existing monitoring programs (e.g., Enhanced Delta Smelt Monitoring Program and USFWS Delta Juvenile Fish Monitoring Program) in the Delta, as well as supplemental sampling performed with specific gear types and technologies (e.g., eDNA transects and/or echo sounder transects to verify and calibrate catch detection data for newer, less-invasive sampling techniques).

3.19 Community Benefits Program

DWR is developing a Community Benefits Program for the proposed Delta Conveyance Project which, if the project is approved, will ultimately identify and implement commitments to help protect and enhance the cultural, recreational, natural resource, and agricultural values of the Delta. This program will at least in part address local Delta community effects that are beyond CEQA's analysis of potential significant impacts on the physical environment. As an initial step in development of the program, DWR prepared the Community Benefits Program Framework (Appendix 3G). This Framework identifies the goals, objectives, and potential components of the Delta Conveyance Project Community Benefits Program. Its purpose is to provide a roadmap for the next steps in developing the Community Benefits Program, including ensuring meaningful community participation. The Framework was informed by public input provided through interviews, workshops, and public comments, as described in Section 3.2 and Chapter 35, *Public Involvement*.

As described in more detail in Appendix 3G, the Community Benefits Program Framework consists of a Delta Community Fund and an Economic Development and Integrated Benefits component. It is designed to meet the following objectives: (1) Provide a mechanism for Delta community members and others to identify opportunities for local benefits; (2) Provide a mechanism for the project proponents to demonstrate good faith, transparency, and accountability to the community through formal commitments developed with input from community members and others; and (3) Be implemented in a manner that contributes to the protection and enhancement of the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

The Community Benefits Program is considered a component of the project. Chapter 34, *Community Benefits Program Framework Analysis,* provides information on potential impacts from Community Benefits Program actions. While CEQA requires analyzing reasonably foreseeable future components of a project, it only requires analyzing them at a level of detail that is commensurate with the detail available for the project. Because the actions that could be funded as part of the Community Benefits Program have not yet been specifically identified, the analysis of the potential environmental impacts of those actions is at a high level. Because significance determinations would be speculative, none are provided. As projects are funded, they would undergo project-level CEQA review as appropriate, and any other required regulatory processes before they would be implemented. Approval of the Community Benefits Program would be contingent on the approval of the project.

3.20 Ombudsman

To increase effective communication and reduce the multiple points of contact for project questions during the construction of the proposed project, DWR will create a Delta Conveyance Project community support position, referred to as a project ombudsman. This ombudsman would be available as a primary point of contact for members of the public during project construction. The project ombudsman would answer questions, refer interested parties to appropriate DWR or Delta Conveyance Design and Construction Authority (DCA) team members for more information, and aid with claims submittals. Once construction is complete, project facilities would be operated and maintained as part of the SWP and public outreach would follow standard DWR practices, which may not involve an ombudsman.

3.20.1 Point of Contact

If after CEQA compliance, DWR decides to approve the project, the ombudsman would supplement the public outreach efforts of DWR, DCA, and other PWAs by acting as a point of contact for property owners or occupants, interested members of the public, or local agencies and community groups. Prior to construction, the ombudsman would be hired and ombudsman contact information distributed throughout the Delta community, including posting on primary construction site locations. Contact information would also be published on the project website and on all project materials. Once construction has started, the ombudsman would be the initial point of contact for all project-related inquiries or questions. The ombudsman would provide an answer or refer the inquiry to the appropriate DWR or DCA representative to provide additional information for all project questions, including those related to construction schedule and location, safety information during construction, and project mitigation. The ombudsman would also assist with any type of formal process that may be established to address project issues (e.g., claims).[13] This position would provide a supplemental resource to the public to ensure effective, efficient, and accurate responses to questions and requests for information.

3.21 Potential Davis-Dolwig Act Actions

The Davis-Dolwig Act was passed into law in 1961 (Assembly Bill 261, Davis) and codified in Water Code Sections 11900-11925. The Act stated that “preservation of fish and wildlife be provided for in connection with the construction of state water projects.” The Davis-Dolwig Act directed that, because these activities benefit all of the people of California, these particular “project construction costs attributable to such enhancement of fish and wildlife and recreation features should be borne by them.”[14]

Under the Davis-Dolwig Act, DWR is to give “full consideration to any recommendations which may be made by the Department of Fish and Game [CDFW], the Department of Parks and Recreation

[13] The ombudsman duties would include providing support to claimants who feel they have been uniquely damaged by the project’s construction. Rather than require logging a formal claim request with the State through the traditional State of California claims procedures, claims for Delta Conveyance Project construction-related damages can be submitted through the ombudsman to the Delta Conveyance Design and Construction Authority for expedient consideration and resolution. While the Delta Conveyance Design and Construction Authority is subject to the Government Claims Act and would process claims under the required statutory procedures, the act provides local public agencies with latitude in structuring claims procedures. This can include delegating settlement and resolution authority to staff or internal administrative bodies. These efforts are intended to decrease the administrative time for consideration of claims.

[14] Wat. Code § 11900.

[DPR], any federal agency, and any local governmental agency with jurisdiction over the area involved, determines necessary or desirable for the preservation of fish and wildlife, and necessary or desirable to permit, on a year-round basis, full utilization of the project for the enhancement of fish and wildlife and for recreational purposes to the extent that those features are consistent with other uses of the project."[15] Consistent with the Davis-Dolwig Act, DWR has coordinated with DPR and CDFW, and will continue to work with DPR and CDFW throughout the development of the Delta Conveyance Project and, if approved, future detailed design.

DPR convened a recreation workgroup and subsequently recommended that DWR consider recreational improvements in areas at the proposed Delta Conveyance Project facilities and within the project alignments. The recreational improvements included expanding non-motorized recreational opportunities and programs along river corridors; construction of additional greenways and trails through the Delta; developing wildlife viewing opportunities, like boardwalks, benches, and walkways near or in existing wildlife refuges; expanding transportation and access to recreational areas for underserved communities within the Delta; expanding overnight camping areas; and installation of interpretative and wayfaring signage for the Delta.

Similar to DPR's proposed recreational improvements, DWR identified and analyzed recreation enhancement proposals suggested through the outreach process for the Community Benefits Program. Chapter 34 provides a summary and analysis of the potential effects of the recreation enhancement and habitat conservation proposals. The proposals include possible actions to expand public access to fishing, birding, walking, bicycling, water sports, and other activities in addition to habitat conservation projects to improve or increase habitat for natural communities. Although not proposed to meet Davis-Dolwig Act requirements, the Community Benefits Program (Appendix 3G) considers and analyzes similar and possibly overlapping recreational enhancements and fish and wildlife improvements that have been proposed under the Davis-Dolwig Act. Because potential actions that may be implemented as part of the Community Benefits Program would be directly related to and funded by the Delta Conveyance Project, if approved, its actions are outside the scope of compliance with the Davis-Dolwig Act. If DWR, as directed by the Davis-Dolwig Act, determines to include recreational enhancements and fish and wildlife improvements analyzed in the Community Benefits Program, it would be outside the both the Community Benefits Program and the Delta Conveyance Project and would be funded separately.

3.22 Contract Amendments

The Legislature designed the water supply function of the State Water Resources Development System, commonly referred to as the SWP, to be a self-funded system. Unlike highways, levees, and other familiar types of publicly owned infrastructure that receive significant funding from the State general fund, the costs of constructing, operating, and maintaining the SWP water supply function, including the proposed Delta Conveyance Project if approved, are paid entirely by the local public agencies that contract with DWR for a supply of water from the SWP.

The timing and amount of SWP charges is described in the SWP Long-Term Water Supply Contracts. DWR has 29 such contracts with a variety of local agencies sometimes referred to as public water agencies (PWAs) or SWP contractors. DWR bills the PWAs for these costs annually.

[15] Wat. Code § 11910.

From time to time, DWR and the PWAs have found it desirable to amend the terms of the SWP water supply contracts to add terms and conditions that are applicable to a specific contractor or to a group of contractors, applicable to a particular project, or both.

DWR and many of the PWAs believe it is desirable to amend the SWP water supply contracts to add terms and conditions applicable to the construction, operation, and maintenance of a new Delta conveyance facility. Negotiations of project-wide contract amendments are conducted in public so that interested members of the public may hear and comment on the matters raised in the negotiations as outlined in California Department of Water Resources Guidelines 03-09 and 03-10.

A series of public negotiations were held following publication of the NOP for the Draft EIR. These negotiations concluded in March 2021 and resulted in an Agreement in Principle (AIP) among DWR and many PWAs that describes a conceptual approach to cost allocation and the related financial and water management matters if a new Delta Conveyance facility is approved. Actual water supply contract amendment language would be developed consistent with the AIP but only approved if DWR approves the Delta Conveyance Project after completion of the CEQA process.

Development of the AIP is not the same as approval of a Delta conveyance-related water supply contract amendment or of a Delta conveyance facility itself. Once the language of the contract amendments is drafted, and only after CEQA review is completed, DWR and each PWA will consider whether to approve and subsequently execute the proposed Delta conveyance-related water supply contract amendments. No further public negotiations are anticipated at this time; however, it is possible that additional negotiation sessions may become necessary or desirable. For additional information about any upcoming public negotiations please see the DWR Contract Amendment for Delta Conveyance website (https://water.ca.gov/Programs/State-Water-Project/Management/Delta-Conveyance-Amendment).

The potential for the SWP contract amendments for the Delta Conveyance Project to cause a direct or indirect environmental impact are presented and analyzed in the EIR as part of the approvals associated with the Delta Conveyance Project. The contract amendments, as they would directly relate to contract terms and conditions applicable to cost allocation for the Delta Conveyance Project, do not have different impacts from those analyzed for the Delta Conveyance Project.

EXHIBIT B

Print Form

Notice of Determination

Appendix D

To:

[■] Office of Planning and Research

U.S. Mail: P.O. Box 3044, Sacramento, CA 95812-3044

Street Address: 1400 Tenth St., Rm 113, Sacramento, CA 95814

[ ] County Clerk
County of: ____
Address: ____

From:

Public Agency: Department of Water Resourc[+]
Address: 1516 9th St, Sacramento, CA 95814
Contact: Marcus Yee
Phone: 916-699-8405

Lead Agency (if different from above): ____
Address: ____
Contact: ____
Phone: ____

SUBJECT: Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

State Clearinghouse Number (if submitted to State Clearinghouse): 2020010227

Project Title: Delta Conveyance Project Final EIR

Project Applicant: California Department of Water Resouces

Project Location (include county): See Attachment 1 and Figure 1

Project Description:

See Attachment 2

This is to advise that the California Department of Water Resouces ([■] Lead Agency or [ ] Responsible Agency) has approved the above described project on 12/21/2023 (date) and has made the following determinations regarding the above described project.

1. The project [[■] will [ ] will not] have a significant effect on the environment.
2. [■] An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
   [ ] A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [[■] were [ ] were not] made a condition of the approval of the project.
4. A mitigation reporting or monitoring plan [[■] was [ ] was not] adopted for this project.
5. A statement of Overriding Considerations [[■] was [ ] was not] adopted for this project.
6. Findings [[■] were [ ] were not] made pursuant to the provisions of CEQA.

This is to certify that the final EIR with comments and responses and record of project approval, or the negative Declaration, is available to the General Public at:

1516 9th St, Sacramento, CA 95814 or https://www.deltaconveyanceproject.com

Signature (Public Agency): Karla Nemeth Title: Director

Date: 12/21/2023 Date Received for filing at OPR: 12/21/2023

Authority cited: Sections 21083, Public Resources Code.
Reference Section 21000-21174, Public Resources Code.

Revised 2011

Attachment 1
Project Location

The project area consists of the construction footprint of the project facilities. The physical footprint of the Project would lie primarily within the boundaries of the statutorily defined Delta. Additionally, certain facilities that would be constructed under the Project would be located southeast of the statutory Delta (see Figure 1, Project Location).

Figure 1. Project Location

Attachment 2
Project Description

The Project consists of the construction, operation, and maintenance of new State Water Project (SWP) water diversion and conveyance facilities in the Delta that would be operated in coordination with the existing SWP facilities.

The Project would include the following key components and actions.

- Two intake facilities along the Sacramento River in the north Delta near the community of Hood with on-bank intake structures that would include fish screens.
- A concrete-lined tunnel, and associated vertical tunnel shafts, to convey flow from the intakes about 45 miles to the south to the Bethany Reservoir Pumping Plant and Surge Basin at a location south of the existing SWP Clifton Court Forebay.
- A Bethany Reservoir Pumping Plant to lift the water from inside the tunnel below ground into the Bethany Reservoir Aqueduct for conveyance to the Bethany Reservoir Discharge Structure and into the existing Bethany Reservoir.
- Other ancillary facilities to support construction and operation of the conveyance facilities including, but not limited to, access roads, concrete batch plants, fuel stations, and power transmission and/or distribution lines.
- Efforts to identify geotechnical, hydrogeologic, agronomic, and other field conditions that will guide appropriate construction methods and monitoring programs for final engineering design and construction.

Volume 1, Chapter 3, *Description of the Proposed Project and Alternatives*, of the Final Environmental Impact Report (EIR) provides further information on the above components and actions and related activities required as part of the Project (e.g. park-and-ride lots).

The EIR evaluates Project operations based on the Project design and what was known and reasonably foreseeable when the EIR was prepared, but DWR acknowledges that: (1) operations will not occur for well over 15 to 20 years due, in part, to the time required to complete construction of the project, and (2) new information of substantial importance or substantial changes could occur with respect to Project design or the circumstances under which the Project is undertaken. Under these conditions, prior to the commencement of operations, DWR would evaluate whether subsequent CEQA review is required before undertaking any discretionary actions that may be required to change Project design or operational criteria such that they are sufficiently protective to environmental resources.